

U.S. DEPARTMENT OF AGRICULTURE

WIC Food Cost-Containment Practices Study

Final Report



U.S. Department of Agriculture | Food and Nutrition Service | Sept 2021

WIC Food Cost-Containment Practices Study

Final Report



September, 2021

Submitted to

USDA Food and Nutrition Service Office of Policy Support 1320 Braddock Place Alexandria, VA 22314

Project Officer

Ruth Morgan

This WIC Food Cost-Containment Practices Study was conducted by Insight Policy Research, Inc., under Contract No. AG-3198-C-15-0022/AG-3198-D-15-0135, supported by the U.S. Department of Agriculture's Food and Nutrition Service. The findings and conclusions in this report are those of the authors and should not be construed to represent any official USDA or U.S. Government determination or policy.

Suggested Citation

Gleason, S., Wroblewska, K., Trippe, C., Kline, N., Meyers Mathieu, K., Breck, A., Marr, J., & Bellows, D. (2021). WIC Food Cost-Containment Practices Study: Final report. U.S. Department of Agriculture, Food and Nutrition Service.

Contents

Executive Summary	i
Chapter 1. Introduction	. 1
A. Background	. 2
B. Organization of the Report	. 7
Chapter 2. Methodology	. 8
A. State Agencies Included in the Study	. 8
B. Data Sources	. 9
C. Approach by Study Objective	L2
Chapter 3. National Picture of WIC Food Cost-Containment Practices	L7
A. Cost-Containment Practices Used Across 70 State Agencies	L7
B. Other Ways State Agencies Contained Costs	26
C. The Role of EBT	27
D. State Agency Perspectives on Most Effective Cost-Containment Practices	27
E. Limitations	29
Chapter 4. Food Costs and Savings	30
A. Background and Approach	30
B. Findings	31
C. Limitations	12
Chapter 5. WIC Participant Shopping Experience	13
A. Background and Approach	13
B. Findings	15
C. Limitations	50
Chapter 6. Participant Satisfaction, Purchases, and Consumption	51
A. Background and Approach	51
B. Findings	52
C. Limitations	55
Chapter 7. Reasons Former WIC Participants Left WIC	56
A. Background and Approach	56
B. Findings	57

Chapter 8. Accommodations for Participants with Modified Diets for Health or Personal Reasons76
A. Background and Approach76
B. Findings78
C. Limitations
Chapter 9. Participant Food Redemptions86
A. Background and Approach86
B. Findings
C. Limitations92
Chapter 10. Participant Health Outcomes93
A. Background and Approach93
B. Findings
C. Limitations
Chapter 11. Conclusions and Recommendations102
A. Summary and Conclusions
B. Recommendations on Restrictions105
C. Recommendations for Future Research108
References

Tables

Table 1.1. Potential Effects of Cost-Containment Practices on Program Outcomes 4
Table 2.1. Characteristics of 12 WIC EBT State Agencies9
Table 2.2. Crosswalk of Data Sources, Study Objectives, and State Agencies 10
Table 2.3. Food-Specific Restrictions Included in the In-Depth Analysis of Outcomes by FoodCategory and Type of Practice13
Table 2.4. Outcome Measures, Data Sources, and Analytic Approach 15
Table 3.1. State Agencies That Reported Practices Were Effective in Containing Costs 28
Table 3.2. Most Effective Cost-Containment Practices
Table 4.1. Summary of Observed and Imputed Data Used to Estimate Cost Savings
Table 4.2. Distribution of Food Expenditures Across Food Categories (Percentages) 32
Table 4.3. Distribution of Food Expenditures Across Subcategories Within Major Food Categories
Table 4.4. Average Estimated Actual and Standardized Food-Category Costs per Participant Month 34
Table 4.5. Estimated Actual and Standardized Food-Cost Savings per Participant Month FromLeast Expensive Brand Restrictions Food Category36
Table 4.6. Estimated Actual and Standardized Food-Cost Savings per Participant Month FromStore Brand Only Restrictions37

Table 4.7. Estimated Actual and Standardized Food-Cost Savings per Participant Month From Manufacturer Rebates for Foods Other Than Infant Formula (Pre-Rebate)	38
Table 4.8. Estimated Actual and Standardized Food-Cost Savings per Participant Month From Manufacturer Rebates for Foods Other Than Infant Formula (Post-Rebate)	39
Table 4.9. Estimated Actual and Standardized Food-Cost Savings per Participant Month From Container Size Restrictions	39
Table 4.10. Estimated Actual and Standardized Food-Cost Savings per Participant Month from Restrictions on Form or Type	40
Table 4.11. Estimated Actual and Standardized Food-Cost Savings per Participant Month from Not Allowing Alternatives	41
Table 5.1. Distribution of Household Characteristics of WIC Current Participant Survey Respondents by State Agency (Percentages)	44
Table 5.2. Reasons for Difficulty Shopping for WIC Foods (Percentages)	48
Table 5.3. Households That Reported Availability Reasons for Not Purchasing All Their WIC Foods by Practice	49
Table 5.4. Household Inability Finding the Correct Container Size by Whether the State Agency Had a Container Size Restriction	50
Table 6.1. Dependent Variable Definitions	52
Table 6.2. Household Satisfaction with Brands of WIC Foods by State Agency (Percentages)	54
Table 6.3. Estimated Relationship Between Household Brand Satisfaction and Least Expensive Brand Restrictions	55
Table 6.4. Estimated Relationship Between Household Brand Satisfaction and Store Brand Only Restrictions	55
Table 6.5. Estimated Relationship Between Household Brand Satisfaction and Manufacturer Rebates	55
Table 6.6. Satisfaction with Container Sizes by State Agency (Percentages)	56
Table 6.7. Estimated Relationship Between Household Satisfaction with Container Sizes and Container Size Restrictions	56
Table 6.8. Full Purchase of Prescribed Food by State Agency (Percentages)	57
Table 6.9. Reasons for Not Fully Purchasing WIC Foods by State Agency (Percentage)	58
Table 6.10. Full Consumption of Purchased WIC Foods by State Agency (Percentages)	59
Table 6.11. Reasons Provided for Not Fully Consuming Purchased WIC Foods (Percentages)	60
Table 6.12. Estimated Relationship Between Full Consumption and Least Expensive Brand Restrictions	61
Table 6.13. Estimated Relationship Between Full Consumption and Store Brand Only Restrictions	62
Table 6.14. Estimated Relationship Between Full Consumption and Manufacturer Rebates	62
Table 6.15. Estimated Relationship Between Full Consumption and Container Size Restrictions	63
Table 6.16. Estimated Relationship Between Full Consumption and Form or Type Restrictions	63

