

The Effects of Changes in WIC Food Packages on Redemptions

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Abstract

Wisconsin participants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) showed a generally positive response to the revised WIC food package, this study found. The vast majority of WIC participants used some or all of their food instruments 18 months after the food package changes were implemented, and most participants purchased all of the prescribed foods. More than three-quarters of WIC participants used their cash value vouchers for fruits and vegetables (CVVs). However, the percentage of WIC participants making full purchases with their traditional food instruments decreased compared to baseline. While many of the measures demonstrate a high level of acceptance, there was an increase from baseline in the proportion of participants who did not use any food instruments (almost 5 percentage points). The decreases were disproportionate among some WIC subpopulations. This change was seen across participant categories and racial and ethnic groups, but appears to impact non-Hispanic Black and non-Hispanic American Indian/Alaska Native participants the most.

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Executive Summary

Each month, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides supplemental nutrition assistance, nutrition education, and referrals to health and social services for more than 9 million low-income and nutritionally at risk pregnant, breastfeeding, and postpartum women, as well as infants and young children up to age 5. Historically, WIC food packages have offered participants basic, nutrient-rich foods, such as eggs, milk, peanut butter, beans, and cereals. However, in 2005, the Institute of Medicine's (IOM) Committee to Review the WIC Food Package recommended changes to better align nutrient intake among WIC participants with the *Dietary Guidelines for Americans* for participants age 2 and older, the dietary recommendations for children under age 2, and the American Academy of Pediatrics' infant nutrition recommendations (IOM, 2005). These changes, which were the most dramatic since the inception of the program, reflect national nutritional recommendations for increased consumption of lower-fat and whole grain foods, as well as fruits and vegetables. The changes were also intended to increase the food choices available to WIC participants and to include options that might be more appealing to the culturally diverse WIC population. To this end, the U.S Department of Agriculture's (USDA) Food and Nutrition Service (FNS) incorporated most of the IOM committee's recommendations into its updated regulations, which all WIC agencies were required to implement by October 1, 2009.

Through a cooperative agreement with the Economic Research Service (ERS) of the USDA and in partnership with the Wisconsin WIC Program, Altarum Institute conducted a study examining the evolution of WIC participant redemption patterns from one month prior to implementation of these major food package changes through 18 months postimplementation. The study uses cross-sectional data that allow for examination of overall redemption patterns prior to implementation of the new WIC food packages and at 6, 12, and 18 months postimplementation.

Purpose

Whether participants will benefit from the changes in WIC foods depends largely on their acceptance of the new food packages and their willingness to purchase the new types or varieties of food available through their WIC food instruments. Results from the 1998 National Survey of WIC Participants found high participant satisfaction with the amount and type of foods offered through the former WIC food packages, and subsequently, a high rate of clients purchasing all their WIC foods (complete buys) among those who were satisfied (Cole, Hoaglin, & Kirlin, 2001). If participants are dissatisfied with the amount and types of foods offered under the revised package, they may not redeem their WIC food instruments or they may not purchase all of their prescribed foods.

Indeed, on the heels of the food package change, still little is known about WIC participants' redemption patterns and food choices and the factors that influence them. State and local WIC agencies would benefit from the timely dissemination of such information as it could inform decisions such as those related to revising allowable food lists, improving or increasing nutrition education, tailoring nutrition education messages to the most appropriate subpopulations, and improving vendor management and training. The two primary aims of the study are to:

- Examine the acceptance of the new WIC food package as measured by redemption rates and reported by WIC participants through focus group discussions, and
- Describe the food choices made by WIC participants in the pre- and postimplementation environments.

Methods

This study is exploratory in nature and uses a multi-method, cross-sectional design to explore WIC participant redemption patterns and food choices over time. Quantitative methods include linking WIC program issuance and redemption data with point-of-sale (POS) data. These results are further informed using qualitative information gathered through a series of focus groups conducted at multiple points in time.

At the core of this study are WIC food instruments (FI), the paper “checks” given to participants to pay for WIC foods at participating vendors. WIC participants generally receive approximately two to four WIC food instruments, plus a cash value voucher (CVV) for fruit and vegetable purchases. Each participant's food prescription is divided among the FIs with the maximum allotments indicated on the face of each instrument, in order to provide WIC families with the opportunity to purchase all of their WIC foods at one time or spread their purchases out throughout the month. Generally, one check contains the majority of the prescribed foods, and a second contains the remainder.

WIC participant issuance and redemption data were provided by Wisconsin's Department of Health Services WIC Program. A purposive sample of WIC vendors, reflecting diversity in geography, store size, and participants served, were recruited in early 2009 and provided POS data containing information on the items purchased with WIC FIs and CVVs. Both types of quantitative data were collected and analyzed at four key points in time: 1 month prior to implementation (baseline), 6 months postimplementation, 12 months postimplementation, and 18 months postimplementation. While the non-random recruitment of WIC vendors into the study is a limitation in the generalizability of the study findings, this design allowed for the examination of differences in observed redemption rates between pre- and postimplementation periods. Furthermore, it allowed for a thorough description of the food choices made by WIC participants who redeemed WIC food instruments at any of the study stores, including differences that may exist between different groups, such as race, ethnicity, and food package category. Qualitative focus group data were collected at two points in time corresponding with the 6 and 18 month postimplementation data collection periods.

Conclusions

More than 18 months after implementation of the food package changes, the evidence presented in this study suggests that WIC participants are very accepting of the revised food package benefits. This is consistent with findings from other research that also found high levels of satisfaction and indicate that WIC participants are purchasing and consuming more nutritious foods as a result of the food package changes (Whaley, Ritchie, Gomez, & Spector, 2011). Despite the generally positive response to the food package changes, some notable decreases in WIC food redemptions or less than ideal redemptions of specific WIC foods were noted overall, and these decreases were disproportionate among some WIC subpopulations. This report details key findings in terms of the use and non-use of WIC benefits, as well as completeness of purchases 18 months postimplementation. Conclusions and recommendations are highlighted below.

❖ Overall, WIC participants accepted and were satisfied with the new WIC food packages.

Although there were no increases in many of the measures of participant acceptance between baseline and 18 months postimplementation, there were no dramatic negative effects overall. The vast majority of WIC participants used some or all of their food instruments 18 months after the food package changes were implemented, and most participants made full purchases of the foods prescribed to them. Moreover, qualitative information gleaned from focus groups point to a high degree of satisfaction with the foods now issued through the WIC program and suggest that other factors, such as the availability of particular food items, food instrument interpretation, and issues at checkout, might help explain some of the decreases observed in this study.

More than three-quarters of WIC participants used their CVVs once this benefit was prescribed. This is consistent with reports from focus group participants indicating high satisfaction with and use of this benefit.

❖ Food instrument non-use increased slightly compared to baseline.

While many of the measures demonstrate a high level of acceptance, there was an increase from baseline in the proportion of participants who did not use any food instruments (almost 5 percentage points). This change was seen across participant categories and racial and ethnic groups, but appears to impact non-Hispanic Black and non-Hispanic American Indian/Alaska Native participants the most.

While it was not within the scope of the study to identify the causes of such change, a number of factors may have contributed to this increase in food instrument non-use. For instance, the economic downturn may have caused some WIC participants to move out of the State, leaving them unable to use their benefits, and may also have affected participants' transportation options, creating barriers to their use of benefits. In addition, little is known about the impact of the recent increases in benefits received through the Supplemental Nutrition Assistance Program (SNAP). Since many WIC participants are also SNAP participants, the increased SNAP benefit may have influenced WIC participants' need for or use of their WIC benefit.

❖ **Full purchases of WIC food benefits decreased slightly compared to baseline.**

Based on an analysis of POS data, most WIC participants made full purchases—or purchased all of the foods issued to them in the prescribed amount—when using their food instruments at 18 months postimplementation. However, the percentage of WIC participants making full purchases with their traditional food instruments decreased compared to baseline. A large proportion of this decrease can be explained by the relatively low redemption of whole grains and beans, and small but significant decreases in full purchases of juice and milk.

A potential contributing factor in the decrease in full purchases overall and for specific foods is the change in how foods were issued. Implementation of the new food packages resulted not only in changes to the food benefit offered to WIC participants, but also the number of food instruments on which they were issued. For Children and all categories of women, the number of food instruments on which traditional foods were issued decreased from 3.0 to 2.2 FIs per participant per month. The result of these changes is that more foods are issued on fewer FIs, which could inadvertently increase the likelihood of partial- or non-redemption of certain foods, especially when transportation and food availability issues at WIC vendors are a concern.

❖ **Non-use and maximum use of the CVV among WIC subpopulations were disproportionate.**

As with traditional food instruments, non-use of CVVs was significantly higher among non-Hispanic Black and non-Hispanic American Indian/Alaska Native participants, though the reasons for this are unknown. Focus group participants did provide some input with regard to non-use of this benefit: specifically, some participants reported that store clerks were not allowing them to exceed the value of the CVV, which is permitted in Wisconsin. Differences in the proportion of participants exceeding the dollar amount of the CVV across the study stores also points to potential confusion among store staff members about whether participants are allowed to use a split tender option—that is, use another form of payment if their fruit and vegetable purchase exceeds the value of the CVV. Because the proportion of participants taking advantage of this option differs dramatically by individual store (when looking across 31 stores), it is likely that some stores or store clerks have misinterpreted this rule and are erroneously refusing to allow participants to exceed the value of their CVV. This observation is consistent with findings from the focus group discussions in which the problem was identified with specific stores and not among all of the stores in which these participants shop. Participants also explained that, when confronted with this opposition at the register, they would sometimes resort to leaving these foods behind. Though not stated explicitly, this issue most likely contributes to WIC participants' non-use of the CVV benefit. Moreover, if this problem was more common in stores that are situated in areas with large non-Hispanic Black and non-Hispanic American/Indian Alaska Native populations, this could help explain the disproportionate non-use of the CVV benefit among these groups of WIC participants.

Additionally, although all WIC participants in the focus groups reported using their CVVs all the time, when asked why other WIC participants might not use this benefit, they offered a few suggestions. In addition to possibly losing the CVVs or forgetting about them, which would not be unique to the CVV but true for any food instrument, some WIC participants also described the angst that they feel about having to do math in the store, and in particular, when they are distracted by watching their children at

the same time. They hypothesized that the math might be more challenging for some—enough so that it deters them from using this benefit.

❖ **Participants demonstrated a preference for some of the new WIC food choices.**

Milk has historically been and continues to be one of the most redeemed benefits of the WIC food package. This is very encouraging and indicates that the State’s choice to limit WIC participants to either fat-free (skim) or low-fat (1%) milk has not deterred participants from purchasing milk through WIC. In fact, based on findings from the focus group discussions, the food package changes appear to have influenced what milk type WIC participants purchase outside of WIC, with more participants reporting that they purchase low-fat milk even after they have used their WIC benefit.

Participants also appear to like the canned bean option. Not only did more participants choose to substitute beans for peanut butter at 18 months postimplementation than at baseline, but when beans were purchased, a preference for canned beans versus dried beans was observed. A preference for canned beans was also reported in focus groups, but primarily by the non-Spanish-speaking participants. This is both interesting and important in terms of the impact the switch from peanut butter to beans could have on total fat consumption.

Despite less than ideal redemptions of food instruments for infant fruits and vegetables, when FIs are used both fruits and vegetables are being purchased more frequently than not. Similarly, when making purchases with the CVV, fruits were purchased more frequently than vegetables, however, many WIC families purchased both. Additionally, WIC families demonstrated a strong preference for fresh fruits and vegetables versus canned or frozen, as found through the examination of POS data and substantiated by WIC participants during focus group discussions. Interestingly, some focus group participants also reported that the CVV increased their willingness to try new fruits and vegetables.

Recommendations

Although this research indicates that WIC participants are generally accepting of and satisfied with recent changes to the WIC food packages, challenges and opportunities remain. While, statistically, these findings are not generalizable to the larger population of WIC participants, this study’s findings are consistent with recent findings related to WIC food package satisfaction and use, and may reflect participant experiences in other States; consequently, the following recommendations and suggestions for future research are relevant for the Federal WIC program as well as for State WIC programs.

❖ **Further examine and consider revising the infant food benefit.**

Due to underutilization of the infant food benefits, which were intended to increase variety as well as the introduction of age-appropriate foods, the WIC program should consider related nutrition education enhancements or alternative means of providing the infant food benefits. Currently, only stage 2 infant foods are issued to WIC infants age 6-11 months, despite those foods generally being recommended by the manufacturer for those aged 6-8 months, depending on the child’s development. One alternative method for prescribing infant foods would be to issue infants a CVV for fruits and vegetables for those caregivers who would prefer to prepare their own infant foods or when it is age-appropriate for infants.

Further research should be conducted to determine whether a CVV for fruits and vegetables would be an appropriate and desirable alternative for the current infant food benefit that would result in increased use and improvements in the health and nutrition of infants.

❖ **Take steps to ensure WIC participants understand their food benefit as issued.**

WIC participants in focus groups could not always interpret their food instruments. When presented with sample food instruments, many participants were not confident that they understood which foods or the amount of those foods that could be purchased. This challenge could limit WIC participants' maximization of their benefits. While explanation of food instruments is federally mandated, participants are expected to learn and absorb a great deal during benefit issuance and nutrition education, which could prove especially problematic for low-literacy participants and those with learning or other disabilities. States should take steps to ensure that WIC participants have a clear understanding of what they can purchase with their food instruments. To this end, States should consider conducting formative research to better understand the extent of this problem within their WIC programs, as well as to identify methods for aiding participants in better understanding their food benefits.

❖ **Increase communication to or education of WIC vendors around the use of the split tender option with the CVV.**

Less than ideal use of the CVV, combined with focus group reports that some vendors do not allow participants to purchase more fruits and vegetables than the amount of the voucher, indicates a great need for further vendor education efforts, especially for the store clerks involved in direct WIC transactions. WIC vendors in Wisconsin lost a potential \$182,500 in CVV dollars in February 2011 due to non-use and underutilization of the CVV; over the course of a year, this would total \$2.2 million dollars in potential lost earnings. State WIC programs that allow split tender should consider multiple methods of vendor training and outreach to increase the ease with which participants can maximize this benefit. Additionally, since allowing split tender is intended to promote and should enable WIC participants to use their CVV benefit fully, it is possible that underutilization of this benefit is even more pronounced in States that do not allow split tender. For this reason, State WIC programs that do not currently allow split tender might want to consider revising their policy, or at a minimum, examining the extent of CVV underutilization in their State.

❖ **Consider nutrition education modifications or enhancements that would increase redemptions for particular food items.**

Underutilization of certain foods, along with focus group reports of participants receiving too much, not liking, or not knowing how to cook with a particular type of food, point to the need for additional or targeted nutrition education efforts as well as investigation of alternative food offerings. In some cases, these issues may be the result of cultural preferences, as may be the case with peanut butter and beans. Further research should be conducted to identify successful nutrition education efforts aimed at increasing consumption of WIC foods, barriers to incorporating these foods into participants' diets, and possible cost-effective alternatives that would provide the same nutritional benefits but possibly appeal to those who are least likely to use certain benefits.

❖ **Implement tailored or targeted nutrition education and outreach to subpopulations with especially high non-use of food instruments.**

The increasing proportion of participants not using any food instruments in a given month is of particular concern, since WIC plays a vital role in improving birth outcomes and the nutritional status of low-income women, infants, and children. State WIC programs should identify those subpopulations at highest risk of non-use and implement tailored outreach and nutrition education efforts to ensure that these participants are able to maximize their benefits. Further research also needs to be done to identify potential barriers to food instrument use and how these could be overcome.

The WIC program serves millions of women, infants, and children each month, offering them access to nutritional foods that are the basis of healthy eating habits. Understanding the effects of changes in the food benefit package is important to learning more about how participants use or do not use their benefits, the types of foods they purchase and consume, and their preferences for various foods. Such understanding is key to ensuring that the program meets its goals of serving at-risk individuals with nutrient-rich foods; promoting consumption of more fruits, vegetables, and whole grains; and reducing consumption of total and saturated fat and cholesterol. The full report describes in detail this study's wide-ranging findings, and their implications for food benefit package design as well as for future research and innovation.

I. Introduction

Through a cooperative agreement with the Economic Research Service (ERS) of the U.S. Department of Agriculture (USDA) and in partnership with the Wisconsin WIC Program, Altarum Institute conducted a study examining the evolution of WIC participant redemption patterns from one month prior to implementation of major food package changes through 18 months postimplementation. The study uses cross-sectional data that allow for examination of overall redemption patterns prior to implementation of the new WIC food package and at 6, 12, and 18 months postimplementation.

This report presents the final study findings across the baseline and three postimplementation data collection periods. Generally, findings are presented for baseline versus 18 months postimplementation to provide an overview of the results of the changes to the food packages at the conclusion of the study period. Findings for 6 and 12 months postimplementation are also presented when there are notable changes in redemption patterns across study periods. When no baseline comparison is possible, for instance with the issuance of the cash value voucher (CVV) and new WIC foods (e.g., whole grains, infant meat), findings are presented for 6 and 18 months postimplementation. The report is organized as follows:

- **Section I** provides background on the rationale for the study and its specific aims.
- **Section II** briefly describes the methods used to conduct the study.
- **Section III and IV** presents key findings related to participant acceptance of the food package changes based on our analysis of WIC program and point of sale (POS) data, as well as focus group discussions.
- **Section V** describes the findings of the study related to WIC participant preferences related to changes in the food packages.
- **Section VI** addresses the limitations and generalizability of the study.
- **Sections VII and VIII** provide overarching conclusions and recommendations for WIC programs to consider, as well as suggestions for future research.

A. Background

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides supplemental nutrition assistance, nutrition education, and referrals to health and social services to low-income and nutritionally at risk pregnant, breastfeeding, and postpartum women as well as infants and young children up to age 5. The program is funded by the USDA's Food and Nutrition Service (FNS), which grants individual States the resources to offer services and food instruments (FI) free of charge, thereby making the program widely available to its target population. WIC has grown significantly since its inception in 1974, and in 2010 the program served nearly 9.2 million women, infants, and children on average each month in the United States.

WIC participants receive benefits by three means: nutrition education (including breastfeeding promotion and support), referrals to health and social services, and provision of specific foods in a "food package." Unlike other federally funded nutrition assistance programs, WIC food packages are intended to provide the most nutritionally adequate foods in order to best benefit WIC participants who have been identified as at risk based on income and health status. Historically, these food packages have offered participants basic, nutrient-rich foods such as eggs, milk, peanut butter, beans, and cereals. However, in 2005, the Institute of Medicine's (IOM) Committee to Review the WIC Food Package recommended changes to better align nutrient intake among WIC participants with the *Dietary Guidelines for Americans* for participants age 2 and older, the dietary recommendations for children under age 2, and the American Academy of Pediatrics' infant nutrition recommendations (IOM, 2005). These changes, which were the most dramatic since the inception of the program, reflect national nutritional recommendations for increased consumption of lower-fat and whole grain foods, as well as fruits and vegetables. FNS incorporated most of the IOM committee's recommendations into their updated regulations on WIC food packages—the 2007 Interim Final Rule—which all WIC agencies were required to implement by October 1, 2009.

In its review of the WIC food packages, the IOM identified the risks and benefits of the proposed changes. One of the intended benefits of the WIC food package changes is the reduction of total and saturated fat, cholesterol, and refined grain intake. Additionally, the changes were intended to increase the food choices that are available to WIC participants, including options that might be more appealing to the cultural preferences of some populations. A description of the food packages, including the major changes made, is shown in table 1.