Status	99
Table 10.6. Estimated Relationship Between EBT Redemption and Probability of Exiting Anemia	90
Table 10.5. Estimated Relationship Between EBT Redemption and Change in Height-for-Age	00
Table 10.4. Estimated Relationship Between EBT Redemption and Infant Birth Weight	98
Table 10.3. Number of WIC Participating Children Observed as Anemic or Underweight at Baseline and Percentage Who Exited That Status by the Time of Follow-Up Measurement: Unadjusted Outcomes by State Agency	97
Table 10.2. Birth Weight and Change in Height-for-Age Percentile of WIC Participants: Unadjusted Outcomes by State Agency	96
Table 10.1. Months of EBT Data Used in Analysis by Month of Outcome Measurement Date	95
Table 9.7. Estimated Relationship Between Redemption Rate and Form or Type Restriction	92
Table 9.6. Estimated Relationship Between Redemption Rate and Container Size Restriction	91
Table 9.5. Estimated Relationship Between Redemption Rate and Manufacturer Rebates	91
Table 9.4. Estimated Relationship Between Redemption Rate and Store Brand Only Restriction	90
Table 9.3. Estimated Relationship Between Redemption Rate and Least Expensive Brand Restriction	90
Table 9.2. Average Monthly Household Redemption Rates by Major Food Category	89
Table 9.1. Distribution of WIC Caseloads by Household Characteristics in EBT Data (Percentages)	87
Table 8.8. Probability of Households Reporting Full Consumption by Diet and Presence of aRestriction	84
Table 8.7. Probability of Households Reporting Zero Purchases by Diet and Presence of a Restriction	83
Table 8.6. Probability of Households Reporting Full Purchase by Diet and Presence of a Restriction	83
Table 8.5. Problems Finding Appropriate WIC Foods Because of Dietary Needs Among WIC Households with Modified Diet (Percentages)	81
Table 8.4. Partial Purchases for Diet-Related Reason Among WIC Households (Percentages)	80
Table 8.3. Food Allergies or Intolerances Among WIC Households (Percentages)	79
Table 8.2. WIC Households with Modified Diet (Percentages)	79
Table 8.1. Modified Diets Reported by Surveyed WIC Households	77
Table 7.2. Probability of Households Reporting Satisfaction with Brands by Participation Status and Presence of a Restriction	75
Table 7.1. Differences in Brand and Container Size Satisfaction Among Former and Current WIC Households	73
Table 6.17. Preference for Organics as Reason for Partial WIC Food Purchase, by State Agency (Percentages)	64

Table 10.7. Estimated Relationship Between EBT Redemption and Probability of Exiting	
Underweight Status	
Table 11.1. Food-Specific Restrictions Associated with Cost Savings	

Figures

Figure 1.1. Example Food List Excerpt for Authorized Milk Products2
Figure 2.1. 12 WIC EBT State Agencies Included in the Study9
Figure 3.1. State Agencies with Food-Specific Restrictions (Percentages)
Figure 3.2. State Agencies with Least Expensive Brand Restrictions (Percentages)
Figure 3.3. State Agencies with Store Brand Only Restrictions (Percentages)
Figure 3.4. State Agencies with Manufacturer Rebates for Foods Other Than Infant Formula (Percentages)
Figure 3.5. State Agencies with Container Size Restriction (Percentages)
Figure 3.6. Variation of Form or Type Restrictions25
Figure 3.7. State Agencies with Food Alternative Restriction (Percentages)
Figure 5.1. Households Reporting Ease or Difficulty with WIC Shopping Experience (Percentages)
Figure 5.2. Households Reporting a Negative WIC Shopping Experience (Percentages)
Figure 6.1. Household Satisfaction with WIC Foods Purchased, by State Agency (Percentages)53
Figure 6.2. Criteria Reported as Most Important by Households When Shopping for WIC Foods Across State Agencies
Figure 7.1. Demographic Characteristics of Former and Current WIC Households (Percentages)67
Figure 7.2. Reasons Former WIC Households Stopped Buying WIC Foods (Percentages)68
Figure 7.3. Ease or Difficulty Shopping for WIC Foods Among Former and Current WIC Households (Percentages)
Figure 7.4. Reasons for Difficulty Shopping for WIC Foods Among Former and Current WIC Households Reporting Difficulty (Percentages)70
Figure 7.5. Negative WIC Shopping Experiences Reported by Former and Current WIC Households (Percentages)
Figure 7.6. Former and Current WIC Household Satisfaction with WIC Foods by State Agency (Percentages)72
Figure 8.1. Demographic Characteristics of Households that Followed a Modified Diet and Households that Did Not Follow a Modified Diet (Percentages)78
Figure 11.1. Classification of Food-Specific Restrictions Based on Key Outcomes

Acknowledgements

This report was prepared by Insight Policy Research, Inc. (Insight) under Contract No. AG-3198-C-15-0022 from the U.S. Department of Agriculture, Food and Nutrition Service. It represents a team effort in which many individuals made key contributions in addition to the authors. We gratefully acknowledge their assistance. In particular, we recognize Project Officers Ruth Morgan and Anna Potter Clifford, as well as Danielle Berman, for their leadership and guidance. We also thank the numerous FNS staff who provided support, expert advice, and encouragement to the Insight team. Their insightful comments on the interim deliverables and throughout the study greatly influenced this research.

The authors also express appreciation to the dedicated individuals in each of the 70 State agencies that participated in in-depth interviews, the 12 State agencies that provided additional administrative data for this study, and the electronic benefit transfer processors for those 12 State agencies that helped prepare the requested data files. Their time and effort to provide insightful information on cost-containment practices, as well as complete and accurate data files, made this research possible.

At Mathematica Policy Research, the authors thank Betsy Santos, Kim Mook, and Bevin Mory, as well as the numerous staff who conducted interviews with current and former WIC participants.

The authors also gratefully acknowledge the numerous individuals from Insight who provided valuable assistance throughout this study. In particular, we thank Betsy Thorn for her subject matter expertise and guidance throughout this study and her thoughtful review of the report. We also thank Nancy Cole for her analytical expertise, helpful advice, and extensive work with the data files and in-depth interviews. We thank Hilary Wagner for her assistance in interviewing the study State agencies, and Chrystine Tadler for providing invaluable assistance with SAS coding and sampling. We also thank Bethann Mwombela, Haoshu Duan, Conor Duffy, Cara Alcorn, and Polina Zvavitch for providing quality control; and Kim Kerson for her assistance with production. Scott Cody and Claire Wilson also provided useful suggestions on the content of this report.