TABLE 1.—Food package types and major changes made via the interim rule

	Foods Prescribed Initially	Foods Added	Other Changes
Type I: Infants Not Fully Breastfed (fully formula-fed or partially breastfed)	<ul style="list-style-type: none"> – Formula 	<ul style="list-style-type: none"> – None 	<ul style="list-style-type: none"> – Age range for food package increased to 0-5 months – Amount of formula based on age of infant – Formula reduced for partially breastfed infants
Type II: Fully Breastfed Infants	<ul style="list-style-type: none"> – Infant cereal 	<ul style="list-style-type: none"> – Jarred infant fruit and vegetables – Jarred infant meat 	<ul style="list-style-type: none"> – Juice eliminated – Age for receiving food package increased to 6 months
Type II: Infants Not Fully Breastfed	<ul style="list-style-type: none"> – Formula – Infant cereal – Juice 	<ul style="list-style-type: none"> – Jarred infant fruit and vegetables 	<ul style="list-style-type: none"> – Formula reduced – Juice eliminated
Type III: Special Diet	<ul style="list-style-type: none"> – Medically prescribed foods 	<ul style="list-style-type: none"> – Makes other WIC foods available to Type III participants 	<ul style="list-style-type: none"> – Shifts infants with special dietary needs to Type III
Type IV: Children (ages 1–5)	<ul style="list-style-type: none"> – Juice – Milk – Cheese (as substitute) – Cereal – Eggs – Dry beans or peanut butter 	<ul style="list-style-type: none"> – Whole grains – \$6 CVV for fruits and vegetables 	<ul style="list-style-type: none"> – Juice reduced – Milk reduced – Cheese eliminated – Canned beans allowed as substitute for dry beans – Prescribe only whole milk to children 1 year of age, only fat-reduced milk to children ages 2–5 and women.
Type V: Partially Breastfeeding and Pregnant Women		<ul style="list-style-type: none"> – Whole grains – \$10 CVV for fruits and vegetables 	
Type VI: Postpartum Women		<ul style="list-style-type: none"> – Whole grains – \$10 CVV for fruits and vegetables – Dry or canned beans or peanut butter 	
Type VII: Fully Breastfeeding Women	<ul style="list-style-type: none"> – Juice – Milk – Cheese – Cereal – Eggs – Dry beans – Peanut butter – Canned tuna – Carrots 	<ul style="list-style-type: none"> – Whole grains – \$10 CVV for fruits and vegetables 	<ul style="list-style-type: none"> – Juice reduced – Milk reduced – Carrots eliminated – Canned beans allowed as substitute for dry beans – Canned fish alternatives authorized – Prescribe fat-reduced milk only

While the Interim Final Rule provided clear guidelines and rules for implementing the food package changes, individual States had considerable flexibility in determining which foods to include on their State-authorized foods list.

The Wisconsin WIC Program implemented the WIC food package change on August 1, 2009, and made the following notable choices within the guidelines of the Interim Final Rule:

- Only allow low-fat (1%) or fat-free (skim) milk for women and 2- to 4-year-olds (the Interim Final Rule allows for reduced fat (2%) milk, as well)
- Eliminate cheese from all food packages except for fully breastfeeding women, women pregnant with multiples, and women partially breastfeeding multiples (the Interim Final Rule only calls for a reduction in the maximum amount of cheese substitutions allowed)
- Allow participants to choose from a variety of whole grain options, including 100 percent whole wheat bread, rolls, and buns, as well as soft corn tortillas, whole wheat tortillas, and brown rice
- Allow participants to purchase fresh, frozen, or canned fruits and vegetables with their CVV
- Allow participants to use another form of payment for fruit and vegetable purchases that exceed the dollar amount of their CVV, including using multiple CVVs in one purchase

Based on the Interim Final Rule guidelines, Wisconsin also chose to allow canned beans as a substitute for dry beans and expanded their canned fish offerings to include tuna. The specific choices made by the Wisconsin WIC Program are important to consider as they have the potential to influence participant acceptance of the new WIC food package—an outcome this study aims to examine.

B. Rationale and Purpose of the Study

Obtaining the intended benefits of the recently implemented changes will depend largely on participant acceptance of the new food package and their willingness to purchase the new types or varieties of food available through their WIC food instruments. Results from the 1998 National Survey of WIC Participants found high participant satisfaction for the amount and types of foods offered through the former WIC food packages, and subsequently, a high rate of clients purchasing all their WIC foods (complete buys) among those who were satisfied (Cole, Hoaglin, & Kirlin, 2001). Decreased satisfaction with the amount and types of foods offered under the revised package may result in an increased number of clients not redeeming their WIC food instruments or not purchasing all of their prescribed foods (partial buys). One noteworthy revision to the WIC food package specific to Wisconsin is the restriction to low-fat or skim milk for women and children over 2 years of age. In a recent study, researchers found that a nutrition education intervention to increase consumption of low-fat milk and cheese was not successful among WIC participants. A focus group to explore reasons for the intervention's failure found that participants' taste preferences, family preferences, and past purchasing patterns were more influential in their food choices than WIC nutrition education (Bell & Gleason, 2006). Nearly 50 percent of milk purchases in that study were for whole milk, largely due to taste and family preference. It is unclear, therefore, whether the new food package will result in increased consumption of lower-fat milk, or rather, whether WIC participants will opt to purchase less milk from their WIC prescription than they previously did.

Another noteworthy change to the WIC food package is the addition of the cash value voucher, which can be used to purchase produce. In a recent study, researchers found that even after an increase in income, lower income families are less likely to spend money on fruits and vegetables than on other food group products (Blisard, Stewart, & Jolliffe, 2004). In this respect, the addition of the cash value voucher for fruits and vegetables in the revised WIC food package may increase fruit and vegetable consumption in WIC households since it cannot be used to purchase foods from any other food group. A recent study related to the provision of food vouchers specifically for fruits and vegetables among WIC participants supports this idea. Researchers found that the cash value voucher was widely accepted by participants and was successful in increasing and sustaining fruit and vegetable consumption both throughout the intervention and in the 6 months that followed (Herman, Harrison, & Jenks, 2006).

WIC food instrument redemption rates are at the core of this study as they will serve as one measure of participant acceptance. Although the volume of research on redemption rates even for the former WIC food package is limited, one study did identify language as a significant factor, with low-English speaking WIC participants having higher rates of food instrument redemption than English-speaking WIC participants, regardless of food type (Matthews, 2000). This holds true in both urban and rural areas. This may be a result of English-speaking WIC participants having slightly higher incomes than limited-English speaking participants or being more aware of other nutrition assistance programs such as SNAP. Matthews also theorizes that as ethnic community members become more assimilated into U.S. culture, their preference for more “American” and less healthy non-WIC foods may increase along with their English proficiency.

While these changes were first implemented in late 2009, still little is known about WIC participants’ redemption patterns and food choices, and the factors that influence them. State and local WIC agencies would benefit from the timely dissemination of such information as it could inform decisions such as those related to revising allowable food lists, improving or increasing nutrition education, tailoring nutrition education messages to the most appropriate subpopulations, and improving vendor management and training.

This study examines the evolution of WIC participant redemption patterns in Wisconsin from one month prior to implementation of the food package changes through 18 months postimplementation. The two primary aims of the study are to

- Examine the acceptance of the new WIC food package as measured by redemption rates and reported by WIC participants through focus group discussions, and
- Describe the food choices made by WIC participants in the pre- and postimplementation environments.

II. Methods

This study is exploratory in nature and uses a multi-method, cross-sectional design to explore WIC participant redemption patterns and food choices over time.

Quantitative methods include linking POS data with WIC program issuance and redemption data. These results are further informed using qualitative information gathered through a series of focus groups conducted at multiple points in time.

A. Data Collection

WIC participant issuance and redemption data were provided by Wisconsin's Department of Health Services WIC Program, and point-of sale data were collected from a sample of WIC vendors recruited into the study in early 2009. (See appendix A for more information regarding store recruitment and a description of the stores participating in the study.) Both types of quantitative data were collected and analyzed at four key points in time: 1 month prior to implementation (baseline), 6 months postimplementation, 12 months postimplementation, and 18 months postimplementation. This design allowed for the examination of differences in observed redemption rates between pre- and postimplementation periods. Furthermore, it allows for a thorough description of the food choices made by WIC participants who redeemed WIC food instruments at any of the study stores, including differences that may exist between different groups, such as race, ethnicity, and food package category. Qualitative focus group data were collected at two points in time corresponding with the 6 and 18 month postimplementation data collection periods. Figure 1 provides the timeline for data collection. More information on focus group recruitment is provided in appendix B and the focus group discussion guides are provided in appendix C.

Commonly Used Abbreviations in WIC

POS: Point-of-Sale

(refers to store purchase data)

FI: WIC Food Instrument

(sometimes referred to as a "WIC check")

CVV: WIC Cash Value Voucher

(food instrument for fruit and vegetable purchases)

FIGURE 1.—Data collection schedule

	WIC Program Data	WIC Vendor Point-of-Sale Data	Focus Groups
Baseline	June/July 2009	June–August 2009	n/a
6 months postimplementation	February 2010	February–March 2010	March 2010
12 months postimplementation	August 2010	August–September 2010	n/a
18 months postimplementation	February 2011	February–March 2011	March 2011

B. WIC Food Instruments

At the core of this study are WIC FIs which are the paper "checks" given to participants to pay for WIC foods at participating vendors. WIC participants generally receive approximately 2–4 WIC FIs plus a CVV for fruit and vegetable purchases when the participant is eligible to receive them. Each participant's food prescription is divided among the FIs, with the maximum allotments indicated on the face of each instrument, in order to provide WIC families with the opportunity to purchase all of their WIC foods at one time or to spread their purchases out throughout the month. Generally, one check contains the

majority of the prescribed foods, and a second contains the remainder. For instance, at 18 months postimplementation, a 1-year-old Child might have received a \$6 CVV plus two FIs containing the following prescription:

First FI:

- 36 ounces of cereal
- 2 gallons of whole milk
- 64 ounces of juice
- 1 dozen eggs
- 18 ounces of peanut butter OR
 - 1 pound of dry beans OR
 - 64 ounces of canned beans (four 16-ounce cans)
- 16 ounces of whole grains (bread, brown rice, tortilla)

Second FI:

- 2 gallons of whole milk
- 64 ounces of juice

Prescriptions for Postpartum, Pregnant, Partially Breastfeeding, and Fully Breastfeeding Women were also divided up across FIs similar to this example. Infants Not Fully Breastfed were generally provided 1–2 FIs containing their infant formula prescription, plus additional FIs for infant cereal and prepared fruit and vegetables when the infant had reached the appropriate age. Fully Breastfed Infants (ages 6 months and older) received an FI containing their infant cereal, plus additional FIs containing prepared infant foods (fruits and vegetables, meat).

C. Data Analysis

Traditional WIC food instruments refer to the traditional method of transacting WIC purchases, involving the prescription of specific foods in specific quantities; this is in contrast to the addition of the cash value voucher which provided participants with a specific dollar amount that could be used to purchase only fruits and vegetables. Traditional FIs were analyzed separately from CVVs to maintain comparability with baseline data since CVVs were not available at this time.

1. Quantitative data

All data cleaning and quantitative analyses for this study were conducted using SAS software version 9.2 (SAS Institute Inc., Cary, NC, USA). State-level WIC program data included information about each FI that was prescribed with a date-of-use falling within our data collection periods. Each record within the state-level file contained information about the foods prescribed, as well as about the WIC participant to which the FI was issued:

- FI or CVV number (unique identifier)
- FI date of use, redemption amount
- Foods prescribed (description of food and quantity)
- WIC vendor ID number (indicating where participant used the FI)
- Participants' unique identifier
- Participant food package category
- Participant race/ethnicity
- Participant age

Because WIC participants typically receive more than one FI as part of their food package in a given month, in most cases multiple records were combined to produce a participant-level record, upon which analyses were conducted. Measures of participant acceptance that use only state-level data include all WIC program participants who were issued FIs during the data collection period and were operationalized in the following ways:

State-level analysis

- **Use and Non-use of Traditional Food Instruments.** Participants were categorized as having used all of their FIs, some of their FIs, or not having used any of their FIs (“full use,” “some use,” “non-use”).
- **Use and Non-use of Cash Value Vouchers.** Since only one CVV is issued to a participant in a given month, participants were categorized as having used the full cash value of the voucher, less than the full amount, or having not used the voucher at all (“full use,” “under-use,” and “non-use”).

Store POS data were matched with state-level data by the FI or CVV unique identifier. The store data included the following types of information about each WIC purchase made in the store:

- WIC FI or CVV number
- Information about foods purchased (price, quantity, package size)

After matching FI-level data and store POS data, purchases made with FIs in the sample stores were combined to produce participant-level observations; however, due to data quality issues, WIC participants categorized as Type I Infants and Type III Special Diet were excluded from store-level analyses, as well as formula purchases for Type II Infants Not Fully Breastfed. Purchases made with the CVV were combined to produce WIC family-level observations because of the unique characteristics of the CVV as payment tender (for more information, see appendix A). Store-specific measures of participant acceptance were created and include only those participants shopping in the study stores:

Store-level analysis

- **Completeness of Individual Food Purchases.** For each WIC food, participants were categorized as having purchased the full amount prescribed (“full redemption”), less than the full amount (“partial redemption”), or having not purchased any of that food (“not redeemed”). See appendix D for “full redemption” definitions for individual foods.
- **Completeness of Traditional Food Instrument Purchases Overall.** An overall full or partial purchase variable was created using each of the individual food purchase variables. A participant was categorized as having made a “full purchase” if all of the prescribed foods were fully redeemed, or purchased in the amounts prescribed. Participants purchasing at least some of every food (at least a partial food redemption for every food) were categorized as having made a “partial purchase,” and participants not purchasing at least one WIC-authorized food in any quantity (nonredemption for any individual food) were categorized as “not purchasing specific foods.”

- **Completeness of Cash Value Voucher Purchases.** WIC families were considered to have made a complete purchase if the full value of all of the CVVs used in the store was redeemed. Analyses also considered the use of split tender by examining the extent to which WIC families purchased more fruits and vegetables than the CVV would allow.

Finally, matched store POS data allowed the study team to explore participant food choices when WIC participants are given options over which food to purchase. In most cases, the options were new to the food packages and are only described in the postimplementation period. This measure is primarily descriptive, but in some cases can be used as a proxy for satisfaction with the changes, as increased substitution options should result in increased purchases.

Descriptive statistics were conducted for each of the measures of participant acceptance at each data collection period. Bivariate and multivariate statistics were conducted to examine differences in redemptions by participant and family characteristics and to assess changes in redemption rates from baseline to postimplementation overall and by characteristics of the sample. Significance tests yielding a p-value of less than 0.05 were considered significant. Logistic regression was used to identify trends in redemption patterns across data collection periods.

2. Qualitative data

WIC participants were recruited to participate in postimplementation focus groups designed to examine participants' experiences using the new WIC food instrument and factors that influenced their redemption patterns and specific food choices. Focus groups were analyzed using a tape-based analysis, which involves the systematic review of the recorded discussions, supplemented by the moderator and observer's notes taken during or shortly after the conclusion of each focus group. Each audio file was reviewed for frequency and extensiveness of themes and patterns in participants' responses. Five concepts were maintained throughout this review—the frequency of statements within focus groups, repetition of similar statements across focus groups, the intensity of the comments, the internal consistency of the comments, and the specificity of responses.

III. Use and Non-use of WIC Benefits (State-Level Findings)

Key Findings at 18 months postimplementation

- ❖ *Overall use of traditional food instruments remains high (90 percent), despite a slight decrease from baseline.*
- ❖ *Non-use of traditional FIs increased from 5.5 to 10.3 percent.*
- ❖ *Non-Hispanic Black participants saw an increase in non-use that was disproportionate to their representation in the WIC population.*
- ❖ *Non-use more than doubled for Partially Breastfeeding Women, Pregnant Women, and Postpartum Women.*
- ❖ *Use of CVVs is slightly lower than that of traditional food instruments (77 percent), but still represents a vast majority of participants.*
- ❖ *Only 56 percent of Infants Not Fully Breastfed had used all of their FIs for infant fruits and vegetables, and 29 percent did not use any.*
- ❖ *Fewer than 35 percent of Fully Breastfed Infants had used all of their FIs for infant meat, and fewer than 50 percent did so for fruit and vegetable FIs.*
- ❖ *Nearly two-thirds of Hispanic participants used the full amount of their CVV, compared to 40 percent of non-Hispanic White and fewer than 40 percent of non-Hispanic Black, non-Hispanic American Indian/Alaska Native, and non-Hispanic participants of multiple races.*
- ❖ *More than half of Partially and Fully Breastfeeding Women made full use of their CVVs, compared to 35.4 percent of Postpartum Women and about 45 percent of Children and Pregnant Women.*

A. Traditional Food Instruments

The study team hypothesized that WIC participants would be more likely to redeem their food instruments after changes were made to the food packages because they would be more satisfied with the variety of foods and food choices offered. One measure of participant acceptance is whether participants use all, some, or none of their traditional FIs. This measure does not take into account which foods or to what extent each of the instruments are being redeemed, but does provide a critical piece of insight into which participants are using the program's food benefits.

1. WIC participant population

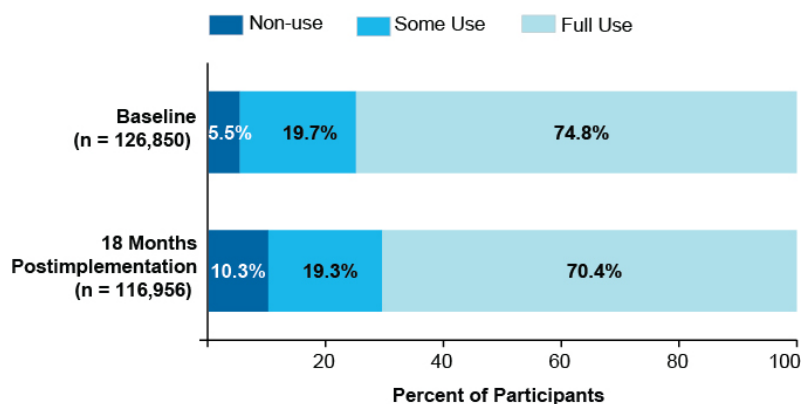
At 18 months postimplementation, there were 116,956 unique WIC participants in Wisconsin, nearly 10,000 fewer than at baseline (126,850). This is reflective of the steady decline nationally in the number of WIC participants between June 2009 and February 2011. At 18 months postimplementation, WIC participants were largely non-Hispanic White (45.8 percent), Hispanic (25.2 percent), and non-Hispanic Black (17.5 percent). The racial and ethnic composition of WIC participants changed slightly with regard to some population groups: non-Hispanic Black and non-Hispanic American Indian/Alaska Natives saw decreases of 0.5 and 0.1 percentage points, respectively ($p < .05$), while non-Hispanic Asian/Pacific Islanders and non-Hispanic participants of multiple races realized increases of 0.4 and 0.3 percentage

points, respectively ($p < .0001$). The distribution of WIC participants by food package category did not vary, however, at baseline and 18 months postimplementation. State-level participant characteristics are shown in detail in appendix E.

2. Comparison of baseline to 18 months postimplementation

Overall, the vast majority of WIC participants use at least some of their FIs, though the proportion doing so decreased somewhat between baseline and 18 months postimplementation (94.5 and 89.8 percent, respectively; $p < .0001$.) The proportion of WIC participants using all of their traditional FIs decreased by 4.4 percentage points from baseline to 18 months postimplementation (74.8 to 70.4 percent; $p < .0001$). The majority of this decrease was accounted for by an increase in the proportion of participants who did not use any FIs—from 5.5 percent at baseline to 10.3 percent at 18 months postimplementation (see figure 2).

FIGURE 2.—Traditional food instrument usage by participants, baseline and 18 months postimplementation

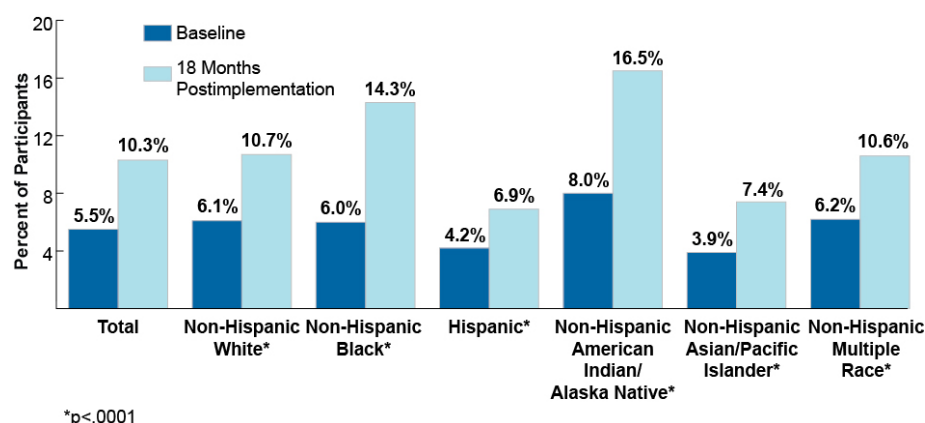


While overall use of food instruments remained high at 18 months postimplementation, variations in non-use by participant race and ethnicity and food package type was further explored to provide a broader view of those populations who might benefit from targeted interventions or for whom further research may be warranted.

a) Differences in FI non-use by race and ethnicity

Increases in non-use of FIs at 18 months postimplementation were significant across all racial and ethnic groups. Non-use of traditional FIs at 18 months postimplementation was highest among non-Hispanic American Indian/Alaska Native and non-Hispanic Black participants (16.5 and 14.3 percent, respectively; $p < .0001$), representing increases over baseline of 104 and 134 percent, respectively (see figure 3).