Glossary

Above-50-percent vendor (A-50): A vendor that derives more than 50 percent of its annual food sales revenue from WIC food instruments

APL: Approved product list

Cash-value benefit: A monthly sum WIC participants receive as part of their prescribed food package to purchase fruits and vegetables

Chi-squared test: Pearson's chi-squared test; used to determine whether there is a statistically significant difference between the expected frequencies and the observed frequencies in one or more categories

Collinear/Collinearity: A condition in which two or more independent variables are highly or perfectly correlated

Competitive price selection criteria: Evaluation of the prices a vendor applicant charges for supplemental foods compared with the prices charged by other vendor applicants and authorized vendors; State agencies must use competitive price selection criteria to authorize vendors selected from among those that offer the program the most competitive prices

Confidence interval: The likely range of the parameter within a specified level of confidence; for example, in a 95 percent confidence interval (used in this report), the intervals have a 95-percent probability of containing the true value of the estimate

Cost-containment practice: Term used in this report for a voluntary measure implemented by State agencies to (1) ensure the best use of available funds and (2) reduce the cost of prescribed food packages

EBT: Electronic benefit transfer

Food instrument: A voucher, check, EBT card, coupon, or other document used by a participant to obtain supplemental foods

Food-specific restrictions: Cost-containment practices applied to a specific food category (i.e., least expensive brand restrictions, store brand only restrictions, manufacturer rebates, container size restrictions, form or type restrictions, and food alternative restrictions)

Full consumption: In the survey of current participants, this refers to a response indicating the household consumed all its purchased food

Full purchase: In the survey of current participants, this refers to a response indicating the household purchased all its issued food

Least expensive brand (LEB): A cost-containment practice in which a State agency requires participants to purchase the lowest priced brand of a food

Maximum allowable reimbursement level (MARL): The highest amount for which a vendor may be reimbursed by WIC for WIC foods purchased by participants; set by State agencies to ensure the WIC program pays authorized vendors competitive prices for supplemental foods

Maximum monthly allowance (MMA): The maximum number of units that can be prescribed to a participant for a given food category based on participant category, age, and breastfeeding status; intended to deliver priority nutrients to participants to meet their supplemental nutrition needs

Multivariable regression: A regression model with multiple independent variables (specifically, ordinary least squares regression in this report)

Not to exceed (NTE): The maximum amount a State agency will pay for a specific food

OLS regression: Ordinary least squares (OLS); a type of least squares method for estimating the unknown parameters in a linear regression model

Price look-up code (PLU): A system of numbers that uniquely identify bulk produce sold in grocery stores and supermarkets

Rebate: The amount of money refunded under cost-containment practices to any State agency from the manufacturer of the particular food product as the result of the purchase of the supplemental food with a voucher or other purchase instrument by a participant in each State agency's program. Most WIC State agencies are required to maintain a competitively bid infant formula rebate contract. Rebate contracts for other supplemental foods are at State agency option; this report focuses only on rebates for supplemental foods other than infant formula

Redemption rate: The percentage of food prescription issuance purchased by a participant (equal to issuance quantity divided by redemption quantity)

Relationship: Refers to the statistical association between two random variables

Restriction: A practice implemented at State agency discretion that limits participants' choices for purchasing foods. (e.g., restricting sliced cheese)

Restrictive/nonrestrictive: Pertaining to a State agency's policy for implementing a cost-containment practice; e.g., a "restrictive" State agency implements an LEB restriction for milk, while a "nonrestrictive" State agency does not implement an LEB restriction for milk

Sample mean: The unweighted average of the dependent variable, used in regression analysis

Statistically significant: Indicates an estimate was sufficiently unlikely to have occurred by random chance for a given null hypothesis. Specifically, the *p*-value is below the alpha level (i.e., the probability that results and any more extreme results are due only to random chance); the alpha level is set at 0.05 for most analyses but may be lowered to 0.01 and 0.001 when a stricter threshold is appropriate

Store brand only (SBO): A cost-containment practice in which a State agency requires participants to purchase only the store or private label brand of a food

Stratified simple random sampling with proportional allocation: Stratified simple random sampling is a method of sampling that involves the division of a population into subgroups known as strata. In stratified random sampling, the strata are formed based on members' shared attributes or characteristics (e.g., income). Proportional allocation refers to a procedure for dividing a sample among the strata in a stratified sample survey. In this report, this sampling method was used to select current and former WIC participants to participate in the Survey of WIC Participants and Survey of Former WIC Participants, respectively

Vendor limiting criteria: Criteria established by the State agency to determine the maximum number and distribution of vendors it authorizes

ZIP Code Tabulation Area (ZCTA): Entities developed by the U.S. Census Bureau for tabulating summary statistics. ZCTAs are used in this report to define household characteristics for (1) presence of a nearby WIC vendor/supermarket (i.e., household and WIC vendor/supermarket located in the same ZCTA) and (2) urbanicity (i.e., the share of each household's ZCTA living in an urban area)

Executive Summary

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides nutritious foods, nutrition education, breastfeeding promotion and support, and healthcare referrals to nutritionally at-risk, low-income pregnant women, new mothers, and infants and children up to age 5. Administered by the U.S. Department of Agriculture's (USDA) Food and Nutrition Service (FNS), WIC State agencies receive grants to provide services through local agencies and clinics. Federal regulations designate the types and amounts of foods that can be prescribed to meet each participant's nutritional needs.

Food costs accounted for \$3.1 billion, or about 61 percent of the WIC program's total costs, in fiscal year (FY) 2019.¹ Unlike entitlement programs, under which Congress sets aside funds to allow every eligible individual to potentially participate, WIC is a grant program that provides State agencies a specific, fixed amount of funds each year. State agencies are responsible for implementing cost-containment practices designed to ensure WIC foods are reimbursed at competitive prices while maintaining Federal nutrition standards and quantities. Some of these practices are federally mandated, while others are voluntary.

Understanding the approaches State agencies use to reduce food costs when selecting and authorizing supplemental foods, and the relative effectiveness of these approaches, is critical to developing useful policies for cost containment. Equally important is understanding the possible negative consequences of these practices on participant outcomes (e.g., whether brand restrictions reduce participant satisfaction or consumption, or even contribute to a participant leaving the program).

Study Objectives

- Objective 1: Provide a national picture of food package cost-containment practices across WIC State agencies.
- **Objective 2:** Examine the impact of at least six food cost-containment practices on their ability to contain food package costs with little or no adverse impact on WIC program outcomes.
- **Objective 3:** Identify at least four best practices that are effective at food cost containment and that FNS could disseminate across WIC State agencies for possible implementation.

A. Background

In addition to federally required cost-containment practices, State agencies also implement voluntary statewide practices. State agencies must ensure Federal nutritional standards and quantities are met while also balancing cost, accessibility, and participant preference. This study examines six common cost-containment practices:

- Least expensive brand (LEB) restrictions. Because food costs may vary by brand, some State agencies require participants to select the LEB available for particular foods to reduce costs.
- Store brand only (SBO) restrictions. Because they are often less expensive than their national brand counterparts, some State agencies require participants to select only store brand (generic and private label items) within a food category.

¹See USDA FNS, 2020a

- Manufacturer rebates. State agencies have the authority to enter competitive manufacturer rebate contracts for supplemental foods other than infant formula, effectively limiting participant purchases to items from the contracted manufacturer within a food category. In exchange, the State agency receives a rebate for each item purchased.
- **Container size restrictions.** Because food items generally cost less per unit in larger containers, some State agencies set minimum container sizes to take advantage of lower per-unit prices.
- Form or type restrictions. Because food costs may vary by the form in which the food is packaged (e.g., string cheese) or the type (e.g., Greek or organic yogurt), some State agencies restrict forms or types of food for cost containment.
- Food alternative restrictions. State agencies may allow participants to select federally authorized alternative foods to accommodate dietary or cultural preferences. For example, soybased beverage and tofu are authorized milk alternatives. However, because these items may be more expensive than the foods they replace, State agencies have the discretion to and sometimes limit the number of allowed alternative foods.

B. Approach

To address the study objectives, the team collected data from two analytic groups of State agencies. In support of objective 1, the team collected information on the cost-containment practices implemented in **70 State agencies**, which consisted of all 50 States, the District of Columbia, 5 U.S. territories, and a sample of 14 of the 34 Indian Tribal Organizations (ITOs).² The study team collected two main sources of data from the 70 study State agencies:

- WIC food lists and policy documents. Information about food-specific restrictions and manufacturer rebates were systematically abstracted from State agency food lists and brochures, State Plans, and other policy documents.
- Interviews with program staff. In-depth telephone interviews were conducted with WIC State agency program staff to understand cost-containment policies, their perceived effectiveness, and administrative burden.

In support of objective 2, the team collected information from **12 EBT State agencies**³ to conduct an indepth assessment of estimated cost savings and program outcomes associated with cost-containment practices. The team also collected information on former WIC participants from 3 of the 12 State agencies (Florida, Ohio, and Virginia). The study team collected 5 main types of data from the 12 EBT State agencies:

Survey of WIC Participants. This survey was administered to participants in the 12 EBT State agencies and covered topics such as satisfaction with WIC food items, benefit use, food item purchases and consumption, use of mobile shopping applications, and presence of modified diets or food allergies.

² In response to a request by the Office of Management and Budget to reduce burden on ITOs, the study team selected 14 of the 34 ITOs. To select the 14 ITOs, all 34 ITOs were divided into three strata by size. ITOs were selected from the large and medium strata with 100 percent certainty; the remainder were randomly selected from the smallest strata. The 14 ITOs included 79 percent of participants in all ITOs.
³ Includes 12 of the 70 State agencies that had implemented EBT by the end of FY 2015. Colorado, which implemented EBT in November 2016, was selected to replace New Mexico after the start of the study because of anticipated difficulties providing data as a result of a system upgrade. New Mexico implemented EBT in December 2007.

- Survey of Former WIC Participants. This survey was administered to participants in 3 of the 12 EBT State agencies and covered reasons for nonparticipation and satisfaction with WIC foods.
- EBT data. Benefit issuance, redemptions, vendor information, and approved product lists were used to understand and characterize the foods purchased by WIC households. Additional extant data sources (e.g., Information Resources, Inc. Consumer Network Panel data) were merged with the EBT data for analysis purposes.
- Certification data. These data, similar to data files State agencies submit as part of the biennial WIC Participant and Program Characteristics data collection, were used to identify and sample current and former participants and included information on participant characteristics, food package prescriptions, health outcomes, and household income.

Based on information collected from the 70 study State agencies, an advisory panel of WIC program experts, and FNS, the study team identified 29 food-specific restrictions across the 6 cost-containment practices to include in the analysis of program outcomes. Those outcomes were food costs and savings, access to and availability of prescribed foods, participant satisfaction with and consumption of prescribed foods, program participation, accommodation for participants with modified diets, participant food redemptions, and participant health outcomes. Information collected and analyzed for objectives 1 and 2 was used to address objective 3 to draw conclusions and make recommendations about cost-containment practices that may be appropriate for broad implementation.

C. National Picture of Cost-Containment Practices

Of the six voluntary food cost-containment practices examined through this study, three were implemented by all or most State agencies nationally. Specifically, all 70 study State agencies imposed at least one container size restriction and at least one form or type restriction; most State agencies (98.6 percent) restricted at least one alternative food (see figure ES.1). Brand-related restrictions were less commonly implemented. Of the three brand-related restrictions (LEB, SBO, and manufacturer rebates), LEB restrictions were most common—used by nearly 40 percent of all State agencies.





Note

N = 70 State agencies

Sources: WIC food lists and policy documents; interviews with program staff

State agency staff discussed the strengths and barriers to implementation, as well as the perceived effectiveness, of each practice. LEB and SBO restrictions were primarily implemented for cost savings. Several State agencies cited concerns over participant satisfaction as a reason for not implementing these restrictions. While most State agencies with manufacturer rebates for foods other than infant formula thought these restrictions were effective at containing costs, many other State agencies indicated they did not seek out these contracts because the costs associated with implementing and maintaining the rebates could reduce the potential cost savings associated with the restriction.

All State agencies implemented at least one container size or form or type restriction, and these restrictions were often primarily implemented to ensure compliance with Federal size or nutrition requirements rather than to contain costs. However, some State agencies with many small vendors cited difficulties implementing container size restrictions because, at times, these vendors struggled to stock larger items. Lastly, State agencies most often restricted alternatives because of a lack of participant demand or statewide availability. Overall, State agencies most frequently identified LEB restrictions, container size restrictions for organics as being most effective at containing costs.

D. Food Costs and Savings

The study team used data from 12 EBT State agencies to conduct an analysis of WIC food costs and cost savings associated with 29 food-specific restrictions. WIC food-category costs vary across WIC State agencies for numerous reasons, including differences in food prices and the average quantities of WIC foods prescribed per participant. To allow for comparisons across State agencies, standardized costs and cost savings per participant per month (referred to herein as "per participant month") were estimated assuming a standard caseload distribution, issuance of Federal maximum monthly allowances without tailoring, and full benefit redemption.

Standardized food package cost estimates (excluding the cost of fruits and vegetables and infant formula) ranged from an average of \$36.97 to \$48.08 per participant month across the EBT State agencies. Estimated actual food package costs, which reflect variations in the total quantity redeemed because of differences in caseload composition and redemption rates, were much lower, ranging from \$14.92 to \$26.93. Partial WIC purchases (i.e., participants not purchasing all the foods prescribed in their food package), likely explain most of the difference observed between estimated actual and standardized food package costs.