FIGURE 3.—Percentage of WIC participants not using any traditional food instruments, by race/ethnicity, baseline and 18 months postimplementation



The changes from baseline to 18 months postimplementation most affected non-Hispanic Black participants who saw an increase in non-use that was disproportionate to their representation in the WIC population. At 18 months postimplementation, this population accounted for nearly one-quarter of non-users, but only accounted for 17.5 percent of the WIC population, while at baseline they accounted for about 18 percent of both non-users and the population.

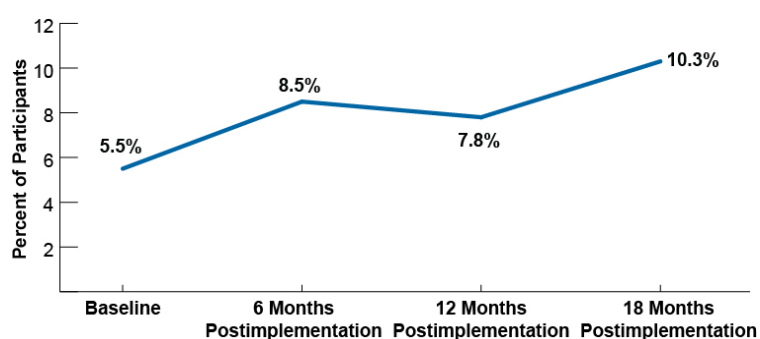
b) Differences in FI non-use by food package type

The change in non-use of traditional FIs was not consistent across food package categories from baseline to 18 months postimplementation. For instance, non-use was highest among Postpartum Women and Fully Breastfed Infants (ages 6–11 months) at 18 months postimplementation (20.2 and 19.5 percent, respectively). These changes represent an increase in non-use among Postpartum Women (+11.4 percentage points; $p < .0001$) and a decrease in non-use among Fully Breastfed Infants (-18.2 percentage points; $p < .0001$) compared to baseline. Children, accounting for nearly 55 percent of all WIC participants, saw non-use nearly double from baseline to 18 months postimplementation (5.8 to 11.4 percent; $p < .0001$). Non-use more than doubled for Partially Breastfeeding Women, Pregnant Women, and Postpartum Women ($p < .0001$), and did not change for Infants Not Fully Breastfed (ages 6–11 months) or those categorized as Special Diet.

c) Trends across data collection periods

Traditional FI usage was lower than at baseline for all postimplementation data collection periods; however there was a slight decrease in non-use at 12 months postimplementation before increasing again at 18 months post (see figure 4). The variation in postimplementation non-use, while small in magnitude, raised concern that seasonal differences in the data collection periods may be influencing the study’s final estimates of non-use of traditional food instruments. Despite this concern, however, the trend indicates that non-use is increasing over time.

FIGURE 4.—Percentage of WIC participants not using any FIs at baseline, 6, 12, and 18 months postimplementation



Due to the constraints of the study design, however, it was not possible to control for this factor with such a limited number of months and seasons in the dataset. Instead, logistic regression models were created to determine the odds of non-use at each of the data collection points. Keeping all other independent variables constant (race and ethnicity, food package type, number of FIs issued), the odds of non-use at 6 months postimplementation was 1.34 (95 percent CI: 1.30,1.39) times that of participants at baseline, while the odds of non-use at 12 months was 1.24 (95 percent CI: 1.20,1.28) and 1.71 (95 percent CI: 1.65,1.76) at 18 months postimplementation compared to baseline.

3. Use of FIs for infant foods

While FIs are not generally specific to individual foods, that is not the case among infants. Infant FIs contain a single type of food on each instrument. For instance, an Infant Not Fully Breastfed (formula-fed or partially breastfed; ages 6–11 months) would typically be issued two food instruments with formula, one FI with their infant cereal prescription, and two FIs containing their infant fruit and vegetable prescription. As such, it was possible to look specifically at FI use for Type II Infants ages 6–11 months with regard to the following specific foods:

- Infant formula (baseline and postimplementation),
- Infant cereal (baseline and postimplementation),
- Infant fruits and vegetables (postimplementation only), and
- Infant meats (postimplementation only).

For infants aged 6–11 months, there was little change across data collection periods in the average number of FIs issued for formula and cereal. Use of FIs for formula did not, in fact, change across data collection periods with 93.3 percent of infants having used all of their formula FIs overall. Use of FIs for infant cereal also did not change across data collection periods with 61.4 percent of both Fully Breastfed Infants and Infants Not Fully Breastfed having used those FIs.

Infants Not Fully Breastfed were also issued an average of 1.9 FIs for infant fruits and vegetables at each of the postimplementation data collection periods. At 6 months postimplementation, 65.3 percent of infants had used all of their FIs for infant fruits and vegetables, while 56.4 percent did so at 18 months

postimplementation. This was met with an increase in non-use of FIs for fruits and vegetables, from 24.1 percent at 6 months postimplementation to 29.4 percent at 18 months postimplementation ($p < .0001$).

Use of FIs for new infant foods among Fully Breastfed Infants (ages 6–11 months), however, showed dramatically different patterns over time. At 6 months postimplementation, infants were issued an average of 1.9 FIs containing their infant fruit and vegetables and infant meat prescriptions (mixed instrument). Similar to Infants Not Fully Breastfed, more than 66 percent of Fully Breastfed Infants used all of their “mixed” instruments at 6 months postimplementation (see figure 5), while 19.8 percent did not use any.

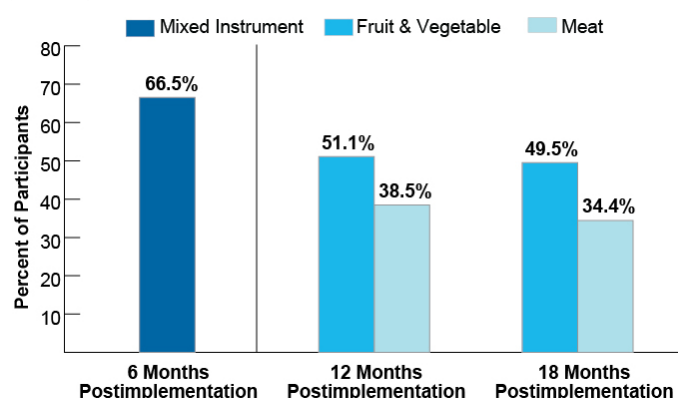
At 12 and 18 months postimplementation, FI issuance changed so that (1) fruits and vegetables were issued on separate instruments than meat and (2) more instruments were prescribed so that participants could spread out their infant food purchases over the month. As a result, an average of 3.9 FIs were issued for fruits and vegetables only and an average of 1.9 FIs were issued for infant meat only (see table 2).

TABLE 2.—Foods issued to infants and method of issuance by infant food package type

Infants Ages 6–11 months	Infants Not Fully Breastfed (Formula-Fed or Partially Breastfed)	Fully Breastfed	
Formula	Issued an average 2.0 FIs per infant	Not applicable	
Cereal	Issued 1.0 FIs per infant	Issued 1.0 FIs per infant	
Infant Fruit and Vegetable	Postimplementation: issued an average of 1.9 FIs per infant	6 months postimplementation: issued average of 1.9 mixed FIs for fruit, vegetables, and meats per infant	12 and 18 months postimplementation: issued an average of 3.9 fruit and vegetable only FIs per infant
Infant Meat	Not applicable		12 and 18 months postimplementation: issued an average of 1.9 FIs per infant for meat

After this change took place, two variations in non-use of infant FIs were noted: at 18 months postimplementation, 49.5 percent of Fully Breastfed Infants used all of their fruit and vegetable instruments and 34.4 percent used all of their infant meat instruments. While the proportion of Fully Breastfed Infants using all of their fruit and vegetable instruments was lower than that of Infants Not Fully Breastfed, only 22.0 percent did not use any fruit and vegetable instruments at 18 months postimplementation as compared to the 29.4 percent that were not used for Infants Not Fully Breastfed ($p < .0001$). More than 50 percent of Fully Breastfed Infants did not use any of their meat instruments (see figure 5).

FIGURE 5.—Percentage of Fully Breastfed Infants using all of their FIs for infant food, 6, 12, and 18 months postimplementation



B. Cash Value Vouchers

The addition of cash value vouchers for fruits and vegetables was one of the most significant changes to the food packages, since it both intended to increase access to and consumption of fruits and vegetables among WIC families and introduced a new method of transacting WIC purchases. Since each eligible participant is issued one CVV per month in \$6, \$10, and \$15 denominations, State-level data are a vital source of information on trends in how and by whom these benefits are redeemed. For this study, use and non-use of CVVs is a key measure of participant acceptance of this specific food package change.

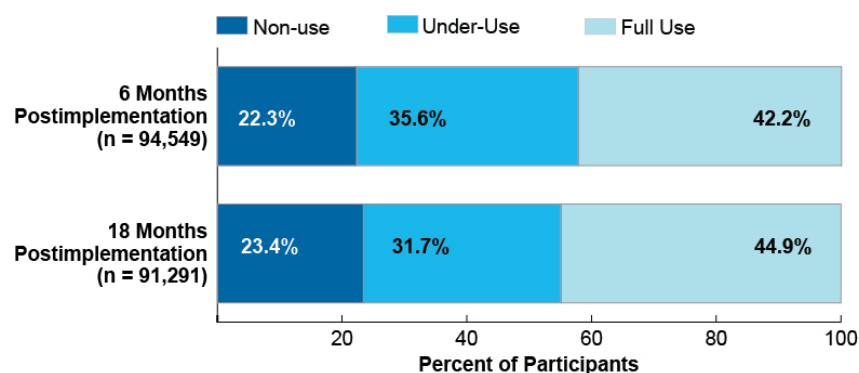
1. WIC participant population

After implementation of the food package changes, CVVs were issued to WIC participants characterized as women and children (ages 1–5 years). Children received a \$6 CVV per month, while Partially Breastfeeding, Pregnant, Postpartum, and Fully Breastfeeding Women received a \$10 CVV and Fully Breastfeeding Women with multiples received a \$15 CVV. At 18 months postimplementation, a total of 91,291 WIC participants were issued CVVs, representing a slight decrease from the 94,549 participants issued CVVs at 6 months postimplementation. The distribution of CVV prescriptions by food package category did not vary from 6 to 18 months postimplementation, but did vary somewhat by race and ethnicity. Non-Hispanic White participants made up a slightly smaller proportion of those issued CVVs at 18 months postimplementation (-1.2 percentage points), while non-Hispanic Black, non-Hispanic Asian/Pacific Islander, and non-Hispanic participants of multiple races made up a slightly larger proportion (+0.4, 0.2, and 0.3 percentage points, respectively). See appendix F for a detailed table showing the participant demographics of those receiving the CVV.

2. Comparison of 6 to 18 months postimplementation

Overall, 76.6 percent of eligible WIC participants used their CVV at 18 months postimplementation which, while significantly lower than at 6 months postimplementation (77.8 percent; $p < .0001$), still indicates a high level of acceptance of the added benefit. Since Wisconsin was 1 of 19 States to allow multiple CVVs to be used in a single transaction and 1 of 38 States that allowed participants to pay the difference on the cost of fruits and vegetables beyond the value of the CVV (Cole, Jacobson, Nichols-Barrier, Fox, & Robare, 2011), the study team also sought to identify the proportion of participants who were able to use the full CVV benefit (see figure 6).

FIGURE 6.—Overall CVV use (State-level), 6 and 18 months postimplementation



While the proportion of participants not using any amount of their CVV increased by only slightly more than 1 percent from 6 to 18 months postimplementation, a greater proportion of participants using their CVV were able to use the full value of the voucher at 18 months postimplementation (44.9 and 42.2 percent, respectively; $p < .001$). Changes in full use of the CVV and CVV non-use were further explored by race and ethnicity and food package type to identify whether and to what extent these factors may vary among WIC participants.

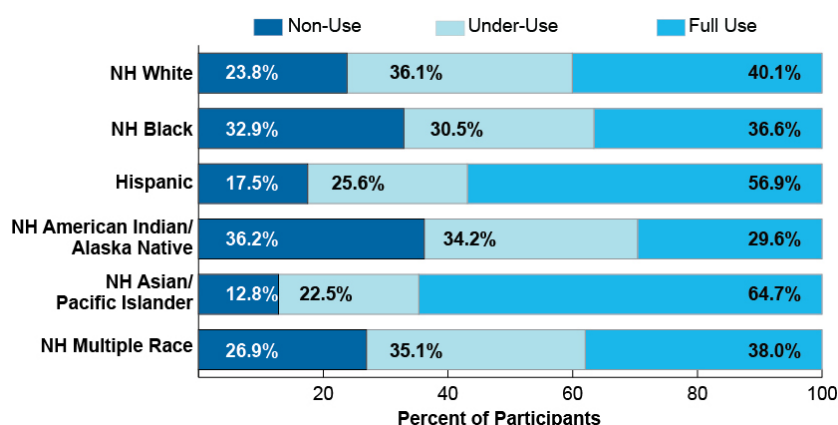
a) Differences in CVV use by race and ethnicity

Nearly all racial and ethnic groups saw an increase in both full use and non-use of CVVs from 6 to 18 months postimplementation. Hispanic participants saw the greatest increase in full use, from 53.0 to 56.9 percent ($p < .0001$), followed by non-Hispanic participants of multiple races, from 35.4 to 38.0 percent ($p < .05$). Full CVV use increased by about 2 percentage points among non-Hispanic White, non-Hispanic Black, and non-Hispanic Asian/Pacific Islander participants ($p < .05$), and did not change among non-Hispanic American Indian/Alaska Natives.

With regard to non-use of CVVs, non-Hispanic American Indian/Alaska Natives saw the largest increase from 6 to 18 months postimplementation (from 31.6 to 36.2 percent; $p < .01$), followed by non-Hispanic Asian/Pacific Islanders (from 10.3 to 12.8 percent; $p < .001$), while there was no change among non-Hispanic Black and non-Hispanic participants of multiple races.

The differences in CVV use between 6 and 18 months postimplementation were statistically significant (for most groups), but practically, the differences were rather small in magnitude. The real differences in CVV use are demonstrated by comparing full use between racial and ethnic groups. Nearly two-thirds of non-Hispanic Asian/Pacific Islander participants and 56.9 percent of Hispanic participants used the full amount of their CVV, compared to about 40 percent of non-Hispanic White and fewer than 40 percent of non-Hispanic Black, non-Hispanic American Indian/Alaska Native, and non-Hispanic participants of multiple races ($p < .0001$; see figure 7).

FIGURE 7.—Overall CVV use, by race/ethnicity, 18 months postimplementation (n = 91,291)

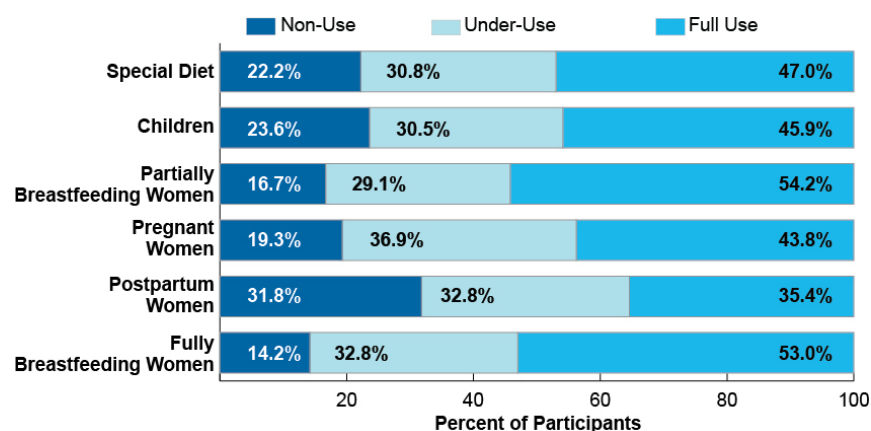


b) Differences in full use of CVVs by food package type

Consistent with overall findings, nearly all food package types saw an increase in full CVV use from 6 to 18 months postimplementation. This ranged from increases of about 2 percentage points among Postpartum ($p < .01$) and Pregnant Women ($p < .001$) to nearly 5 percentage points among those categorized as Special Diet ($p < .05$). Partially and Fully Breastfeeding Women did not see a change in full use. At the same time, Children, Pregnant Women, and Postpartum Women also saw a slight increase in non-use of CVVs ($p < .001$).

While changes in CVV use from 6 to 18 months postimplementation were not dramatic for any specific food package category, there were noteworthy differences in CVV use between food package types at both 6 and 18 months postimplementation. For instance, at 18 months postimplementation, more than half of Partially and Fully Breastfeeding Women made full use of their CVVs, compared to 35.4 percent of Postpartum Women and about 45 percent of Children and Pregnant Women ($p < .0001$; see figure 8).

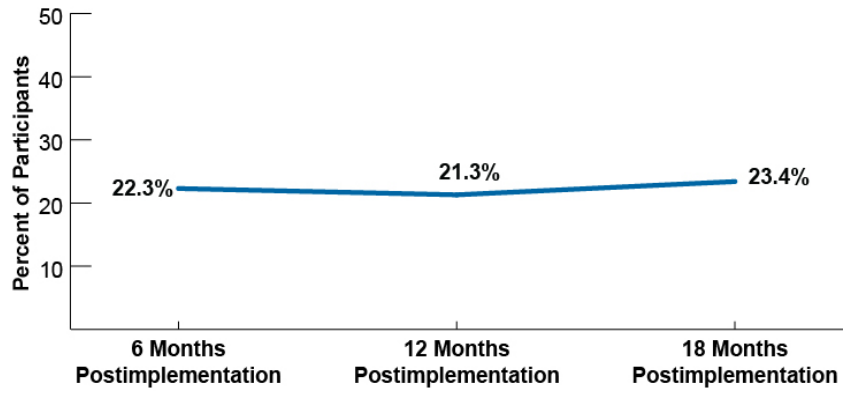
FIGURE 8.—Overall CVV use, by food package type, 18 months postimplementation (n = 91,291)



c) Trends across data collection periods

CVV usage did not differ dramatically across data collection periods. Similar to traditional FIs, there was a slight decrease in non-use of CVVs at 12 months postimplementation, which may be an indication of seasonal differences (see figure 9), followed by an increase at 18 months postimplementation.

FIGURE 9.—CVV non-use at 6, 12, and 18 months postimplementation*



*Differences between each data collection point were significant at $p < .0001$.

IV. Completeness of Purchases (Store-Level Findings)

Key Findings at 18 months postimplementation

- ❖ Overall, 77 percent of WIC participants at baseline and 67 percent of those at 18 months postimplementation made full purchases of all of their prescribed WIC foods in the study stores.
- ❖ Full redemptions of individual foods remains high in the study stores (>85 percent) for foods traditionally offered by WIC.
- ❖ Milk had among the highest redemption rates of any WIC food, and focus group reports of dissatisfaction with the new choices were much less common at 18 months than at 6 months postimplementation.
- ❖ Fewer than 40 percent of participants prescribed both beans and peanut butter made full redemptions for both foods, compared to 66 percent of participants at baseline.
- ❖ Nearly 85 percent of participants fully redeemed their whole grain benefits, despite some participants reporting trouble finding the correct size packages of whole grain breads earlier in the study.
- ❖ 92 percent of infants whose FIs were used in the study stores made full infant fruit and vegetable redemptions.
- ❖ More than 63 percent of WIC families using their CVVs in the study stores purchased more fruits and vegetables than the maximum value of the CVV.
- ❖ Some focus group participants reported that store clerks were not allowing them to exceed the value of the CVV, despite this being allowed by the Wisconsin WIC Program.
- ❖ In general, WIC participants in focus groups did not feel confident that they understood what could be purchased on any given food instrument.