Food cost savings from food-specific restrictions vary based on food prices, prescribed quantities, and participant preferences and yield savings equal to the difference between food costs incurred without item restrictions and food costs incurred with item restrictions. Using EBT redemption data, food-cost savings were estimated separately for State agencies with and without restrictions. Of the 29 food-specific restrictions examined through the study, 16 were associated with estimated average cost savings of \$0.01 or more per participant month: 3 LEB, 2 SBO, 2 manufacturer rebates for foods other than infant formula; 3 container size, 4 form or type, and 2 food alternatives.

E. Relationship Between Food-Specific Restrictions and Participant Outcomes

The study team used data from 12 EBT State agencies to examine associations between 29 food-specific restrictions and 6 participant outcomes: access to and availability of prescribed foods (i.e., WIC participant shopping experience); participant satisfaction, purchases, and consumption of prescribed foods; program participation (i.e., reasons former WIC households left WIC); accommodation for participants with modified diets; participant food redemptions; and participant health outcomes.

1. WIC Participant Shopping Experience

In total, 72.5 percent of households indicated the WIC shopping experience was easy or very easy (see figure ES.2). However, when households were asked about shopping difficulties they may have encountered while shopping for WIC foods, more than 70 percent of households reported they had at least once selected the wrong item and been asked by the cashier to retrieve the correct item, or found the WIC food was out of stock or not available in the correct container size.



Figure ES.2. Households Reporting Ease or Difficulty with WIC Shopping Experience (Percentages)

Notes

Total N = 2,962; see appendix table E.1 for State agency sample sizes

Sample sizes include all survey respondents who provided a response to the question. Respondents who answered "don't know" or refused to answer were not included. All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

Source: Insight tabulations of Survey of WIC Participants, question A4

2. Participant Satisfaction, Purchases, and Consumption

More than 90 percent of households were satisfied or very satisfied with foods purchased with WIC (see figure ES.3). Regression analyses indicated LEB restrictions, SBO restrictions, and manufacturer rebates were not significantly associated with brand satisfaction for WIC foods. Container size restrictions were not significantly associated with container size satisfaction for WIC foods.



Figure ES.3. Satisfaction with Purchased WIC Foods by State Agency (Percentages)

Notes

Total N = 2,852; see appendix table F.1 for State agency sample sizes

All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies. Sample sizes include only households prescribed the food category. CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

Source: Insight tabulations of Survey of WIC Participants, question A1_4a

While full purchase (i.e., purchasing the entire prescribed amount of a WIC food) and full consumption (i.e., consuming all the WIC food purchased) varied greatly by food, there was little variation across State agencies for a given food. Several food-specific restrictions were associated with full consumption of purchased WIC foods. LEB restrictions for whole-grain bread products and tortillas, SBO restrictions for juice, container size restrictions for yogurt (only quarts), and form or type restrictions for cheese (no shredded) were negatively associated with full consumption of WIC foods (see table ES.1). Restrictions for 48-ounce containers of juice had a positive relationship with full consumption.

Food Category	Mean (Percent)	Estimate	95 Percent Confidence Interval	Sample Size ^a
Milk and milk alternatives				
Yogurt (only quarts)	64.4	-14.2***	(-21.6, -6.8)	1,095
Cheese (no shredded)	66.6	-8.0*	(-14.5, -1.5)	1,960
Juice (SBO)	76.6	-7.2**	(-11.6, -2.7)	2,273
Juice (no 48-ounce containers) ^b	76.6	3.9*	(0.3, 7.5)	2,273
Whole grains		·	·	
Whole-grain bread products (LEB)	56.2	-9.5*	(-16.9, -2.1)	1,891
Tortillas (LEB)	53.2	-17.3*	(-33.9, -0.8)	419

Table ES.1. Estimated Relationship between Full Consumption and Selected Food-Specific Restrictions

Notes

Estimates are OLS⁴ regression coefficients showing the association between the restriction and the probability of fully consuming purchased WIC foods. The mean is the percentage of respondents who indicated they fully consumed each WIC food. The restriction of interest is listed in parentheses next to the WIC food.

^a Sample sizes include only households that reported purchasing all or some of the food category.

^b Typically, 48-ounce containers are prescribed to women so they may receive their full nutritional benefit. For study purposes, State agencies identified as having a restriction on 48-ounce juice containers, only allow frozen concentrate containers that reconstitute to 48 ounces.

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight analysis of Survey of WIC Participants, question C3

3. Reasons Former WIC Households Left WIC

More than half of former WIC households stopped buying WIC foods at least partly because of negative shopping or retailer experiences; more than one-third stopped buying WIC foods at least partly because they did not like the kinds of food they could obtain through WIC (see figure ES.4). A greater percentage of former than current WIC households reported being embarrassed while purchasing WIC foods because of confusion about allowable foods (48.8 and 38.0 percent, respectively; p < 0.05).

General satisfaction with foods purchased through WIC differed between former and current households; 90.3 percent of former households indicated they were satisfied compared with 95.0 percent of current households (p < 0.05). Only one of the five food-specific restrictions that could be examined using regression analysis was associated with a disproportionately lower probability of brand satisfaction among former WIC households relative to current households (LEB for whole-grain bread products).

⁴ Across the report, OLS = ordinary least squares

Insight • WIC Food Cost-Containment Practices Study: Final Report





Notes

N = 380

Percentages are weighted to be representative of all WIC participants in the three State agencies included in the former participant analysis. Reasons indicate the percentage of former WIC households that volunteered or agreed with statements for why they stopped buying WIC foods. Reasons were combined into the five categories shown. Percentages sum to more than 100 because respondents could provide more than one response.

Source: Insight tabulations of Survey of Former WIC Participants, questions F_B1-F_B13

4. Accommodations for Participants with Modified Diets for Health and Personal Reasons

Of the households surveyed, nearly 22 percent followed a modified diet for health or personal reasons (religious, cultural, and other personal choice diets; see figure ES.5). Among households with a modified diet, about 11 percent reported problems finding appropriate WIC foods because of their dietary needs.

Associations between participant outcomes and 12 food-specific restrictions were examined among households that follow a modified diet and households that do not. Only two restrictions were associated with disproportionately lower probabilities of full purchase and full consumption among households that followed a modified diet: LEB restrictions for cheese and eggs. LEB restrictions for eggs were associated with a disproportionately lower likelihood of full purchases among households that followed a modified diet compared with households that did not follow a modified diet (by 10.7 percentage points; p < 0.05). Similarly, LEB restrictions for cheese were associated with a disproportionately lower likelihood of full consumption among households that followed a modified diet compared with households that did not (by 18.1 percentage points; p < 0.05).

Figure ES.5. Prevalence of a Modified Diet Among Survey Respondents, Across the 12 EBT State Agencies



Notes

N = 2,963

Percentages are weighted averages representative of all WIC participants in the 12 State agencies included in the study. Source: Insight tabulations of Survey of WIC Participants, questions F1, F4, and F5

5. Participant Food Redemptions

Household redemption rates were examined for the 12 EBT State agencies and varied across food categories. Overall, redemption rates were highest for eggs and lowest for infant food meat (see figure ES.6).