A. Traditional Food Instrument Purchases

Another indication of WIC participant acceptance is the extent to which participants purchase all of their prescribed foods, or make “full purchases.” The study team hypothesized that with increased alternatives for beans (dry or canned) and canned fish (tuna or salmon), and additional healthful items, such as whole grains, participants might be more inclined to purchase all of their prescribed food items. On the other hand, the study team was aware that changes in the types of milk allowed and the elimination of the option to substitute cheese for milk (for most food packages) could have a negative effect on a participants’ likelihood to purchase all of their prescribed foods.

1. WIC participants in study stores

At 18 months postimplementation, 44 WIC-approved, full-service grocery stores provided POS data on purchases made with traditional FIs. These stores accounted for approximately 5.5 percent of WIC sales at 18 months postimplementation, providing data on WIC purchases made by a total of 6,989 WIC participants (see appendix A for detailed description of the study stores). This represents a decrease

from 9,127 participants shopping in the study stores at baseline. Since stores were purposively recruited, and not random, the sample of participants is not representative of the entire WIC population in Wisconsin. Hispanic and non-Hispanic White participants were overrepresented in the sample (+13.8 and +2.9 percentage points, respectively; $p < .0001$), while non-Hispanic Black and non-Hispanic Asian/Pacific Islander participants were significantly underrepresented (-13.8 and -2.2 percentage points, respectively; $p < .0001$). Non-Hispanic American Indian/Alaska Native and non-Hispanic participants of multiple races were represented proportionately within the study stores.

At 18 months postimplementation, Pregnant Women, Fully Breastfeeding Women, Partially Breastfeeding Women, and Infants Fully Breastfed (ages 6–11 months), were also overrepresented in the store participant sample (+2.9, +2.0, +0.6, +0.7 percentage points, respectively; $p < 0.0001$), while Infants Not Fully Breastfed (ages 6–11 months) and Postpartum Women were underrepresented (-3.5 and -2.6 percentage points, respectively; $p < .0001$). Children were represented proportionately within the store sample, compared to the total WIC participant population.

The racial and ethnic composition of the participant sample in the study stores did not change over time, though there were slight changes in the composition of participants sampled by food package type. At 18 months postimplementation, Infants accounted for a greater proportion of the sample, while Children, Partially Breastfeeding Women, and Postpartum Women comprised a smaller proportion than at baseline (see appendix G for participant characteristics).

Slightly fewer than 50 percent of participants in the sample made all of their FI purchases in the sample stores at 18 months postimplementation, and so have their entire food package purchase accounted for in the analysis. This is a greater proportion than at baseline (49.0 at 18 months and 39.0 percent at baseline; $p < .0001$), and is likely due to the decrease in the total number of food instruments issued—a result of the changes to the food packages.

2. Baseline to 18 months postimplementation

A large majority of WIC participants in the study stores purchased all of their prescribed foods at baseline and again at 18 months postimplementation. Overall, 77.1 percent of WIC participants at baseline and 67.4 percent of participants at 18 months postimplementation made full purchases of all of their prescribed WIC foods ($p < .0001$). This, however, represents a 9.7 percentage point decrease in full purchases since implementation of the changes to the WIC food packages.

Redemption Definitions

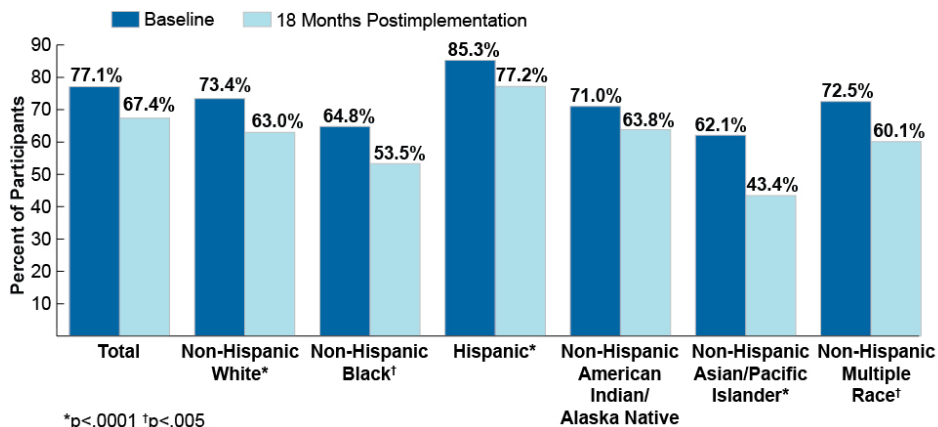
Full Purchase:

Participants purchased all foods on their FIs in the quantities prescribed.

a) Differences in full purchases by race and ethnicity

While decreases in full purchases from baseline to 18 months postimplementation were seen for nearly every racial and ethnic group, the magnitude of the differences varied dramatically. Non-Hispanic Asian/Pacific Islander participants saw the largest decrease in full purchases (from 62.1 to 43.4 percent; $p < .0001$), while Hispanic participants saw the smallest decrease (from 85.3 to 77.2 percent; $p < .0001$; see figure 10).

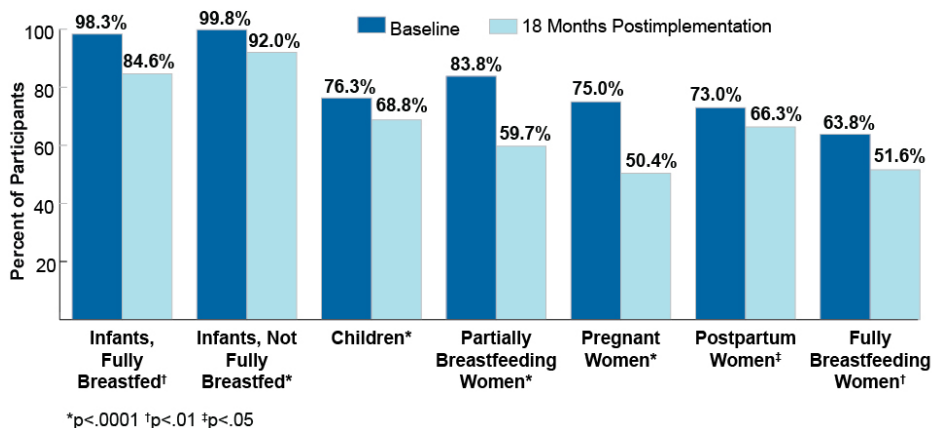
FIGURE 10.—Percentage of participants making full purchases, by race/ethnicity, baseline and 18 months postimplementation



b) Differences in full purchases by food package type

Similarly, decreases in full purchases were seen for all food packages, but differed across groups. Full purchases fell by nearly 25 percentage points among Partially Breastfeeding and Pregnant Women ($p < .0001$), while Postpartum Women saw the smallest decline (from 73.0 to 66.3 percent; $p < .05$ – see figure 11).

FIGURE 11.—Percentage of participants making full purchases of all prescribed foods, by food package type, baseline and 18 months postimplementation



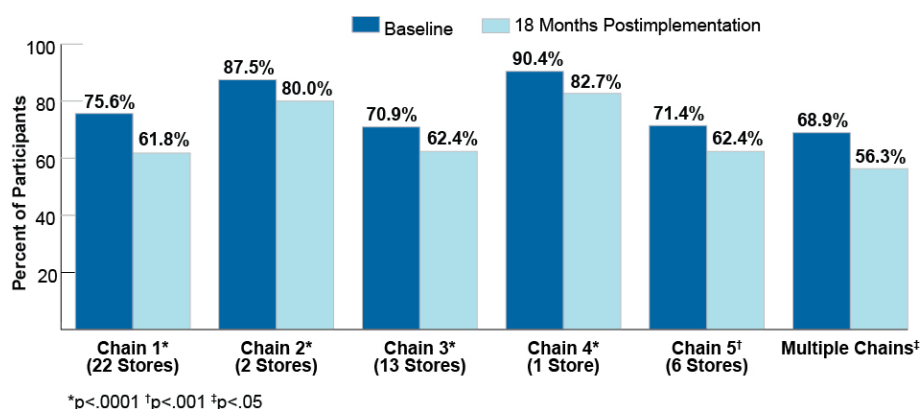
The observed decreases in infant purchases are likely due to the fact that, now, more foods are issued. Keeping in mind that these analyses do not include formula (due to issues with data quality), at baseline, the majority of infants ages 5–11 months were only prescribed infant cereal, which would have provided 1–2 boxes of cereal on a single WIC food instrument. In addition to cereal, at postimplementation, Infants Not Fully Breastfed (ages 6–11 months) were prescribed between 8 and 32 jars of infant fruit and vegetables (up to 128 ounces), and Infants Fully Breastfed were prescribed twice as much infant fruits and vegetables, as well as 15–31 jars of infant meat. As such, it can be expected that, with more food and quantity options, full purchases among infants would decrease after implementation of the food package changes, regardless of whether participants are more or less “satisfied” with the addition of infant food benefits. While the state-level analyses indicate that many infants do not use their FIs for

infant foods, the full redemption of infant foods among those who do use it may indicate that families are “stockpiling” infant foods, and therefore may not need that particular benefit in the months that follow.

c) Differences in full purchases by study store

Finally, differences in the proportion of participants making full purchases from baseline to 18 months postimplementation were examined by the sample store or chain in which the participants shopped. This is an important factor to consider, since WIC vendors were required to make some significant changes to comply with the food package changes, including stocking specific brands of infant foods and a 16 ounce loaf of whole grain bread, which was not a common size. This was also important to consider, since the study relied upon a non-random sample of stores that met certain criteria. In addition, focus group participants also mentioned that some stores are more “WIC-friendly” which may affect participants’ abilities to maximize their benefits. Each of the six chains or store designations (five primary chains or stores plus multiple chains or stores) saw a decrease in the proportion of participants making full purchases (see figure 12). The decreases in full purchases ranged from a high of 13.8 percentage points for chain 1 ($p < .0001$) to lows of about 7.5 percentage points for chains 2 and 4 ($p < .0001$).

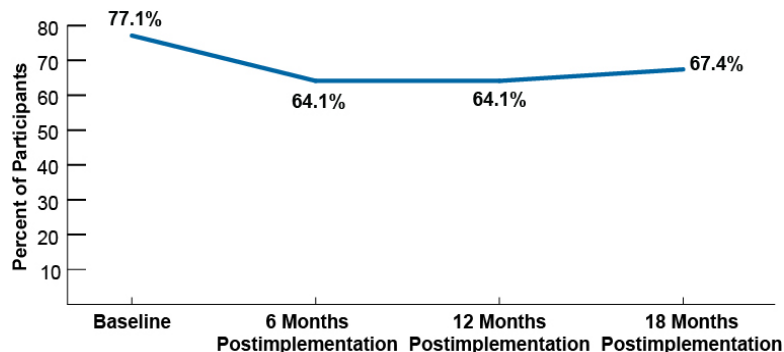
FIGURE 12.—Percentage of participants making full purchases, by sample chain/store, baseline and 18 months postimplementation



d) Trends across data collection periods

The proportion of WIC participants making full purchases was lower than at baseline for all postimplementation periods, however, the findings at 18 months postimplementation represent a significant increase over 6 and 12 months postimplementation, indicating increased satisfaction over the immediate postimplementation periods ($p < .0001$; see figure 13). This increase at 18 months postimplementation was seen primarily among Children and Fully Breastfed Infants, as well as Hispanic participants. Other food package types and racial and ethnic groups saw no change in full purchases between postimplementation data collection periods.

FIGURE 13.—Percentage of WIC participants making full purchases, baseline, 6, 12, and 18 months postimplementation*



*All postimplementation data points are significantly different from baseline at $p < .0001$. Full purchases at 6 and 12 months postimplementation did not differ significantly from one another, while 18 months postimplementation differed significantly from the previous postimplementation periods ($p < .0001$).

B. Individual Food Purchases

Another indicator of participant acceptance is the extent to which participants redeem all or none of each of the prescribed WIC foods. The study team expected that redemptions for some foods would increase due to decreased issuance (e.g., eggs, milk, and cheese) and additional substitution options (e.g., canned fish, beans).

1. Traditional WIC foods

Rates of redemption of traditional WIC foods were generally very high and did not change dramatically from baseline to 18 months postimplementation for most foods (see figure 14). Among food types showing a significant change were juice, milk, and beans. For each of the foods showing a significant change from baseline, this section describes the changes in their prescription resulting from the 2007 Interim Final Rule and the extent to which redemption patterns varied. (For detailed information regarding the foods that did not show a change in overall redemptions, see appendix H.)

Redemption Definitions

Full Redemption:

Participants redeemed their FI for the maximum amount prescribed of a specific food.

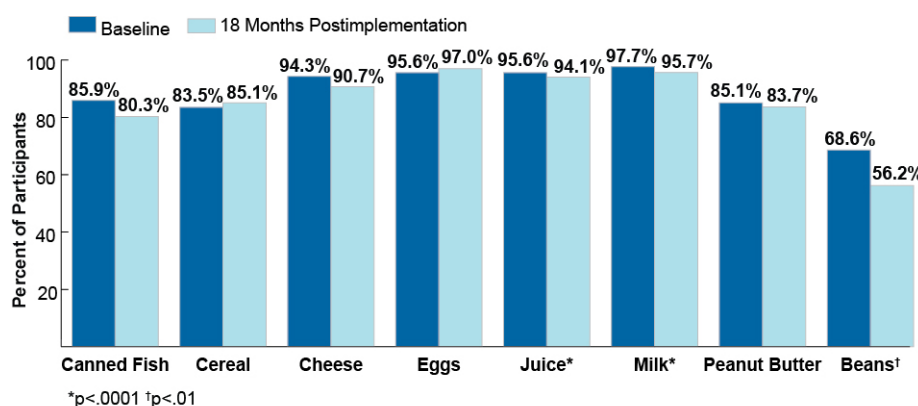
Partial Redemption:

Participants redeemed their FI for some of a specific food prescribed, but not the maximum amount.

Nonredemption or Not Redeemed:

Participants did not redeem their FI for any amount of a specific food.

FIGURE 14.—Percentage of participants making full redemptions of WIC foods, baseline and 18 months postimplementation



a) Juice

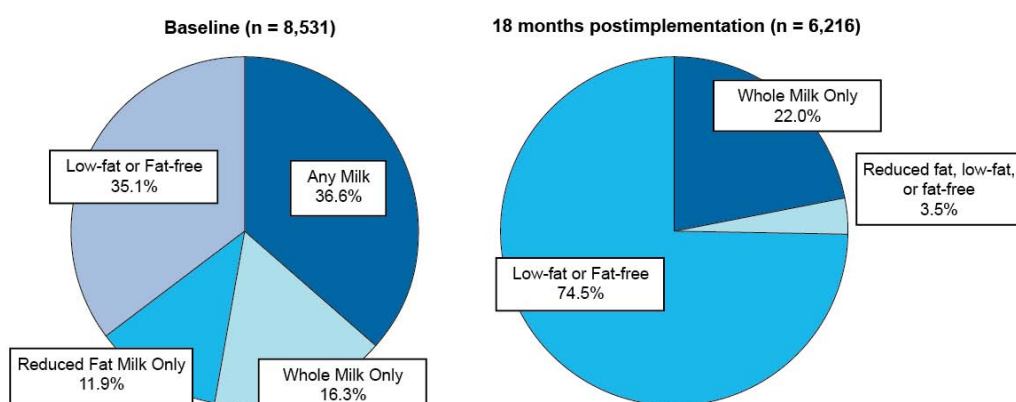
The 2007 Interim Final Rule dramatically reduced the maximum juice prescription from 288 to 128 fl. oz. for all children and women receiving food packages, and eliminated juice entirely for infants. Overall, participants had very high redemption rates for juice, though a very slight but significant decrease in full juice redemptions was observed from baseline to 18 months postimplementation (95.6 to 94.1 percent; $p < .0001$). The decrease in full redemptions was seen primarily among Pregnant and Postpartum Women (-3.7 and -5.7 percentage points, respectively; $p < .001$), and non-Hispanic White participants (-2.0 percentage points; $p < .001$).

b) Milk

Under the 2007 Interim Final Rule, maximum milk prescriptions were reduced for all food packages prescribed milk: Children, Pregnant and Partially Breastfeeding Women, Postpartum Women, and Fully Breastfeeding Women. In addition, only whole milk would be prescribed to Children up to age 2 and only fat-reduced milk would be prescribed to women and children ages 2 and older. The Wisconsin WIC program further limited milk to low-fat or fat-free for these food packages. Prior to these rule changes, participants were able to choose what type of milk to purchase. While these changes reduce the overall fat content of the WIC food packages, consistent with Institute of Medicine recommendations, it was hypothesized that some participants may not be willing to switch from whole or reduced-fat (2%) to low-fat (1%) or fat-free (skim) milk.

Prior to implementation of these changes, 36.6 percent of participants shopping in the study stores were prescribed any type of milk and 35.1 percent were prescribed low-fat or fat-free milk only. Fewer participants had their options limited further to whole milk (16.3 percent) and reduced fat milk (11.9 percent). In contrast, nearly three-quarters of participants shopping in the study stores at 18 months postimplementation were prescribed low-fat or fat-free milk only, while 22.0 percent were prescribed whole milk, and the remaining 3.5 percent were prescribed tailored packages offering the option of reduced-fat, low-fat, or fat-free milk (see figure 15).

FIGURE 15.—Milk prescriptions at baseline and 18 months postimplementation



Milk had among the highest redemption rates of any WIC food, with 97.7 percent of prescriptions fully redeemed in the sample stores at baseline. At 18 months postimplementation this had decreased only slightly to 95.7 percent ($p < .0001$). The majority of this change was accounted for by Children, among whom full redemptions decreased from 99.0 to 97.0 percent ($p < .0001$). Non-Hispanic White and non-Hispanic participants of multiple races also saw significant decreases in full milk redemptions (-2.6 and -4.1 percentage points, respectively; $p < .01$).

To further explore whether the type of milk was related to redemption patterns, milk purchases were compared based on the type of milk prescribed. Among those prescribed low-fat or fat-free milk at baseline and 18 months postimplementation, there were no changes in full milk redemptions. In contrast, there was a significant but small decrease in full redemptions among those prescribed whole milk: from 99.4 percent at baseline to 97.3 percent at 18 months postimplementation ($p < .0001$). Other milk prescriptions that were not used in both data collection periods are also shown in table 3.

TABLE 3.—Full milk purchases by type of milk prescribed, baseline and 18 months postimplementation

Type of Milk Prescribed	Baseline		18 Months Postimplementation	
	N	%	N	%
Any Milk	3,126	98.1%	--	--
Whole Milk Only	1,390	99.4%	1,367	97.3%*
Reduced Milk Only	1,019	98.3%	--	--
Reduced, Low-Fat, or Fat-Free	--	--	218	95.4%
Low-Fat or Fat-Free	2,996	96.2%	4,631	95.6%

*Difference between baseline and 18 months postimplementation significant at $p < .0001$.

c) *Peanut Butter and Beans*

Traditionally, food packages for Children, Partially Breastfeeding and Pregnant Women included 18 ounces of peanut butter with the option to substitute 1 pound of dry beans, while the food package for Fully Breastfeeding Women provided both 1 pound of dry beans and 18 ounces of peanut butter, and Postpartum Women were prescribed neither. The 2007 Interim Final Rule did not change the bean and

peanut butter prescriptions for Children or Fully Breastfeeding Women, but increased the prescriptions for other food packages. Partially Breastfeeding and Pregnant Women are now prescribed both beans and peanut butter and Postpartum Women are prescribed 18 ounces of peanut butter with a 1 pound bean substitution (see table 4). In addition, all food packages were given the added option to substitute 64 ounces (four 16-ounce cans) of canned beans for dry beans or peanut butter.

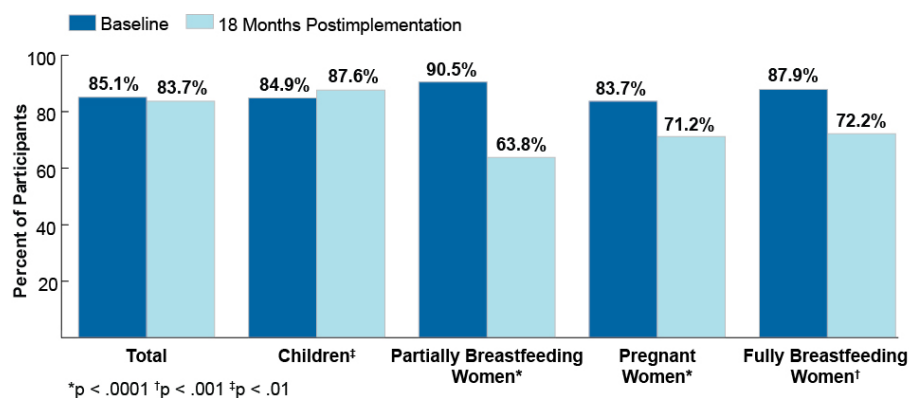
TABLE 4.—Changes in bean and peanut butter prescriptions, by food package type

	Prior Prescription	2007 Interim Final Rule
Children	Peanut butter (bean substitute)	
Partially Breastfeeding Women	Peanut butter (dry bean substitute)	Peanut butter and beans
Pregnant Women	Peanut butter (dry bean substitute)	Peanut butter and beans
Postpartum Women	None	Peanut butter (bean substitute)
Fully Breastfeeding Woman	Peanut butter and beans	

Full peanut butter and bean redemptions were defined based on the prescriptions described above. A full peanut butter redemption consisted of a 16 or 18-ounce jar of peanut butter (sizes smaller than that were not WIC-approved). A full bean redemption consisted of 1 pound of dry beans at baseline or four 14.25- to 16-ounce cans of beans (postimplementation only). When participants were prescribed peanut butter with a bean substitute, satisfying either of these conditions resulted in a full redemption; therefore, the discussion on peanut butter redemptions also includes redemptions when beans were selected instead of peanut butter.

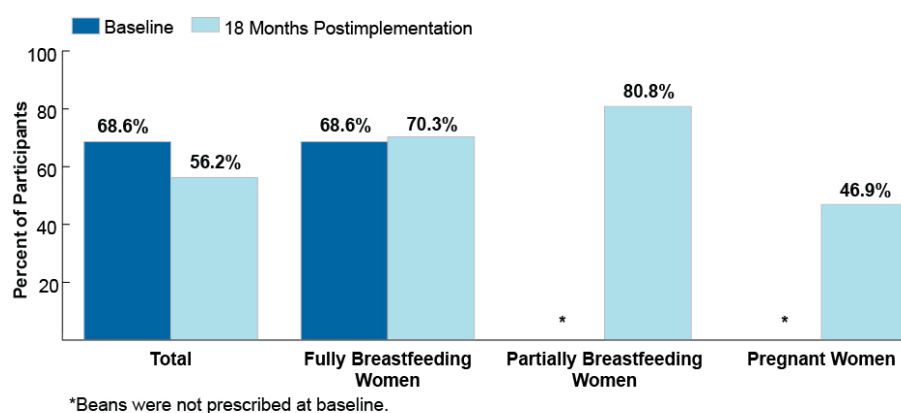
Overall, full peanut butter redemptions did not change significantly from baseline to 18 months postimplementation, but redemption patterns changed dramatically by food package type, which reflects to some extent the changes made to the food packages themselves. Among Children, whose prescription did not change, full peanut butter redemptions increased by nearly 3 percentage points from baseline to 18 months postimplementation ($p < .01$). However, Partially Breastfeeding and Pregnant Women, whose prescriptions increased to include both peanut butter and beans saw more than a 10 percentage point decrease in full redemptions ($p < .0001$), as did full redemptions for Fully Breastfeeding Women ($p < .001$; see figure 16).

FIGURE 16.—Percentage of WIC participants making full peanut butter redemptions, by food package type, baseline and 18 months postimplementation



Bean prescriptions generally have among the lowest rates of redemption among all WIC foods. At baseline when only Fully Breastfeeding Women were prescribed beans with no option to substitute for peanut butter, 68.6 percent of participants prescribed beans made full purchases. In comparison, only 56.2 percent of those prescribed beans without an option to substitute at 18 months postimplementation did so (Fully Breastfeeding, Partially Breastfeeding, and Pregnant Women; $p < .01$). Fully Breastfeeding Women did not see a change in full bean redemptions, and the overall decrease was solely due to significantly lower redemption rates among Pregnant Women at 18 months postimplementation (46.9 percent). More than 80 percent of Partially Breastfeeding Women purchased all of their beans at 18 months postimplementation (see figure 17).

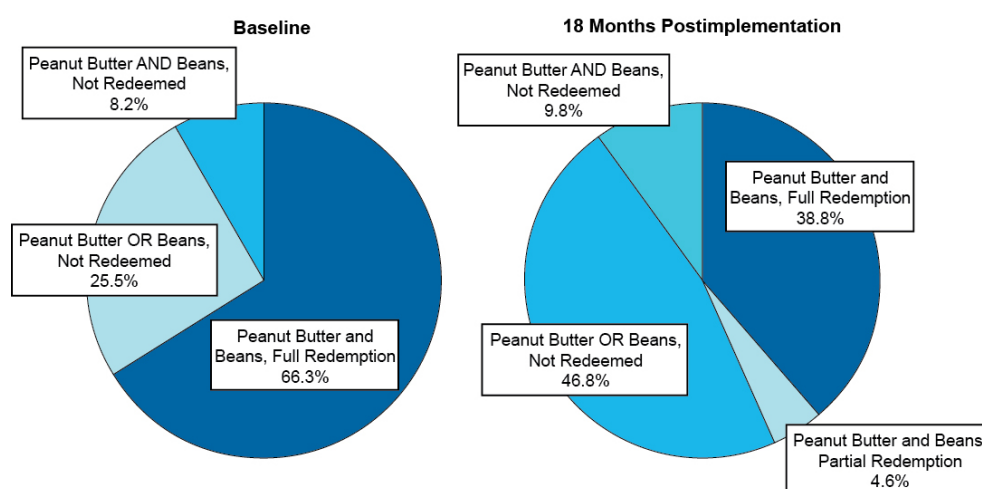
FIGURE 17.—Percentage of WIC participants making full bean redemptions among those prescribed beans only, baseline and 18 months postimplementation



Due to the differences in redemption patterns of peanut butter and beans between food package types after various changes to those food packages, additional analyses were conducted to examine redemption rates among participants prescribed peanut butter with a bean substitute and participants prescribed both peanut butter and beans.

Among participants whose prescriptions included peanut butter with a bean substitution, there was a small, but significant increase in full redemptions, from 85.0 percent at baseline to 87.1 percent at 18 months postimplementation ($p < .01$; not shown). However, among participants prescribed both peanut butter and beans, there was a significant change in the proportion of participants purchasing both foods overall and by food package type. At baseline, 66.3 percent of participants prescribed both beans and peanut butter made full redemptions for both foods. In contrast, only 38.8 percent of participants fully redeemed both foods at 18 months postimplementation. The decrease in full redemptions for both foods appears to be accounted for by a significant increase in the proportion of participants not redeeming one of the foods prescribed (25.5 to 46.8 percent; see figure 18).

FIGURE 18.—Percentage of participants redeeming peanut butter and beans, among those prescribed both, baseline and 18 months postimplementation



There were also significant differences in redemption patterns among the three food packages that prescribed both peanut butter and beans. At 18 months postimplementation, about 50 percent of Partially and Fully Breastfeeding Women made full redemptions for both peanut butter and beans, compared to only 32.0 percent of Pregnant Women. This difference was explained, in large part, by nearly 53 percent of Pregnant Women purchasing only one of these foods, and 12.2 percent not purchasing either. Fewer than 40 percent of Partially Breastfeeding Women and 35.8 percent of Fully Breastfeeding Women purchased only peanut butter or beans.

2. “New” WIC foods

In addition to the changes that were made to the traditionally prescribed WIC foods, noted above, the 2007 Interim Final Rule also mandated that additional foods be added to more closely align with the Institute of Medicine’s recommendations.

a) *Whole grains*

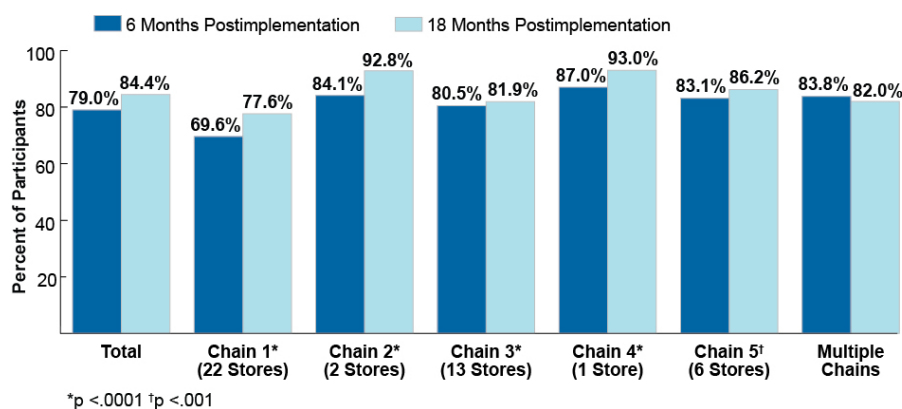
Whole grains were added to all food packages for participants ages 1 year and older. A 16 ounce loaf of whole grain bread is prescribed, with the option to substitute brown rice or whole grain tortillas. A large majority of participants fully redeemed these benefits at 18 months postimplementation (84.4 percent), indicating a high level of satisfaction with the addition of this new food. This also represents a significant

increase in full redemptions over the 79.0 percent of participants who fully redeemed this benefit at 6 months postimplementation ($p < .0001$).

Each of the food packages that prescribed whole grains had high rates of full redemptions at 18 months postimplementation, ranging from 79.8 percent of Pregnant Women to 91.8 percent of Fully Breastfeeding Women. While the variation between food package categories was not great, there were notable differences in full redemptions by race and ethnicity ($p < .05$). Non-Hispanic Asian/Pacific Islander participants were least likely at 18 months postimplementation to have fully redeemed their whole grain benefit (59.7 percent), followed by non-Hispanic Black participants (71.4 percent), while Hispanic participants were most likely to have done so (89.3 percent). More than 80 percent of non-Hispanic White and non-Hispanic American Indian/Alaska Natives also fully redeemed their whole grain benefit.

Other research has indicated that stocking and maintaining inventory of 16 ounce loaves of WIC-allowable whole grain bread has been problematic for some stores (Gleason, Morgan, Bell, & Pooler, 2011). Information provided by WIC participants via focus groups indicated that some stores had particular challenges with stocking some of the whole grain food items (described in detail later in this section). For this reason, the study team also sought to determine whether the study store or chain influenced full redemptions of whole grains. All of the chains participating in the study saw significant increases in the proportion of participants making full whole grain redemptions between 6 and 18 months postimplementation. The most dramatic increases occurred among participants shopping in chains 1 and 2 (shown in figure 19), both of which saw at least an 8 percentage point increase in full redemptions ($p < .0001$). These findings are consistent with focus group reports indicating that availability of the appropriate size whole grain loaves of bread had improved by 18 months postimplementation.

FIGURE 19.—Percentage of participants fully redeeming whole grains, by store, 6 and 18 months postimplementation



b) Infant foods

Infant foods were also added to the food packages for infants ages 6–11 months in order to provide appropriate levels of nutrients, introduce more variety into the diet, and encourage healthy eating early

in life (USDA, 2007). All infants of this age group are eligible to receive prepared infant fruits and vegetables, while Fully Breastfed Infants also receive prepared infant meats.

At 18 months postimplementation, 92.0 percent of infants whose FIs were used in the sample stores, made full infant fruit and vegetable redemptions. This represented a small, but significant decrease in full redemptions compared to 6 months postimplementation (94.7 percent; $p < .05$). Full infant fruit and vegetable redemptions did not vary among Infants not Fully Breastfed and Infants Fully Breastfed, but Hispanic infants were slightly more likely to have had a full redemption compared to non-Hispanic infants (94.9 versus 90.1 percent, respectively; $p < 0.05$).

Among Fully Breastfed Infants, 86.6 percent of those purchasing infant meat in the sample stores made full redemptions at 18 months postimplementation. Full redemptions did not vary significantly by ethnicity. Due to changes in the way FIs were issued for infant meats at 6 and 18 months postimplementation, it is not possible to compare the two time periods.

C. Cash Value Voucher Purchases

As noted in previous sections, CVVs could be used with other payment tender so that participants would be encouraged to use the full value of the voucher and potentially purchase greater quantities of fruits and vegetables than the CVV would allow. As such, analyses were conducted to examine the extent to which the full amounts of CVVs were redeemed in the sample stores and the extent to which this may have changed as use of the CVV became more commonplace.

1. WIC families in study stores

At 18 months postimplementation, 1,900 WIC families in the store sample redeemed a total of 2,297 CVVs or an average of 1.2 CVVs per family. This did not vary between 6 and 18 months postimplementation. Among the 31 study stores that were able to provide CVV data at all data collection periods, 66.9 percent of families were categorized as non-Hispanic White (based on the race and ethnicity of the oldest family member redeeming a WIC CVV), 17.2 percent were Hispanic, and 6.2 percent were non-Hispanic Black at 18 months postimplementation. This was unchanged from 6 months postimplementation. The composition of families in terms of WIC participant category did not change from 6 to 18 months postimplementation. See appendix I for a detailed description of the families in the sample.

CVV purchases were analyzed at the family level and include any fruits and vegetables purchased when at least one CVV was used as a form of payment at the sample stores.

2. Six to 18 months postimplementation

Among family purchases made with CVVs in the study stores, the total mean value of prescribed vouchers was \$8.70 at 18 months postimplementation, which was unchanged from 6 months postimplementation. The mean CVV redemption amount was \$8.24, which represents only a marginally significant increase over the mean redemption amount at 6 months postimplementation (\$8.05; $p < .09$). On average, WIC families in the sample redeemed \$0.46 less than the maximum amount of their total voucher prescription.

Since split tender permits WIC families to use more than one form of payment when using their CVVs, the store-level data included all fruits and vegetables purchased during such a transaction. Overall, 63.2 percent of WIC families in the study stores purchased more fruits and vegetables than the maximum value of the CVV at 18 months postimplementation, compared to only 56.5 percent of families at 6 months postimplementation ($p < .0001$).

The increase in the proportion of participants purchasing more fruits and vegetables than their CVV would allow was observed among Hispanic ($p < .001$), non-Hispanic White ($p < .0001$), and non-Hispanic Black households ($p < .05$), while there was no significant change among non-Hispanic Asian/Pacific Islander and non-Hispanic families of multiple races and ethnicities (the sample of non-Hispanic American Indian/Alaska Natives was not sufficient to discern any change). In addition, WIC families in which the oldest participant was a Child or a Pregnant Woman saw significant increases in the proportion of fruit and vegetable purchases that exceeded the amount of the CVV ($p < .0001$ and $p < .01$, respectively). Finally, increases were also seen among both of the chains that provided CVV data at 6 and 18 months postimplementation ($p < .05$).

D. Participant Satisfaction with the Food Package Changes

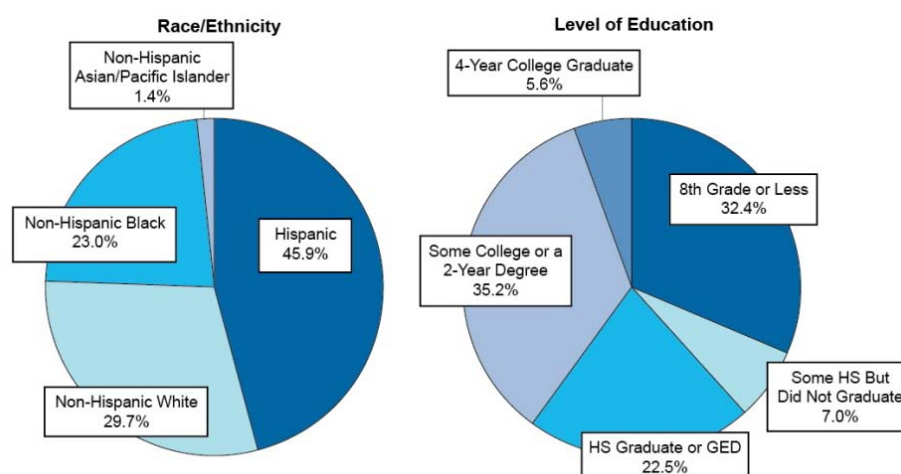
Information gleaned from focus group discussions contributed to greater understanding of participants' acceptance of the new food package. It also provided valuable insight into factors other than acceptance that could have influenced participants' purchasing patterns, which are critical to understand for two reasons. First, the identification of barriers to WIC food instrument use or full redemption of allocated foods is important from a programmatic perspective because they may present opportunities for improvement. Second, because redemption rates are used as a measure of participant acceptance in this study, it is important to understand to what extent factors other than preferences may have influenced participants' use of WIC FIs and CVVs and redemption of specific foods.

1. Focus group participant sample

A total of 99 WIC participants were recruited and confirmed to participate in the 12 focus groups that were conducted in March 2010 and March 2011—approximately 6 and 18 months postimplementation (six focus groups at each time period). The overall show rate was 75 percent with a total of 74 participants attending the focus groups across both data collection periods. Show rates ranged from a low of 57 percent to a high of 91 percent and were highest among those that were Spanish-speaking focus groups. See appendix B for a detailed table on focus group recruitment and participation.

Overall, nearly half of focus group participants reported being Hispanic (45.9 percent), while 29.7 percent reported that they were non-Hispanic White and 23.0 percent were non-Hispanic Black. Nearly one-third of focus group participants had less than a high school education (32.4 percent), while 7 percent had some high school but no diploma and 22.5 percent had a high school degree or equivalent. More than one-third of focus group participants had some college (40.8 percent), while fewer than 6 percent had a four-year college degree (see figure 20).

FIGURE 20.—Focus group participation, by race/ethnicity and level of education (n=74)



2. Participant satisfaction with the food package changes

Overall, WIC participants in the focus groups reported great satisfaction with the recent changes to the WIC food package, and in particular, the addition of fruits and vegetables and whole grains. Participants also reported purchasing some of the other foods that are newly available through WIC—most notably, canned beans instead of dried beans—and appreciate the increased diversity of foods that can now be purchased through WIC.

Despite the general consensus among focus group participants that the food package changes were a step in the right direction, there was some discontent within the groups with regard to specific changes that have been made. For example, many WIC participants reported being unhappy about the omission of cheese from the new food packages, as well as the change from any type of milk to only fat-free and low-fat milk. Reports of dissatisfaction with the milk choices were much more common at 6 months postimplementation than at 18 months postimplementation, which is indicative of increased acceptance of this particular change over time. There were also many reports of WIC participants being prescribed more peanut butter, tuna, and baby food than they wanted or needed, which likely contributes to under-redemption of these foods.

Additionally, when asked about the ease of transitioning to the new food package or using the new food instruments, many WIC participants reported feeling unprepared. Based on information gleaned from the focus group discussions, it seems that challenges imposed by the inadequate stock of new foods in some stores and inexperience of store clerks in transacting new food instruments may have compounded participants' general feeling of unpreparedness, particularly around the time of implementation. However, not all participants felt unprepared. In fact, one focus group participant noted that she thought the WIC program did a fine job of preparing her for the changes and insightfully acknowledged that, "... you just have to get used to it." Overall, focus group participants felt the CVV was the easiest food instrument to use.