Figure ES.6. Average Monthly Household Redemption Rates, by Major Food Category, Across the 12 EBT State Agencies



Note

Average monthly rates were equal to the unweighted average across multiple months. Source: Insight tabulations of WIC EBT data

SBO restrictions for cheese and juice, container size restrictions for yogurt (only quarts), and form or type restrictions for cheese (no shredded) and eggs (large only) were all significantly associated with lower redemption rates. These results were also relatively large in magnitude—5.3 to 24.3 percentage points (see table ES.2). LEB restrictions for both cow's milk and cheese were associated with higher redemption rates.

Food Category	Mean Redemption Rate	Estimate	95 Percent Confidence Interval	Sample Size ^a
Milk and milk alternatives				
Cow's milk (LEB)	67.7	31.0**	(13.0, 49.1)	964,441
Yogurt (only quarts)	60.8	-24.3*	(-47.5, -1.2)	405,076
Cheese (LEB)	73.1	8.8*	(0.2, 17.4)	808,877
Cheese (SBO)	73.1	-5.6**	(-9.2, -1.9)	808,877
Cheese (no shredded)	73.1	-12.1**	(-20.2, -4.1)	808,877
Eggs (large only)	78.0	-5.3***	(-7.5, -3.1)	966,462
Juice (SBO)	70.9	-17.1*	(-29.4, -4.9)	959,950

Table ES.2. Estimated Relationship Between Redemption and Selected Food-Specific Restrictions

Notes

Estimates are OLS regression coefficients showing the association between the restriction and the mean redemption rate. The restriction of interest is listed in parentheses next to the WIC food. Standard errors are clustered at the State agency level. ^a Sample sizes include only households prescribed the food category.

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight analysis of WIC EBT data

6. Participant Health Outcomes

A goal of the WIC program is to improve health among participants. Food-specific restrictions may indirectly affect health outcomes through their direct effect on benefit redemption. It is possible foodspecific restrictions may cause individuals to reduce their consumption of prescribed foods. In turn, reduced consumption of WIC foods may result in worse health outcomes or limit the potential for improved health outcomes associated with program participation. To examine the latter, the study team tested the relationship between benefit redemption and four health outcomes: infant birth weight, child anemia, child weight, and child height. An important caveat is that the analysis did not directly assess the complex relationship between food-specific restrictions and health but instead assessed the relationship between WIC benefit redemption and participant health. Because WIC food consumption was not observed, household redemption of WIC benefits was used as a proxy for individual consumption of WIC foods. The results indicated no evidence of a relationship between WIC benefit redemption and infant birth weight for babies born to WIC-participating women, or the change in height-for-age percentile, probability of exiting anemia, or probability of exiting underweight status for participating children. However, there were improvements in the prevalence of anemia and underweight status among children in households that recertified for WIC benefits. Sixty-eight percent of children who were anemic at a baseline WIC certification assessment were no longer anemic at their recertification hematological assessment, and one-third of children who were underweight at a baseline WIC certification anthropometric measurement were not underweight at their recertification anthropometric measurement.

F. Conclusions and Recommendations

To address study objective 3, findings from the food-cost savings and household outcomes analyses were used to classify 25 food-specific restrictions into 1 of 4 categories: (1) cost savings and no adverse participant outcomes, (2) cost savings and some adverse participant outcomes, (3) no cost savings and no adverse participant outcomes, and (4) no cost savings and some adverse participant outcomes (see figure ES.7). Participant outcomes used to classify restrictions included satisfaction with and consumption of WIC foods as reported by households in the Survey of WIC Participants and EBT redemption rates. Restrictions were identified as resulting in cost savings if estimates of actual cost savings were statistically significant (p < 0.05, p < 0.01, or p < 0.001) and greater than \$0.01 per participant month. Restrictions on alternatives were not classified because participant outcomes were not examined for these restrictions.



Figure ES.7. Classification of Food-Specific Restrictions Based on Key Outcomes

Notes

Participant outcomes used to classify restrictions included satisfaction with and consumption of WIC foods as reported by households in the Survey of WIC Participants and EBT redemption rates. Restrictions were identified as resulting in cost savings if estimated actual cost savings were statistically significant (p < 0.05, p < 0.01, or p < 0.001) and greater than \$0.01 per participant month. Restrictions on alternatives are excluded from the figure because participant outcomes were not examined.

^a Whole-wheat/whole-grain bread/rolls/buns

The above-referenced classifications and important contextual information (e.g., barriers to implementation and the prevalence of each restriction) informed the following recommendations:

- Disseminate information about food-specific restrictions that reduced food costs but were not associated with adverse participant outcomes. Four food-specific restrictions may be most appropriate for broad implementation: form and type for yogurt (no Greek) and infant fruits and vegetables (no organic) and container size for cheese (16 ounce only) and juice (no 48 ounce).⁵ Each of these restrictions was widely used across the 70 study State agencies, perhaps indicating fewer barriers to implementation.
- Reconsider food-specific restrictions that did not reduce estimated food costs and/or were associated with adverse participant outcomes. Two food-specific restrictions did not yield any estimated cost savings and were associated with adverse participant outcomes: tortilla brand (LEB) and cheese form or type (shredded). These restrictions were unpopular with households, resulting in negative associations with full consumption or redemption of the given foods. Based on the outcomes examined through this study, it may not be advisable to implement or maintain such restrictions.

Given the variation across State agencies regarding their caseload distribution, vendor population, available foods, food prices, redemption rates, and many other factors, even the most promising restrictions may not be appropriate for adoption by all State agencies. Factors such as the retail environment, access to food distributors, geography, or participant demographics would be important for State agencies to consider when making decisions about restrictions. Likewise, the administrative costs of implementing food-specific restrictions need to be considered, along with costs that may be incurred (e.g., additional participant communication or vendor training) when implementing restrictions that are challenging to communicate or enforce.

⁵ Typically, 48-ounce containers are prescribed to women so they may receive their full nutritional benefit. For study purposes, State agencies identified as having a restriction on 48-ounce juice containers, only allow frozen concentrate containers that reconstitute to 48 ounces.