3. Challenges related to food instrument redemption

Indeed, a learning curve is to be expected with a change of this magnitude, which could explain why some of the issues that were noted frequently by participants in the focus groups conducted at 6 months postimplementation were noted less frequently at 18 months postimplementation. Some of the issues identified through focus group discussions are not directly related to satisfaction with the new food package but are important to consider because of their potential to influence participants' purchasing patterns.

a) Finding specific foods in the stores

When participants were asked about the availability of the new WIC foods at 6 months postimplementation, many noted issues finding whole wheat bread. Reportedly, stores in which some focus group participants shop were frequently out of stock of the one pound package of bread, and in some cases, they did not carry it altogether. Even when stores did have allowable bread packages in stock, WIC participants reported having a lot of trouble finding them on the shelf because they were not well marked. Whole wheat tortillas, juice, and specific types of cereal were also, reportedly, difficult to find or unavailable. When faced with these types of issues, some participants reported that they would leave all of their items behind and go to a different store, which caused some frustration and increased the time participants' spent food shopping. Still, others reported finishing their shopping trip and omitting the item from their purchase. Issues related to the availability of whole wheat bread, specifically, were noted less frequently at 18 months postimplementation.

"I thought I was prepared until I went to buy bread. Finding that one pound loaf is really hard!"
—Focus Group Participant (6 months postimplementation)

b) Issues at the register

Many WIC participants noted that checking out at the grocery store when using their WIC food instruments was their least favorite part of the entire program. Participants expressed how stressful and lengthy these transactions can be and noted that they frequently have problems at the register. Most of the challenges participants described were directly related to store clerks' familiarity with WIC transactions, receptivity of store clerks to WIC participants, or the accuracy with which stores' systems recognized allowable WIC foods. Certainly, these concerns are not new to WIC participants nor are they directly related to the recent changes to the WIC food package. However, with the introduction of a new type of food instrument (CVV) and an increase in the number and types of products WIC participants could purchase, the new WIC food package may have exacerbated these types of problems. While these factors were most likely to complicate transactions around the time of implementation, WIC participants were still reporting similar issues at 18 months postimplementation. One issue noted by focus group participants is unique to the revised food package as it relates to CVV transactions. Some participants reported that store clerks were not allowing them to exceed the value of the CVV, which is permitted in Wisconsin. Participants expressed their frustration with this clerk error, in particular, because it ultimately leads to increased time at the register or having to return or leave behind a portion of their fruit and vegetable purchase.

c) Interpreting WIC food instruments

Questions related to interpreting WIC food instruments were incorporated into the focus group guide used at 18 months postimplementation. The focus group facilitator also brought a series of voided WIC food instruments to show to and discuss with focus group participants. Findings from this specific discussion indicate that WIC participants do have some trouble understanding what they can buy with their food instruments. Focus group participants reported that the food instrument format (e.g., indentation of some lines, use of asterisks), use of abbreviations that were not clearly defined (e.g., “Oz” instead of “ounce”), and frequent use of “or” were particularly confusing. The use of decimals to define the amount of a food item that could be purchased (e.g. “14.75 oz canned salmon”), reportedly, intimidated WIC participants because they were not confident that they could find the exact amount listed on the food instrument. In general, WIC participants did not feel confident that they understood what could be purchased on any given food instrument. Primarily Spanish-speaking focus group participants reported even greater concern about understanding their WIC benefit because their food instruments are issued in English.

“I just get the foods I really understand on the check. Then I know the check out person won’t give me a hard time.”

—Focus Group Participant (18 months postimplementation)

V. WIC Participants Food Choices and Preferences (Store-Level Findings)

Key Findings at 18 Months Postimplementation

- ❖ *Among participants using their benefit for low-fat or fat-free milk, the majority purchased low-fat (81 percent), while 13 percent purchased fat-free and 6.0 percent purchased both types of milk.*
- ❖ *There were more reports of WIC participants purchasing low-fat milk with their own money after their WIC checks had been used.*
- ❖ *There was a significant increase in the proportion of participants substituting beans for peanut butter during the study period.*
- ❖ *Among participants purchasing beans, 46 percent of participants purchased dry beans, while 54 percent purchased canned beans.*
- ❖ *More than 80 percent of participants using their whole grain benefit purchased bread, and 44 percent of focus group participants reported continuing to purchase whole grain breads after their WIC benefits had been used.*
- ❖ *Overall, 87 percent of families purchased fresh fruit and 52 percent purchased fresh vegetables.*
- ❖ *When shopping for fruits and vegetables, WIC participants frequently reported shopping for what was seasonal and on sale.*
- ❖ *Some participants specifically noted that the CVV allows them to buy a larger variety of fruits and vegetables than they would otherwise.*

A. Traditional Food Instrument Purchases

While the WIC program prescribes specific, nutritious foods for each food package, participants are able to make some choices about what to buy, beyond whether to buy something (as described in the previous section). Among these options are beans as a substitute for peanut butter, low-fat versus fat-free milk, and whether to purchase infant fruits, vegetables, or both. In addition, with the introduction of the CVV for fruits and vegetables, participants are able to choose among fresh, frozen, and canned fruits and vegetables. This section describes the choices participants are making when purchasing their WIC foods based on analysis of store-level POS data and is supplemented by qualitative information gathered through focus groups.

1. Milk

As noted above, significant changes were made to the types of milk offered to participants. Prior to implementation of the food package, most WIC participants were able to choose any type of milk, but after implementation, Children ages 2 and older and women of all food package categories were given the option of low-fat or fat-free milk.

At 18 months postimplementation, 74.5 percent of WIC participants shopping in the sample stores were prescribed low-fat or fat-free milk, compared to only 35.1 percent prior to the food package changes. At baseline, 36.6 percent of participants were able to purchase any type of milk, which was not an option after the changes took effect. Among participants who were prescribed and used their benefit for low-fat or fat-free milk in the sample stores at 18 months postimplementation, the majority purchased low-fat (80.8 percent), while 13.2 percent purchased fat-free and 6.0 percent purchased both types of milk.

2. Peanut butter and beans

In addition to adding peanut butter and bean prescriptions to a number of food packages, canned beans were also added as a substitute for dry beans or peanut butter. This alternative was included to provide WIC participants with more options and greater convenience when preparing meals using beans. The study team sought to determine participant acceptance of this new alternative by examining the rates at which participants substituted any beans for peanut butter and how frequently canned beans were purchased instead of dry beans.

Only participants prescribed peanut butter or beans were able to substitute canned beans for their peanut butter. This affected Children, who were already prescribed peanut butter with a bean substitute prior to the food package changes, and Postpartum Women who were offered that benefit for the first time after the food package changes. Among Children, there was a significant increase in the proportion of participants substituting beans for peanut butter between baseline and 18 months postimplementation (32.1 and 43.8 percent, respectively; $p < .0001$). Making the substitution was much more common among Children than among Postpartum Women at 18 months postimplementation (43.8 and 29.2 percent, respectively; $p < .0001$). Substituting beans for peanut butter was also most common among Hispanic participants (78.5 percent), followed by non-Hispanic Black and non-Hispanic American Indian/Alaska Native participants (36.2 and 27.3 percent, respectively). Fewer than 14 percent of non-Hispanic White and non-Hispanic participants of multiple races substituted beans for peanut butter.

Among participants who purchased beans in the study stores, 46.4 percent of participants at 18 months postimplementation purchased dry beans, compared to 53.6 percent purchasing canned beans. The large proportion of participants making use of canned beans indicates a high level of satisfaction with this specific change.

3. Canned fish

Historically, Fully Breastfeeding Women, the only group prescribed canned fish, were able to purchase only canned tuna, however the changes to the food package provided a choice of canned fish. At 18 months postimplementation, 90.3 percent of women purchased tuna, while 8.3 percent purchased salmon, and the remaining 1.4 percent purchased both types of canned fish. This was unchanged from 6 months postimplementation.

4. Whole grains

With the addition of whole grains to many of the food packages, participants had the option to purchase whole grain bread, whole grain or corn tortillas, and brown rice. At 18 months postimplementation, the

vast majority of participants using their whole grain benefit in the study stores purchased bread (83.0 percent), while 11.8 percent purchased whole grain tortillas and 1.9 percent purchased brown rice. Slightly more than 3 percent of participants purchased more than one type of whole grain, the majority of which included whole grain bread. There were no differences in whole grain preferences from 6 to 18 months postimplementation.

5. Infant fruits and vegetables

At 18 months postimplementation, the majority of families purchasing prepared infant fruits and vegetables bought both types (77.9 percent), which was unchanged from 6 months postimplementation. Only 16.2 percent of infants purchased only infant fruits, while 5.9 percent purchased only infant vegetables at the sample stores.

B. Cash Value Voucher Purchases

1. Types of fruits and vegetables

Wisconsin opted to provide WIC participants receiving CVVs for fruits and vegetables a significant amount of control over the variety of fruits and vegetables they purchased by allowing fresh, frozen, and canned vegetables. Among the stores providing data, fruits were more popular than vegetables, with 90.4 percent of families purchasing fruits at 18 months postimplementation and 59.9 percent purchasing vegetables during transactions when a CVV was used. There was no change compared with 6 months postimplementation in the proportion of families purchasing fruit, however, there was a small, but significant decrease in the proportion of families purchasing vegetables (from 63.2 to 59.9 percent; $p < .05$).

There was very little change in the proportion of purchases that were fresh, frozen, or canned at 6 and 18 months postimplementation. Despite it being February at both data collection periods, fresh produce was most commonly purchased, while fewer families purchased frozen or canned fruits and vegetables (see figures 21 and 22). Overall, 87.0 percent of families purchased fresh fruit at 18 months postimplementation, and 52.4 percent purchased fresh vegetables. Frozen vegetables were the next most-purchased item (10.6 percent), followed by canned fruit and vegetables (8.8 and 8.4 percent each, respectively).

FIGURE 21.—Percentage of WIC families purchasing fresh, canned, and frozen fruits, 6 and 18 months postimplementation

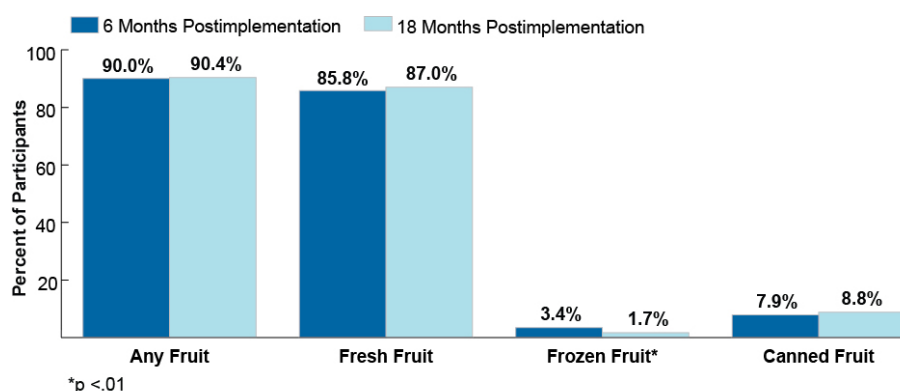
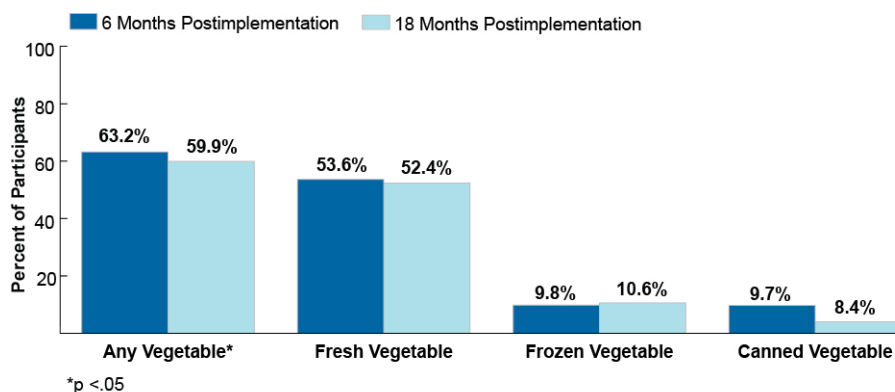


FIGURE 22.—Percentage of WIC families purchasing fresh, frozen, and canned vegetables, 6 and 18 months postimplementation



2. Variety of fruits and vegetables

A wide variety of fruits and vegetables were purchased at 18 months postimplementation. Among the study stores providing data, bananas were most-often purchased among families purchasing fruit (55.7 percent), followed by apples and grapes (39.5 and 29.9 percent, respectively). More than 25 percent of families also purchased oranges and strawberries, while about 7 percent purchased pears, cantaloupes, pineapples, and mixed fruit (e.g., fruit cocktail, frozen blueberries, and strawberries).

Among families purchasing vegetables, greens (e.g., any type of lettuce, collard or mustard greens, spinach) were most-often purchased (33.1 percent), followed by carrots (29.8 percent) and tomatoes or tomato products (28.9 percent). Nearly 20 percent of WIC families bought onions, 14.7 percent bought broccoli, and more than 10 percent purchased peppers, corn, cucumbers, celery, and beans (e.g., green, yellow, waxed).

C. Focus Group Findings Related to Food Preferences

When asked how they decide what to buy with their WIC food instruments, WIC participants reported personal preferences as the primary consideration. However, item availability was also a factor. Cost of food items was not a consideration when shopping for WIC, with one exception. When shopping for fruits and vegetables, WIC participants frequently reported shopping for what was seasonal and on-sale. Most participants reported that cost outranked personal preferences across the board when shopping for non-WIC foods.

“On WIC, I buy brand names, but if I have to pay for it, I wouldn’t.”
—Focus Group Participant (6 months postimplementation)

1. Milk

Interestingly, though not unexpected, at 6 months postimplementation the majority of focus group participants reported purchasing 2% milk after they had used their WIC food instruments. In some cases, this was the type of milk they preferred or were used to drinking. However, more often than not, purchasing 2% milk was related to their children’s preference for this type of milk or their perception

that it is better for their health or their child's health. For this reason, at 6 months postimplementation, a large proportion of focus group participants were opposed to the change to lower fat milk. Still, most participants did report buying milk with their WIC food instruments even though they were limited to fat-free or low-fat milk. Some reported mixing the lower fat milk purchased through WIC with higher fat milk purchased with their own money or switching milk caps in order to get their children to drink the lower fat milk. Discontent about the restriction to lower fat milk was noted much less frequently at 18 months postimplementation. Moreover, there were more reports of WIC participants purchasing low-fat with their own money after their WIC food instruments had been used.

2. Peanut butter and beans

During the focus group discussions there were many reports of participants not purchasing all of their allotted peanut butter because they either did not like peanut butter or received more peanut butter than they could consume. Spanish-speaking WIC participants were most likely to report the omission of peanut butter from their purchases, although this was reported frequently by other participants as well.

"I like that I can buy beans now. We used to buy peanut butter until we got too many of them. Now we buy beans."

—Focus Group Participant (6 months postimplementation)

Some participants reported that they did not know how to cook with beans or that they did not like them. However, this was not particularly common among Spanish-speaking focus group participants. When beans were purchased, Spanish-speaking focus group participants reported a preference for dry beans, whereas, other focus group participants reported a preference for canned.

"We won't use the peanut butter or beans. They'll eat peanut butter but we have so much of it....and my kids refuse to eat beans."

—Focus Group Participant (6 months postimplementation)

3. Whole grains

At 6 and 18 months postimplementation, all WIC participants reported buying whole wheat bread when it was available as opposed to other allowable types of whole grain. When whole wheat bread is not available, the majority of WIC participants reported purchasing whole wheat tortillas. When asked what type of bread they purchase (whole wheat or white bread) with their own money after their WIC food instruments have been used, 19 out of 43 focus group respondents (44 percent) at 6 months postimplementation reported purchasing whole wheat bread. Also, at 18 months postimplementation the majority of participants reported that they would eat more whole grains if they were able to buy more with their WIC food instruments.

4. Fruits and vegetables

Most focus group participants reported purchasing fresh fruits and vegetables with their CVVs. High-quality fresh fruits and vegetables were, reportedly, readily available to all focus group participants. Only a few participants reported buying frozen fruits and vegetables, primarily because of challenges related to keeping produce fresh. Similarly, only a few participants reported buying canned fruits and

vegetables; their preference for canned products was based on what they were accustomed to eating at home. Some participants specifically noted that the CVV allows them to buy a larger variety of fruits and vegetables than they would otherwise.

“We get all kinds of stuff. Sometimes I let the kids pick out something fun and try it. We’ve definitely increased our variety of fruit but we always go way over the amount.”

—Focus Group Participant (18 months postimplementation)

VI. Limitations

While the State-level measures of participant acceptance include the entire universe of WIC participants, store-level findings rely on a sample of stores willing and able to participate in the study. Because purposive sampling was conducted to include a variety of stores, including urban and rural geography as well as small and large vendors, the result is a nonrepresentative sample of participants. As such, the results are not generalizable to a larger population. This method of data collection also introduces potential for clustering effects of stores, as was demonstrated to some extent in analysis presented by chain, which yielded different rates of redemption based on the chain in which the participant shopped. This was the case both in overall full purchases and redemptions where availability of foods may have had an impact on completeness of purchases. While focus groups also yield a nonrepresentative sample of participants, using this type of triangulation approach helps to identify potential issues that may be present for the population in general. Similar findings from focus groups suggest that the issues identified specific to WIC vendors, such as availability of foods, training and knowledge of store clerks, and processing of CVV tender by stores may be more widespread and representative of other WIC participants' experiences than just those making purchases in the sample stores.

Another slight limitation of the study is the lack of individual-level data showing participant reactions and adjustments to the changes in the food packages over time. A longitudinal study, which would allow one to assess individual-level behavior, however, is neither feasible nor desirable because of the short timeframe in which most participants remain in a single food package. For instance, pregnant women may be on the program as a pregnant women for no more than 9 months and then as postpartum or breastfeeding for 6 or 12 months. Similarly, an infant at baseline could have progressed through three or four different food packages (depending on age at baseline), making conclusions very difficult to draw. Finally, the only food package in which participants may have remained throughout the 18-month study period, Children, have relatively high turnover rates in WIC, which could potentially influence findings from a longitudinal study. For these reasons, the cross-sectional design was much more feasible and meaningful in interpreting shifts in redemption patterns for specific foods and food packages over time.

VII. Conclusions

Recent changes to the WIC food package were made based on recommendations of an IOM committee with the intention of better aligning nutrient intake among WIC participants with the *2005 Dietary Guidelines for Americans* and infant feeding practice guidelines of the American Academy of Pediatrics (USDA, 2007). The committee's recommendations were intended to improve WIC participant food choices and promote healthy eating practices, while maintaining cost-neutrality within the WIC program. In its review of the WIC food packages, the IOM identified the risks and benefits of the proposed changes and sought to minimize the risk of increased costs. However, as the new food packages were implemented, there were some questions about how accepting WIC participants would be of the newly allowable foods. For example, would WIC participants be willing to redeem their food instruments for low or reduced fat milk instead of whole milk, or for the newly available whole grain options? Would they use their CVVs to purchase fruits and vegetables? Achieving the proposed benefits of the food package changes depends largely on participant acceptance of these changes, which was the purpose of this study.

More than 18 months after implementation of the food package changes, the evidence presented in this study suggests that WIC participants are very accepting of the WIC food package benefits. This is consistent with findings from other research that also found high levels of satisfaction and indicate that WIC participants are purchasing and consuming more nutritious foods as a result of the food package changes (Whaley et al., 2011). Despite the general positive response to the food package changes, some notable decreases in WIC food instrument use and less than ideal redemptions of specific WIC foods were noted overall and disproportionately among some WIC subpopulations. This section provides a summary and discussion of the key findings from this study with regard to WIC participant acceptance of the new food packages, as well as their preferences among the food choices now offered.

❖ Overall, WIC participants accepted and were satisfied with the new WIC food packages.

While we did not see increases in many of our measures of participant acceptance between baseline and 18 months postimplementation, we also did not identify any dramatic negative effects overall. The vast majority of WIC participants used some or all of their food instruments 18 months after the food package changes were implemented and most made full purchases of the foods prescribed to them. Moreover, qualitative information gleaned from focus groups point to a high degree of satisfaction with the foods now issued through the WIC program and suggest that other factors, such as the availability of particular food items, food instrument interpretation, and issues at checkout, might help explain some of the decreases observed in this study.

More than three-quarters of WIC participants used their CVVs once this benefit was prescribed. This is consistent with reports from focus group participants indicating high satisfaction with and use of this benefit.

❖ **Food instrument non-use increased slightly compared to baseline.**

While many of our measures demonstrate a high level of acceptance, there was an increase from baseline in the proportion of participants who did not use any food instruments (almost 5 percentage points). This change was seen across participant categories and racial and ethnic groups, but appears to impact non-Hispanic Black and non-Hispanic American Indian/Alaska Native participants the most. Unfortunately, focus group discussions with WIC participants did not provide much insight into the reasons for food instrument non-use. Rather, WIC participants offered some explanations for less than ideal redemptions of specific WIC foods, which are discussed in the sections that follow. Since focus groups consist of a self-selected sample, it's possible that only those WIC participants who use their food instruments opted to participate.

In addition, infant foods were purchased by a relatively small proportion of those eligible for this benefit. Limited use of these food instruments might indicate that parents of infants are not buying or feeding all of the infant foods provided by WIC, especially Fully Breastfed Infants where only about half redeemed any food instruments for infant meat at 18 months postimplementation. Information gleaned from focus groups substantiate this finding as several WIC participants explained that they did, in fact, receive more baby food than they would feed to their infants.

While it was outside the scope of this study to examine factors that might contribute to non-use, one can surmise that multiple factors may have contributed to this increase in food instrument non-use. For example, given the economic downturn that began during the study, it's possible that more WIC participants than usual moved out of the State and were, thus, unable to redeem their food instruments. If participants' transportation options were affected by the economic downturn, this could also have increased barriers to participants' using their benefits. Also, little is known about the impact of the recent increases in benefits received through the Supplemental Nutrition Assistance Program (SNAP). Since many WIC participants are also SNAP participants, it's possible that the increased SNAP benefit influenced WIC participants' need for or use of their WIC benefit.

❖ **Full purchases of WIC food benefits decreased slightly compared to baseline.**

Based on an analysis of POS data, most WIC participants made full purchases—or purchased all of the foods issued to them in the prescribed amount—when using their food instruments at 18 months postimplementation. However, the percent of WIC participants making full purchases with their traditional food instruments decreased compared to baseline. A large proportion of this decrease can be explained by the relatively low redemption of whole grains and beans, as well as small but significant decreases in full purchases for juice and milk.

Full prescriptions of whole grains were purchased by 79 percent of WIC participants at 6 months postimplementation. At first glance, this observation might point to a less than ideal acceptance or uptake of this benefit by WIC participants. However, focus group participants indicated that they were very satisfied with the addition of whole grains to the WIC food package, but that the availability of whole grain bread in the allowable one pound package was limited, particularly at 6 months postimplementation. Focus group participants were less likely to report issues finding the one pound

packages at 18 months postimplementation, which is consistent with the quantitative findings indicating that full redemption of this food item increased to more than 84 percent during this time period. This trend over time for increased uptake of whole grain benefits provides some indication that full redemptions may continue to increase over time.

Second, full prescriptions of beans were purchased by only 56.2 percent of WIC participants overall at 18 months postimplementation. Pregnant Women were least likely to make a full purchase of their bean prescription (46.9 percent). Further examination of this issue, including information gleaned from focus group discussions, indicates that issues interpreting WIC food instruments could help explain this relatively low redemption of beans overall, and in particular, for Pregnant Women. Under the new rule, Pregnant Women are issued beans and peanut butter. It is possible that the change from having to choose peanut butter or beans to a prescription of both peanut butter and beans might have been missed or overlooked by Pregnant Women because of the relatively minor change that was made to the food instrument itself. The change to the food instrument consisted of deleting the word “or.” Due to the small proportion of Pregnant Women who actually purchased both items and focus group reports regarding the complexity of understanding FIs, it is reasonable to assume that issues interpreting the food instruments influenced non-redemption of these items.

One factor that might have contributed, as well, to the decrease in full purchases overall and for specific foods is the way in which foods were issued. Implementation of the new food packages resulted not only in changes to the food benefit offered to WIC participants, but also the number of food instruments on which they were issued. For Children and all categories of women, the number of food instruments on which traditional foods were issued decreased from 3.0 to 2.2 FIs per participant per month. The result of these changes is that more foods are issued on fewer FIs, which could inadvertently increase the likelihood of partial- or non-redemptions of certain foods.

❖ **Non-use and maximum use of the CVV among WIC subpopulations were disproportionate.**

As with traditional food instruments, non-use of CVVs was significantly higher among non-Hispanic Black and non-Hispanic American Indian/Alaska Native participants, though the reasons for this are unknown. Focus group participants did provide some input with regard to the underutilization of this benefit. Specifically, some participants reported that store clerks were not allowing them to exceed the value of the CVV, which is permitted in Wisconsin. Differences in the proportion of participants exceeding the dollar amount of the CVV across the study stores also points to potential confusion among store staff members about whether participants are allowed to use a split tender option—that is, use another form of payment if their fruit and vegetable purchase exceeds the value of the CVV. Because the proportion of participants taking advantage of this option differs dramatically by individual store (when looking across the 31 study stores), it is likely that some stores or store clerks have misinterpreted this rule and are erroneously refusing to allow participants to exceed the value of their CVV. This observation is consistent with findings from the focus group discussions in which the problem was identified with specific stores and not among all of the stores in which these participants shop. Participants also explained that, when confronted with this opposition at the register, they would sometimes resort to leaving these foods behind. Though not stated explicitly, this issue most likely contributes to WIC

participants' non-use of the CVV benefit. Moreover, if this problem was more common in stores that are situated in areas with large non-Hispanic Black and non-Hispanic American/Indian Alaska Native populations, this could help also explain the disproportionate non-use of the CVV benefit among these groups of WIC participants.

Additionally, although all WIC participants in the focus groups reported using their CVVs all the time, when asked why other WIC participants might not use this benefit, they offered a few suggestions. In addition to possibly losing the CVVs or forgetting about them, which would not be unique to the CVV but true for any food instrument, some WIC participants also described the angst that they feel about having to do math in the store, and in particular, when they are distracted by watching their children at the same time. They hypothesized that the math might be more challenging for some—enough so that it deters them from using this benefit.

❖ **Participants demonstrated a preference for some of the new WIC food choices.**

Milk has historically been and continues to be one of the most redeemed benefits of the WIC food package. This is very encouraging because the choice to limit WIC participants to either fat-free or low-fat milk has not deterred WIC participants from purchasing milk through WIC. In fact, based on findings from the focus group discussions, the food package changes appear to have influenced what milk type WIC participants purchase outside of WIC, with more participants reporting that they purchase low-fat milk even after they have used their WIC benefit.

Participants also appear to like the canned bean option. Not only did more participants choose to substitute beans for peanut butter at 18 months postimplementation than at baseline, but when beans were purchased, a preference for canned beans versus dried beans was observed. A preference for canned beans was also reported in focus groups, but primarily by the non-Spanish-speaking participants. This is both interesting and important in terms of the impact the switch from peanut butter to beans could have on total fat consumption.

Despite less than ideal redemptions of food instruments for infant fruits and vegetables, when FIs are used, both fruits and vegetables are being purchased more frequently than not. When making purchases with the CVV, fruits were purchased more frequently than vegetables, however, many WIC families purchased some of both. Additionally, WIC families demonstrated a strong preference for fresh fruits and vegetables versus canned or frozen, as found through the examination of POS data and substantiated by WIC participants during focus group discussions. Interestingly, some focus group participants also reported that the CVV increased their willingness to try new fruits and vegetables.

VIII. Recommendations

This study demonstrates that WIC participants are generally accepting of and satisfied with recent changes to the WIC food packages. However, some challenges and opportunities for improvement were also identified. As the findings presented in this report are not likely limited to participant experiences in Wisconsin, the following recommendations and suggestions for future research are relevant for the WIC program as a whole, as well as for State WIC programs to consider.

❖ **Further examine and consider revising the infant food benefit.**

Due to underutilization of the infant food benefits, which were intended to increase variety as well as the introduction of age-appropriate foods, the WIC program should consider related nutrition education enhancements or alternative means of providing the infant food benefits. Currently, only stage 2 infant foods are issued to WIC infants age 6-11 months, despite those foods generally being recommended by the manufacturer for ages 6-8 months, depending on the child's development. One alternative method for prescribing infant foods would be to issue infants a cash value voucher for fruits and vegetables for those caregivers who would prefer to prepare their own infant foods or when it is age-appropriate for infants. Further research should be conducted to better understand the reasons for non-use and partial redemption of infant foods and to determine whether a cash value voucher for fruits and vegetables would be an appropriate and desirable alternative for the current infant food benefit that would result in increased use and improvements in the health and nutrition of infants.

❖ **Take steps to ensure WIC participants understand their food benefit as issued.**

One of the challenges identified through this study is WIC participants' interpretation of their food instruments. When presented with sample food instruments, many focus group participants were not confident that they understood what foods or the amount of those foods that could be purchased, which has the potential to limit WIC participants' maximization of their benefits. While explanation of food instruments is federally mandated, participants are expected to learn and absorb a great deal during benefit issuance and nutrition education, which could prove especially problematic for low-literacy participants and those with learning or other disabilities. States should take steps to ensure that WIC participants have a clear understanding of what they can purchase with their food instruments. To this end, States should consider conducting formative research to better understand the extent of this problem within their WIC program, as well as to identify methods for aiding participants in better understanding their food benefits.

❖ **Increase communication to or education of WIC vendors around the use of the split tender option with the CVV.**

Less than ideal use of the CVV combined with focus group reports that some vendors do not allow participants to purchase more fruits and vegetables than the amount of the voucher, indicate a great need for further vendor education efforts, especially for store clerks who are often the ones to transact

WIC purchases. WIC vendors in Wisconsin lost a potential \$182,500 in CVV dollars in February 2011 due to non-use and underutilization of the CVV—over the course of a year, this would total \$2.2 million dollars in potential lost sales. State WIC programs that allow split tender should consider multiple methods of vendor training and outreach to increase the ease with which participants can maximize this benefit. Additionally, since allowing split tender is intended to promote and should enable WIC participants to fully use their CVV benefit, it is possible that underutilization of this benefit is even more pronounced in States that do not allow split tender. For this reason, State WIC programs that do not currently allow split tender might want to consider revising their policy, or at a minimum, examining the extent of CVV underutilization in their State.

❖ **Consider nutrition education modifications or enhancements that would increase redemptions for particular food items.**

Underutilization of certain foods and focus group reports of receiving too much, not liking, or not knowing how to cook with a particular type of food point to the need for additional or targeted nutrition education efforts, as well as investigation of alternative food offerings. In some cases, these issues may be the result of cultural preferences, as may be the case with peanut butter and beans. Further research should be conducted to identify successful nutrition education efforts aimed at increasing consumption of WIC foods, barriers to incorporating these foods into participants' diets, and possible cost-effective alternatives that would provide the same nutritional benefits but possibly appeal to those who are least likely to use certain benefits.

❖ **Implement tailored or targeted nutrition education and outreach to subpopulations with especially high non-use of food instruments.**

The increasing proportion of participants not using any food instruments in a given month is of particular concern, since WIC plays a vital role in improving birth outcomes and the nutritional status of low-income women, infants, and children. State WIC programs should identify those subpopulations at highest risk of non-use and implement tailored outreach and nutrition education efforts to ensure that these participants are able to maximize their benefits. Further research also needs to be done to identify potential barriers to food instrument use and how these could be overcome.

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Appendices

Appendix A. Store Recruitment and Characteristics of Participating Stores

Selection and recruitment of stores was a challenging aspect of the study—one that demanded careful consideration and effort. While the sample of WIC retailers participating in the study is ultimately a convenience sample, efforts were made to recruit a diverse sample of stores in terms of geography and population served. Recruitment efforts first targeted retail chains with a large number of stores, preferably covering a wide geographic area, based on the principal of economies of scale—the potential to obtain data from a large number of stores through one central contact point. To ensure diversity in the type of stores included, as well as the demographics of participants, recruitment efforts also targeted smaller chains and independent retailers, particularly those serving ethnic minorities in the State. Stores that agreed to participate were also required to meet the following criteria:

- Have electronic scanning equipment,
- Be able to differentiate between WIC and non-WIC purchases or tenders and provide POS data for all WIC-tendered transactions, and
- Be able to provide WIC food instrument numbers for each transaction record.

At 18 months postimplementation, 44 stores participated in the study. All of the stores were full-service grocery stores, ranging in size from 4 to 21 registers. Due to discrepancies in how the CVV tender was recorded by the stores and technological challenges related to providing those data in the requested format, fewer stores provided useable CVV data at each data collection period, compared to traditional WIC purchases. In addition, due to the ability to use multiple CVVs in one transaction, foods purchased by an individual CVV were not distinguishable from those purchased by another CVV. As such, CVV purchases were analyzed at the family level. POS data including CVVs were received from a total of 31 stores at all postimplementation data collection periods.

The stores represented in the sample accounted for 6.1 percent of WIC dollars redeemed at baseline, and 5.5 percent redeemed at 18 months postimplementation. The total percentage of dollars redeemed in the sample stores did not differ across postimplementation periods. Among the study stores, there were positive matches between store-level POS data and state-level FI data for 91.9 percent of traditional FIs used in the stores at 18 months postimplementation, representing a slight decrease from baseline (94.1 percent). Nearly 93 percent of CVVs used in the study stores were successfully matched with state-level data at 18 months postimplementation (92.9 percent).

TABLE A.1 — Characteristics and match rates for participating stores, baseline and 18 months postimplementation

	Baseline	18 Months Postimplementation	
		Traditional FI	CVV
Number of Stores	43	44	31
Percent of Overall State Redemptions (dollars redeemed)	6.1%	5.5%	3.6%
Percent of Overall State Redemptions (number of food instruments redeemed)	5.8%	4.9%	2.7%
Number of Food Instruments Redeemed	21,333	14,354	2,297
Percentage Successfully Matched with State Data	94.1%	91.9%	92.9%

Appendix B. Focus Group Recruitment and Participation

WIC participants were recruited to participate in postimplementation focus groups designed to examine participants' experiences using the new WIC food instrument and factors that influenced their redemption patterns and specific food choices. Three WIC clinics in the Milwaukee and West Bend areas agreed to recruit participants for two focus groups each. The clinics were provided with recruiting instructions, 100 recruitment fliers, 2 clipboards with customized forms to document recruits, and 50 frequently asked questions sheets for recruits.

For each clinic, two population groups were recruited during each of two data collection periods. At 6 months postimplementation, one group included participants who were new to WIC since implementation of food package changes ("new to WIC") and the second group included participants with prior WIC experience ("WIC-experienced"). Clinics were able to run reports to identify new WIC clients and made phone calls to fully recruit the new client groups, as that population was more difficult to identify. At 18 months postimplementation, one group recruited only Pregnant Women, while the second group was open to any WIC participants or their caregivers. Two focus groups recruited primarily Spanish-speaking WIC participants at both points in time.

Focus group participants were also asked to complete consent forms, as well as a brief survey of demographic characteristics and food purchasing habits. Focus group participants were given a \$35 incentive for participating in the study.

TABLE C-1.—Characteristics of focus group recruitment and participation

Location	Group	Participants Recruited	Participants Confirmed	Participants Attended	Show Rate
6 Months Postimplementation					
1	New to WIC	12	7	4	57%
	WIC-Experienced	11	7	5	71%
2	New to WIC	12	11	9	82%
	WIC-Experienced	12	11	7	64%
3	New to WIC*	11	10	9	90%
	WIC-Experienced*	12	11	10	91%
Subtotal		70	57	44	77%
18 Months Postimplementation					
1	Open	10	5	3	60%
	Pregnant Women Only	10	8	6	75%
2	Open	10	8	5	63%
	Pregnant Women Only	10	7	5	71%
3	Open*	10	8	7	88%
	Pregnant Women Only*	10	6	4	67%
Subtotal		60	42	30	71%
TOTAL		130	99	74	75%

*Indicates Spanish-speaking group

Appendix C. Focus Group Protocols (6 and 18 Months Postimplementation)

Effects of the Revised WIC Food Packages on Redemptions

Focus Group Discussion Guide (English Version)

6-Months Post-Implementation

A. General questions about WIC

1. What are some of the things you like about WIC?
2. What are some things you like least about WIC?
3. In your family who qualifies for WIC now?

B. What your family likes to eat

Think about the kinds of foods your family likes to eat

1. What are some of your favorite foods?
2. What are some of your favorite meals?
3. What are some of your family's favorite foods?
4. What are some of your family's favorite meals?
5. How would you describe the kinds of foods your family likes to eat?
Probe: fast food chain, healthy, easy to cook, whatever is around....
6. Do the foods you like to serve your family include the foods you can buy with your WIC check?
7. Do you buy yogurt for your family to eat?
8. What are some of the reasons that members of your family prefer the type of milk they like? Why?
8a. [if people report whole milk preference.]
Do you remember the WIC clinic advising you buy a certain kind of milk?
8b. [If yes to 8a.]
What do you think of the suggestion/recommendation that children over age 2-
drink 1% (low fat) or fat free milk?

C. Factors influencing food choices

For the next set of questions think of feeding your family- and how you make decisions about what foods you will buy.

1. Who are you buying food for?

Probe: are there people other than your children that you buy food for- friends, cousins?

2. Who does most of the cooking in your family?

Probe: yourself, mother, mother in law?

3. How do you decide what foods you will buy in the grocery store?

Probe: cost, WIC approved food, preference, freshness?

4. Do members of your family have favorite foods that you think of when buying food?

Probe: give example of my daughter and specific type of apples she will eat.

5. Do members of your family have foods they really don't like- that influence what food you buy?

Probe: give example of my daughter and type of bread/tortillas she will eat.

6. Have you ever gone to a store and they are out of a WIC food you wanted to buy? What do you do then?

7. What do you think of when you are deciding which foods to buy with your WIC check?

Probes: Do you think of: What my family likes to eat, What foods are allowed to buy with WIC, what food items this store has on its shelves, how much time I have to shop, how to buy the most food with my WIC check...

8. After you have used up your WIC check for the month how do you pay for or get your food items?

9. After your WIC checks have been used- do you ever buy WIC foods with cash?

9a. If yes- which WIC foods do you buy with cash?

10. After your WIC checks have been used— Do you CHANGE the kind of foods you buy?

If yes: what kind of:

10a. What kind of milk do you choose to buy?

10b. What kind of bread do you choose to buy?

10c. Do you buy fruit? If so- what kind do you choose to buy?

10d. Do you buy vegetables? If so- what kind do you choose to buy?

D. Knowledge of new WIC food package changes (FOR WIC Experienced)

As you know, WIC changed its food package in October. We would like to discuss these changes and what you think about the food changes.

1. What do you think about the changes in the foods you can buy with your WIC checks?

- 1a. Can you tell me what you like about the food changes you can buy with your WIC checks?
- 1b. Can you tell me about what you don't like about the food changes you can buy with your WIC checks?
2. How prepared were you for the changes to the foods you can buy with your WIC checks?
 - 2a. If prepared- how were you prepared?
 - 2b. If un-prepared- how would you have liked to learn about the changes?
3. What do you think about the fact that you can buy fruit and vegetables now?
4. Did you buy fruits and vegetables before you got the WIC fruit and vegetable check?
5. Have you bought fruits and vegetables with the fruit and vegetable check? If yes- What types of fruits and vegetables do you buy with your WIC check? WHY? Do they ever go bad before they are eaten?
 - 5a. are they fresh?
 - 5b. are they frozen?
 - 5c. are they canned?
 - 5d. if canned- why do you buy canned?
 - 5e. if canned- how did you learn how to use the canned foods?
6. What is it like to use the actual fruits and vegetables check [facilitator hold up sample check]?
 - 6a. Have you “used” (cashed in the store) the new fruit and vegetable check?
 - 6b. What do you like about the new fruit and vegetable check?
 - 6c. What don't you like about the new fruit and vegetable check?
 - 6d. Is there anything that could make it easier to use the fruit and vegetable check?
7. Are there food items on your WIC check that you usually don't buy?
8. Have you bought any of the other new WIC foods? Rice, whole wheat bread, tortillas, canned beans, canned salmon? If so which ones and how often?
 - 8a. soy milk
 - 8b. tortillas
 - 8c. canned beans
 - 8d. whole wheat bread
 - 8e. brown rice
 - 8f. tofu
 - 8g. canned salmon

E. Knowledge of WIC food package (For WIC Naïve)

1. Can you tell me how you found out about WIC?

2. Do you think WIC has helped you a lot or a little? Why?
3. Has WIC been what you expected? Why?
4. What had you heard about WIC foods from people – before you joined WIC?
5. What do you think about that fact that you can buy fruit and vegetables?
6. Have you bought fruits and vegetables? If yes- What types of fruits and vegetables do you buy with your WIC check? WHY?
 - 6a. are they fresh?
 - 6b. are they frozen?
 - 6c. are they canned?
 - 6d. if canned- why do you buy canned?
 - 6e. if canned- how did you learn how to use the canned foods?
7. What is it like to use the actual fruits and vegetables check [facilitator hold up sample check] ?
 - 7a. Have you “used” (cashed in the store) the new fruit and vegetable check?
 - 7b. What do you like about the new fruit and vegetable check?
 - 7c. What don’t you like about the new fruit and vegetable check?
 - 7d. Is there anything that could make it easier to use the fruit and vegetable check?
8. Are there food items on your WIC check that you usually don’t buy?
9. Have you bought any of the other new WIC foods? Rice, whole wheat bread, tortillas, canned beans, canned salmon? If so which ones and how often?
 - 9a. soy milk
 - 9b. tortillas
 - 9c. canned beans
 - 9d. whole wheat bread
 - 9e. brown rice
 - 9f. tofu
 - 9g. canned salmon

F. Food availability issues

1. Have you wanted to buy soy milk, corn tortillas, canned beans, or whole wheat bread and the store didn’t have the items on the shelves? WHY? What did you do then?
 - 1a. soy milk
 - 1b. tortillas
 - 1c. canned beans
 - 1d. whole wheat bread
 - 1e. brown rice
 - 1f. tofu
 - 1g. canned salmon

2. Have you wanted to buy fruits and/or vegetables – but you weren't able to? WHY? What did you do then?

Probe: produce looked bad/old, too expensive, not available.