Chapter 1. Introduction

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides nutritious foods, nutrition education, breastfeeding promotion and support, and healthcare referrals to nutritionally at-risk, low-income pregnant women, new mothers, infants, and children up to age 5. Administered by the U.S. Department of Agriculture's (USDA) Food and Nutrition Service (FNS), WIC State agencies receive grants to provide services through local agencies and clinics. Federal regulations designate the types and amounts of foods that can be prescribed to meet each participant's nutritional needs. Eligible participants receive electronic benefit transfer (EBT) cards, vouchers, or checks to redeem prescribed foods such as milk, eggs, and whole-grain products at authorized retail vendors.⁶

Food costs accounted for \$3.1 billion, or about 61 percent of the WIC program's total costs, in fiscal year (FY) 2019.⁷ Unlike entitlement programs, under which Congress sets aside funds to allow every eligible individual to potentially participate, WIC is a grant program that provides State agencies a fixed amount of funds each year. To make the most effective use of their food grants, State agencies are responsible for implementing cost-containment practices designed to ensure WIC foods are reimbursed at competitive prices while maintaining Federal nutrition standards and quantities. Some of these practices are federally mandated, while others are voluntary. For example, State agencies are required to group vendors with similar characteristics to determine competitive price criteria. State agencies may voluntarily choose to modify the brands, container sizes, and forms or types of federally allowable WIC foods to contain costs (USDA FNS, 2018).

Understanding the approaches State agencies use to reduce food costs when selecting and authorizing supplemental foods, and the relative effectiveness of these approaches, is critical to developing useful policies for cost containment. Equally important is understanding the possible negative consequences of these practices on participant outcomes (e.g., whether brand restrictions reduce participant satisfaction or consumption, or even contribute to a participant leaving the program). Consistent with its objectives, this study provides a national picture of voluntary food cost-containment practices used by State agencies, analyzes cost savings and other program outcomes associated with the different practices, and identifies the practices that may be most effective at balancing cost and participant outcomes when applied across State agencies.

Study Objectives

- Objective 1: Provide a national picture of food package cost-containment practices across WIC State agencies.
- **Objective 2:** Examine the impact of at least six food cost-containment practices on their ability to contain food package costs with little or no adverse impact on WIC program outcomes.
- **Objective 3:** Identify at least four best practices that are effective at food cost containment and that FNS could disseminate across WIC State agencies for possible implementation.

⁶ See 7 C.F.R. § 246.10 (Special Supplemental Nutrition Program for Women, Infants and Children (WIC), 2014).
⁷ See USDA FNS, 2020a

Insight • WIC Food Cost-Containment Practices Study: Final Report

A. Background

FNS administers WIC at the Federal level and regulates the composition of food packages, which are specific sets of foods prescribed to each participant by WIC local agency staff (USDA, 2016). WIC food packages specify the types and amounts of foods prescribed to participants based on participant category (pregnant women, breastfeeding women, postpartum women, infants, and children); age; breastfeeding status; and any qualifying medical condition that requires the use of certain formulas or nutritionals.

The WIC food categories referenced throughout this report (see text box)

WIC Food Categories Used in This Report Milk and milk alternatives Peanut butter Whole grains Cow's milk Whole-wheat/whole-Soy-based beverage grain bread/rolls/buns Tofu Tortillas Yogurt Brown rice Cheese Oats Eggs Juice Bulgur Breakfast cereal Barley Canned fish Whole-wheat pasta Legumes Infant cereal Dry beans

- Canned beans
- Infant fruits and vegetables
 - Infant food meat

reflect food packages for women and children, which may include milk, cheese, eggs, juice, breakfast cereal, canned fish (for certain breastfeeding women), legumes, peanut butter, and wholewheat/whole-grain bread/buns/rolls (whole-grain bread products). These food categories also reflect food packages for infants, which may include infant fruits and vegetables, infant cereal, and infant food meat. State agencies may also choose to offer alternatives such as soy-based beverage, tofu, and yogurt for cow's milk; canned beans for dry beans; and tortillas, brown rice, oats, bulgur, barley, and wholewheat pasta for whole-grain bread products.⁸

Figure 1.1. Example Food List Excerpt for Authorized Milk Products



State agencies develop WIC food lists to identify the products participants can purchase with their WIC benefits. They provide the lists to participants in various formats (e.g., printed brochures, mobile applications) and post them online. The food lists often include pictures of and details about the brands, container sizes, and forms or types of foods authorized in each WIC food category, like those depicted in figure 1.1.

Most State agencies are required to maintain competitively bid infant formula rebate contracts for costcontainment purposes.⁹ The rules for these systems are outlined in Federal regulations. Because these required cost-containment practices are not the focus of this study, infant formula was excluded from the analysis. Fruits and vegetables for women and children are provided for a set dollar amount and are therefore not subject to costcontainment practices. For this reason, fruits and vegetables were also excluded from the analysis.

⁸ For more information, see Thorn et al. (2015).

Insight • WIC Food Cost-Containment Practices Study: Final Report

⁹ In FY 2019, infant formula rebates to all States totaled approximately \$1.7 billion (USDA FNS, 2019).

1. Food-Cost Containment in the WIC Program

FNS requires State agencies to implement a variety of cost-containment practices related to the selection, authorization, and reimbursement of WIC vendors. To do this, State agencies group vendors with similar characteristics into peer groups, establish competitive price selection criteria, and set maximum allowable reimbursement levels (MARLs) for those groups.¹⁰

In addition to federally required vendor cost-containment practices, State agencies also implement voluntary statewide practices to contain the costs of authorized foods. State agencies must ensure Federal nutritional standards and quantities are met while also balancing cost, accessibility, and participant preference. Common food-specific cost-containment practices include the following:

- Brand restrictions. For some food categories, State agencies allow participants to choose any brand (i.e., store, private, or national) based on their preference. State agencies use three types of restrictions to reduce costs based on brand:
 - Least expensive brand (LEB) restrictions. Because food costs may vary by brand, some State agencies require participants to select the LEB available for a particular food to reduce costs. This approach is most often applied to food categories for which there are no strong brand associations or preferences, such as milk, cheese, and eggs.
 - Store brand only (SBO) restrictions. Because they are often less expensive than their national brand counterparts, some State agencies require participants to select only store brand items within a food category.¹¹ Similar to LEB, this strategy is most commonly applied to food categories for which there are no strong brand associations or preferences, such as milk, cheese, and eggs.
 - Manufacturer rebates. State agencies sometimes enter competitive rebate contracts with manufacturers for supplemental foods, in addition to infant formula rebate contracts described earlier in this chapter (e.g., infant cereal or infant fruits and vegetables). When they do, participants are limited to specific items included in the contract.
- Container size restrictions. Because food items generally cost less per unit in larger container sizes, some State agencies set minimum container sizes to take advantage of lower per-unit prices. This practice is used most often with foods that come in a variety of container sizes, such as milk, breakfast cereal, yogurt, juice, and cheese. For example, State agencies may require participants to select a 16-ounce container of cheese rather than two 8-ounce containers.
- Form or type restrictions. Form or type refers to the form in which the food is packaged (e.g., string cheese) or the type (e.g., Greek or organic yogurt). Some State agencies restrict the form or type of food in each category for purposes of cost containment. For example, State agencies may require participants to select a block of cheese rather than string cheese.
- Food alternative restrictions. State agencies may allow participants to select federally authorized alternative foods to accommodate dietary or cultural preferences. For example, soybased beverage and tofu are authorized milk alternatives. However, because these items may be more expensive than the foods they replace, State agencies have the discretion to and sometimes limit the number of allowed alternative foods.