3. How many different stores do you shop at to buy your WIC foods?

3a. [if report more than one store]

Why do you go to different stores?

4. What kind of store do you choose to shop in to use your WIC check? Corner bodega? Big supermarket, supermarket chain?

4a. Do you shop in the same store for your other groceries?

5. When you have used up the WIC checks for the month—what kind of store do you food shop in? Corner bodega? Big supermarket? How many checkout areas does the store have?

6. Think of the store that you prefer to food shop in.....does the store you prefer have the WIC foods you want to purchase?

G. Likelihood of purchasing all allotted foods

There are lots of different foods that you can buy with the WIC checks. And in some families there is more than one person who is getting WIC checks. Now we are going to talk about if you buy all the foods that are listed on the WIC checks.

1. In your family – how many people are getting WIC checks now?
2. How often do you buy all the items that you can on your WIC check?

Probes: About half the time? All of the time?

2a. [If report partial buys] Can you tell me about why people don't buy all the food they can buy on their WIC check?

2b: Can you think of anything that would make it easier for people to buy all the food items on their WIC checks?

3. What WIC approved foods don't you buy? Why?

H. Nutrition Education

One of the benefits to WIC is nutrition education.

1. Do you remember getting nutrition education (someone talking to you about healthy foods) while you were at WIC?
2. Have you made any changes to your diet based on the advice of a staff person (nutrition educator) at WIC?

3. [For WIC Naïve] Did the staff at the WIC clinic help you learn how to use your WIC checks?

[For WIC experienced] Did the people at the WIC clinic help you learn about the changes in the kinds of foods you can buy with your WIC checks?

- If yes—How?
- If no- can you think of anything that would help you in using your WIC checks?

I. We are almost finished!

We are almost finished- just a few more questions to get more of your suggestions.

1. If you could make the rules, how would you change the WIC foods and the way you buy food using the WIC checks?
2. Is there anything we haven't asked that you would like to tell us about WIC?

Effects of the Revised WIC Food Packages on Redemptions
Focus Group Discussion Guide (English Version)
18-Months Post-Implementation

A. General questions about WIC

1. I was here last March. Were any of you in the group with me last year?
2. In your family who qualifies for WIC now?
3. How long have you been with the WIC program?

B. What your family likes to eat

Think about the kinds of foods your family likes to eat...

1. There are lots of different kinds of milk in the store- 1% 2% skim, whole etc... What kind of milk do people in your family like to drink?
 - a. Why do you think your family members prefer the type of milk that they do?
 - b. Do you remember the WIC clinic talking to you about buying a certain kind of milk?
 - c. [if people report whole milk preference.] What do you think it would take for you to switch to a lower fat milk?
2. In the past year have you changed the kind of milk you buy at the store? Why?
3. Do you ever have trouble finding skim milk in the store?

C. Factors influencing food choices

*For the next set of questions think of going to the store and using your WIC checks.
[facilitator holds up sample checks]*

1. Have you ever gone to a store and they are out of a WIC food you wanted to buy? Which food were they out of? What do you do then? Use part of the check?
2. After your WIC checks have been used—and you can choose the kind of milk, bread and other WIC foods you can buy-- Do you CHANGE the kind of foods you buy?

If yes: what kind of:

- a. What kind of milk do you choose to buy?
 - b. What kind of bread do you choose to buy?
 - c. Do you still buy fruit? If so what kind do you choose to buy?
 - d. Do you still buy vegetables? If so what kind do you choose to buy?
3. (WIC experienced only) As **many of** you know, WIC changed its food package in October 2009. **How many of you were on WIC before these changes were made? Do**

you think you have used your WIC checks more or less since the food package changes? Why?

4. If you are on Food share/ Quest Card/ SNAP (food stamps) or have ever been in both Food share/ Quest Card/ SNAP and WIC, do you think that getting food from both programs changes how or what you buy with your WIC checks?
5. If you are on Food share/ Quest Card/ SNAP (food stamps) -does food share/Quest card/ SNAP give your family enough money to buy all the food you need?
6. How prepared were you for the changes to the foods you can buy with your WIC checks?
 - a. If prepared- how were you prepared?
 - b. Do you still have questions about the changes that have not been answered?
7. How prepared are the stores now that you shop in for foods you can buy with your WIC checks?
8. What is it like to use the fruits and vegetables check [facilitator hold up sample check] ?
 - a. Has this changed since you got your first fruit and vegetable check?
 - b. Have you tried to go over the check amount? If yes, what did the store clerk do?
9. What kinds of fruits and vegetables did you buy before you started getting the WIC fruit and vegetable check?
10. Have you tried any new fruits and/or vegetables with the fruit and vegetable check?
11. What are some reasons that you might not use the fruit and vegetable check sometimes?
12. Are there food items on your WIC check that you usually don't buy? Why?
13. If you are on SNAP (food stamps) do you think that being on SNAP changes how or what you buy with your WIC checks?

D. Food availability issues

1. Have you wanted to buy WIC foods and the store didn't have the items on the shelves? WHY? What did you do then?
 - a. soy milk
 - b. tortillas
 - c. canned beans
 - d. whole wheat bread
 - e. brown rice
 - f. tofu

2. Have you wanted to buy fruits and/or vegetables – but you weren't able to? WHY? What did you do then?

Probe: produce looked bad/old, too expensive, not available.

3. How many different stores do you shop at to buy your WIC foods?
 - a. [if report more than one store] Why do you go to different stores?
4. What kind of store do you choose to shop in to use your WIC check? Corner bodega? Big supermarket, supermarket chain?
 - a. Do you shop in the same store for your other groceries?
5. When you have used up the WIC checks for the month—what kind of store do you food shop in? Corner bodega? Big supermarket? How many checkout areas does the store have?

E. Likelihood of purchasing all allotted foods

There are lots of different foods that you can buy with the WIC checks. And in some families there is more than one person who is getting WIC checks. Now we are going to talk about if you buy all the foods that are listed on the WIC checks.

1. In your family – how many people are getting WIC checks now?
2. I am going to pass out some sample voided checks/vouchers so we can talk about them. How many of you get checks that look like this? [hold up check of package #1] This is the [insert package name].
 - a. If you were at the store right now- what do you think you can buy with this check?
 - b. Do you think there are choices of what to buy on the check?
 - c. What would you buy on this check and why?
 - d. Is there anything you wouldn't buy? Why?
3. [Pass out sample food package #2 – ask questions]
 - a. If you were at the store right now- what do you think you can buy on this check?
 - b. Do you think there are choices of what to buy on the check?
 - c. What would you buy on this check and why?
 - d. Is there anything you wouldn't buy? Why?
4. [Pass out sample food package #3– ask questions]
 - a. If you were at the store right now- what do you think you can buy with this check?
 - b. Do you think there are choices of what to buy on the check?
 - c. What would you buy on this check and why?
 - d. Is there anything you wouldn't buy? Why?

5. How often do you buy all the items that you can on your WIC check?

Probes: About half the time? All of the time?

- a. [If report partial buys] Can you tell me about why people don't buy all the food they can buy on their WIC check?
- b. Can you think of anything that would make it easier for people to buy all the food items on their WIC checks?

6. What WIC approved foods don't you buy? Why?

[PROBES: don't like them, don't know how to prepare them, doctor has advised you not to eat certain foods available through WIC]

F. Nutrition Education

One of the benefits to WIC is nutrition education.

1. Have you made any changes to the foods you or your family eats based on the advice of a staff person (nutrition educator) at WIC?
2. Did the staff at the WIC clinic help you learn how to use your WIC checks?
 - a. If yes, how?
 - b. If no- can you think of anything that would help you in using your WIC checks?
3. Did the staff at the WIC clinic help you learn about the foods that were on your check?
 - a. If yes, how?
 - b. If no, do you think it would help to learn more about the foods? What would be most helpful?

Appendix D. Redemption Definitions for Each WIC-Authorized Food

Food	Full Redemption
Cereal	The prescribed amount minus amount purchased is less than 9 ounces. (The smallest box size permitted in Wisconsin is 9 ounces. Participants could not purchase another box of cereal.)
Cheese	Random weight cheeses (blocks of cheese) were considered a full redemption. Cheeses purchased with a determined measure counted as a full redemption if at least 90 percent [*] of the prescribed amount was purchased (e.g., 14.4 out of 16 ounces).
Juice	At least 95 percent [†] of the maximum prescribed ounces were purchased (e.g., 46–48 ounce bottle at baseline or 11.5–12 ounce frozen can).
Eggs	Exact amount of eggs prescribed was purchased.
Milk	Exact amount of milk prescribed was purchased.
Peanut butter	<p><i>If a substitution was allowed:</i></p> <p>At least 90 percent[‡] of the maximum prescribed ounces of peanut butter were purchased OR</p> <p>The prescribed amount minus the purchased amount was less than 15 ounces <i>If a substitution was not allowed:</i></p> <p>At least 90 percent of the maximum prescribed ounces of peanut butter were purchased.</p>
Beans	The prescribed amount minus the purchased amount was less than 15 ounces, indicating that participants could not purchase another bag or can of beans.
Canned fish	The prescribed amount minus the purchased amount was less than 6 ounces, indicating that participants could not purchase another 6 ounce can of tuna.
Whole grains	Any tortilla purchase counted as a full redemption, as the amounts were not consistently reported in ounces. Bread and rice purchases totaling more than 85 percent of the prescribed amount were considered a full purchase. (This was done to account for variability in bread sizes.)
Infant fruit and vegetables	Exact amount of infant fruits and vegetables was purchased.
Infant meat	Exact amount of infant meat was purchased.

^{*} 90 percent was used to account for the wide-range of sizes that were purchased.

[†] 95 percent was chosen to account for the lower threshold of bottle and can sizes.

[‡] 90 percent was used to include the most common size jar of peanut butter observed in the sample (16.3 ounces).

Appendix E. State-Level Demographic Characteristics of WIC Participants at Baseline and 18 Months Postimplementation

	Baseline		18 Months Postimplementation		p-value
	N	%	N	%	
Total WIC Participants	126,850	100.0	116,956	100.0	
Participant's Race/Ethnicity					
Hispanic	31,726	25.0	29,432	25.2	ns
Non-Hispanic	95,124	75.0	87,524	74.8	
White	58,398	46.0	53,560	45.8	ns
Black	22,829	18.0	20,442	17.5	
American Indian/Alaska Native	2,129	1.7	1,828	1.6	0.0008
Asian/Pacific Islander	6,102	4.8	6,069	5.2	<0.0001
Multiple Races	5,666	4.5	5,625	4.8	<0.0001
Food Package Category					
Type I: Infants Not Fully Breastfed	11,187	8.8	11,954	10.2	ns
Type II: Fully Breastfed Infants	1,269	1.0	1,279	1.1	
Type II: Infants Not Fully Breastfed	16,228	12.8	12,288	10.5	
Type III: Special Diet	1,044	0.8	1,077	0.9	
Type IV: Children	67,427	53.2	63,941	54.7	
Type V: Partially Breastfeeding Women	3,787	3.0	1,337	1.1	
Type V: Pregnant Women	12,667	10.0	10,777	9.2	
Type VI: Postpartum Women	9,960	7.9	10,246	8.8	
Type VII: Fully Breastfeeding Women	3,281	2.6	4,057	3.5	

ns = not significant.

Appendix F. State-Level Demographic Characteristics of WIC Participants Prescribed CVVs at 6 and 18 Months Postimplementation

	6 Months		18 Months		p-value
	Postimplementation		Postimplementation		
	N	%	N	%	
Total WIC Participants	94,549	100.0	91,291	100.0	
Participant's Race/Ethnicity					
Hispanic	24,335	25.7	23,765	26.0	ns
Non-Hispanic	70,214	74.3	67,526	74.0	
White	44,569	47.1	41,924	45.9	<0.0001
Black	15,381	16.3	15,250	16.7	<0.05
American Indian/Alaska Native	1,593	1.7	1,458	1.6	ns
Asian/Pacific Islander	4,691	5.0	4,785	5.2	<0.01
Multiple Races	3,980	4.2	4,109	4.5	<0.01
Food Package Category					
Type III: Special Diet	936	1.0	1,005	1.1	ns
Type IV: Children	65,994	69.8	63,898	70.0	
Type V: Partially Breastfeeding Women	1,430	1.5	1,350	1.5	
Type V: Pregnant Women	11,292	11.9	10,833	11.9	
Type VI: Postpartum Women	10,818	11.4	10,235	11.2	
Type VII: Fully Breastfeeding Women	4,079	4.3	3,970	4.3	

ns = not significant.

Appendix G. Characteristics of WIC Participants Redeeming Traditional Food Instruments in Sample Stores, Baseline and 18 Months Postimplementation

	Baseline		18 Months Postimplementation		p-value*
	N	%	N	%	
Total WIC Participants	9,127	100.00	6,989	100.0	--
By Race and Ethnicity					
Hispanic	3,434	37.6	2,692	38.6	ns
Non-Hispanic	5,693	62.4	4,297	61.5	
White	4,493	49.2	3,414	48.9	
Black	429	4.7	275	3.9	
American Indian/Alaska Native	138	1.5	94	1.3	
Asian/Pacific Islander	256	2.8	221	3.2	
Multiple Races	377	4.1	293	4.2	
By Food Package Type†					
Type II: Fully Breastfed Infants	60	0.7	130	1.9	0.0015
Type II: Infants Not Fully Breastfed	474	5.2	601	8.6	
Type IV: Children	5,918	64.8	4,296	61.5	
Type V: Partially Breastfeeding Women	396	4.3	129	1.9	
Type V: Pregnant Women	1,208	13.2	917	13.1	
Type VI: Postpartum Women	706	7.7	519	7.4	
Type VII: Fully Breastfeeding Women	365	4.0	397	5.7	

*Based on Mantel-Haenszel chi-square test statistic.

†Food package types do not include Type I: Infants Not Fully Breastfed and Type III: Special Diet, as there were data quality issues specific to these food packages. As such, these participants were excluded from the store-level analyses.

ns = not significant.

Appendix H. Redemptions for Additional Individual Traditional WIC foods

Canned Fish

While canned fish (including pouches, jars, and other shelf-stable packaging) are only prescribed to Fully Breastfeeding Women, tuna had been the only canned fish option since the WIC program began. The 2007 Interim Final Rule authorized States to approve light tuna, salmon, sardines, and mackerel, and increased slightly the maximum prescription from 26 to 30 ounces. The Wisconsin WIC Program chose to offer the option of light tuna or salmon to participants.

Among participants in the sample prescribed canned fish (Fully Breastfeeding Women), there was no change in redemptions from baseline to 18 months postimplementation. Slightly more than 80 percent of participants fully redeemed their canned fish prescription at 18 months postimplementation, while 14.2 percent did not use this benefit at all.

Cereal

Cereal is one of the most often prescribed WIC foods, provided to all food packages except Infants younger than 6 months of age. While the 2007 Interim Final Rule required that at least 50 percent of WIC-approved cereals be whole grain, there were no changes made to cereal prescriptions, and overall cereal redemptions did not change significantly from baseline to 18 months postimplementation. At 18 months postimplementation, 85.1 percent of participants fully redeemed their cereal prescription, and only 4.8 percent did not purchase any cereal.

There were slight variations from baseline to 18 months postimplementation, however, in full redemptions by Children and Pregnant Women. Children saw a significant increase in cereal redemption between these data collection periods (from 81.6 to 85.4 percent; $p < .0001$), while Pregnant Women saw a similar decrease (from 84.2 to 79.6 percent; $p < .05$). With regard to race and ethnicity, only Hispanic participants saw a change from baseline—an increase from 88.8 to 91.6 percent of participants fully redeeming their cereal prescriptions ($p < .01$).

Cheese

Prior to implementation of the food package changes, cheese was substituted quite commonly for milk among food packages for Women and Children. Under the 2007 Interim Final Rule, states were instructed to significantly reduce the amount of allowable substitutions, and Wisconsin went further by eliminating the cheese substitution for Children and Pregnant, Partially Breastfeeding, and Postpartum Women. Among Fully Breastfeeding Women (the only group prescribed cheese both at baseline and 18 months postimplementation) there was no change in full cheese redemptions across data collection periods. More than 90 percent of women made full cheese redemptions at 18 months postimplementation.

Eggs

Eggs are prescribed to all WIC participants categorized as Children or Women, and have historically had high redemption rates. Maximum prescription allotments were reduced via the 2007 Interim Final Rule from a maximum of 2½ dozen for all food packages to 2 dozen for Fully Breastfeeding Women and 1 dozen for Children and Partially Breastfeeding, Pregnant, and Postpartum Women. At 18 months

postimplementation, there was no change from baseline in full egg redemptions—97.0 percent of participants fully redeemed their prescription, and fewer than 3 percent did not redeem any.

Children, who were now prescribed fewer eggs, saw a 2 percent increase in egg redemptions over baseline (from 95.5 to 97.5 percent; $p < .0001$), while partially breastfeeding women were the only group to see a decrease in full redemptions (98.8 to 95.0 percent; $p < .05$). Non-Hispanic participants of multiple races and non-Hispanic White participants also saw significant increases from baseline to 18 months postimplementation (+4.3 and +1.7 percent, respectively; $p < .05$). All other observed differences among food packages and racial and ethnic groups were not significant at $p < .05$.

Appendix I. Characteristics of WIC Families Redeeming CVVs in Sample Stores, 6 and 18 Months Postimplementation

	6 Months		18 Months		p-value*
	Postimplementation		Postimplementation		
	N	%	N	%	
Total WIC Families	2,061	100.0	1,900	100.0	--
By Race and Ethnicity of Oldest Participant in Family					
Hispanic	396	19.2	326	17.2	ns
Non-Hispanic	1,665	80.8			
White	1,333	64.7	1,272	66.9	
Black	130	6.3	117	6.2	
American Indian/Alaska Native	14	0.7	15	0.8	
Asian/Pacific Islander	68	3.3	76	4.0	
Multiple Races	120	5.8	94	0.9	
By Food Package Type of Oldest Participant in Family					
Type III: Special Diet	7	0.3	13	0.7	ns
Type IV: Children	1,315	63.8	1,204	63.4	
Type V: Partially Breastfeeding Women	28	1.4	29	1.5	
Type V: Pregnant Women	348	16.9	309	16.3	
Type VI: Postpartum Women	239	11.6	223	11.7	
Type VII: Fully Breastfeeding Women	124	6.0	122	6.4	

*Based on Mantel-Haenszel chi-square test statistic.

ns = not significant.