¹⁰ See 7 C.F.R. § 246.12 (Special Supplemental Nutrition Program for Women, Infants and Children (WIC), 2010). ¹¹ Store brands consist of generic and private labels.

Insight • WIC Food Cost-Containment Practices Study: Final Report

National brand restrictions. State agencies specify the national brands of foods they allow, primarily to ensure Federal nutrition and size requirements are met; streamline the food list; manage nutritional reviews of allowed foods; and, at times, bar more expensive brands. This restriction is most often used for foods strongly associated with particular brands, such as cereal, juice, or yogurt.

2. Effects of Cost Containment

Although voluntary cost-containment practices may help to reduce food costs, they also may have unintended adverse consequences on participant outcomes. For example, limiting the brands or container sizes allowed for purchase with WIC benefits may reduce participant satisfaction with the program because participants prefer the disallowed brands or sizes, or because they face challenges identifying allowable products in the store. Lower satisfaction could reduce their likelihood of redeeming and consuming all the prescribed foods, which in turn could compromise WIC's goal of improving the health and nutrition status of women, infants, and children through the provision of nutrient-rich foods. These consequences are particularly relevant to consider in the current environment of declining WIC participation and coverage rates among those eligible for the program.¹² Table 1.1 summarizes the potential effects of cost-containment practices on eight program outcomes of interest.

Program Outcome	Potential Effects of Cost-Containment Practices on Outcome			
	Primary Effects			
Food costs	Because of food-specific restrictions, participants may select lower cost foods, which result in food cost savings.			
Access to and availability of prescribed foods	Food-specific restrictions may negatively affect participants' shopping experiences, including difficulties finding an item in the store or making it more likely the item will be unavailable or out of stock.			
Secondary Effects				
Participant satisfaction with and consumption of prescribed foods	Reduced food choice or increased difficulty shopping for WIC foods because of food- specific restrictions may reduce participant satisfaction and could also lead to lower consumption rates of prescribed WIC foods.			
Program participation	Former WIC participants may have left the program as a result of being dissatisfied with WIC foods at least partly because of food-specific restrictions that reduced food choice or increased difficulty shopping for WIC foods.			
Accommodations for participants with modified diets for health and personal reasons	Participants who follow a modified diet that limits the foods they can eat may be more adversely affected by restrictive practices because of challenges finding appropriate foods when shopping with WIC.			
Participant food redemptions	Reduced participant satisfaction, difficulties finding an item in the store, or other factors related to food-specific restrictions may result in lower redemption rates for WIC foods.			
Tertiary Effects				
Participant health outcomes	If participants reduce their consumption of WIC foods or leave WIC, the potential health benefits of WIC may be lost.			

Table 1.1.	Potential I	Effects of	Cost-Containment	Practices on	Proaram Outcomes

¹² After increasing from 2000 through 2010, the number of participants has steadily decreased (see USDA FNS, 2020c). The percentage of individuals eligible for WIC who participate (the coverage rate) has also dropped since 2011 (see Gray et al., 2019).

3. Previous Research and Rationale

The last comprehensive study of the effects of cost-containment practices on WIC program costs and outcomes was sponsored by the USDA Economic Research Service and completed in 2003 (Kirlin et al., 2003). The investigators selected six State agencies with a mix of cost-containment practices and compared the costs and participant outcomes of these practices to the extent possible by food category. The findings of that study follow:

- Cost-containment practices reduced average food package costs in four of the six State agencies by nearly 15 percent, ranging from 0.2 to 21.4 percent depending on the practices implemented and local conditions. The 21.4 percent cost savings estimated for Oklahoma was attributed mostly to the SBO restriction the State agency had in place for breakfast cereal—a practice that no State agency currently implements.
- Cost-containment practices were associated with few adverse participant outcomes.
- Administrative costs attributed to cost-containment practices were relatively low; in the four State agencies with substantial food-specific restrictions, administrative costs averaged less than 1.5 percent of estimated food package savings.

Since the 2003 study, the WIC program has undergone important changes that may affect the implementation and assessment of cost-containment practices:

- Federal regulations¹³ require State agencies to implement a vendor peer group system, competitive price criteria, and allowable reimbursement levels in a manner to ensure the WIC program pays authorized vendors competitive prices for supplemental foods. The regulations also require State agencies to ensure authorizing "above-50-percent" (A-50) vendors (those that earn 50 percent or more of their food sales from WIC transactions) does not result in higher total food costs if program participants redeem benefits at these vendors rather than others that do not meet the A-50 criterion.¹⁴
- Between 2009 and 2014, Federal regulations comprehensively revised the WIC food packages to include fruits and vegetables, yogurt as a partial milk substitute, and whole-grain options. The regulations also provided greater flexibility in prescribing food packages to accommodate the cultural food preferences of WIC participants and more support for the establishment of successful, long-term breastfeeding.¹⁵

 ¹³ See 7 C.F.R. § 246.12 (Special Supplemental Nutrition Program for Women, Infants and Children (WIC), 2010).
 ¹⁴ Ibid.
 ¹⁵ Ibid.

- The Healthy, Hunger-Free Kids Act of 2010 (Pub. L. 111–296) requires all WIC State agencies to implement EBT by October 1, 2020.¹⁶ EBT vastly improves the ability to administer benefits and track food purchases and costs. With EBT, WIC purchases are conducted electronically at the authorized vendor. At checkout, the scanned universal product codes (UPCs) are assessed against an approved product list (APL) created and updated by the State agency and regularly downloaded by the vendor. The scanned food items and APL are then assessed against the food benefits prescribed to any participant in a household. If the scanned food items satisfy both the APL and the food prescription requirements, and the household has remaining benefits available, the purchases are authorized, and the benefit balance is updated to reflect the use of the benefits. As of August 2021, 77 State agencies had fully implemented EBT statewide; these State agencies represent more than 91 percent of all participants nationwide. All remaining State agencies using checks or vouchers are in the process of planning for or piloting EBT to meet the requirement.
- Several additional studies conducted since 2003 provided information on WIC cost-containment practices, which included a 2005 study that examined the degree to which food prices, caseloads, and cost-containment practices influenced interstate variations in average monthly WIC food costs (Davis & Leibtag, 2005). By simulating interstate variation in average monthly WIC food package costs, the study found the same cost-containment practice could generate different effects on average monthly food costs across WIC State agencies. Another study provided detailed information on the food packages, options, and cost-containment practices selected by State agencies since Federal regulations were implemented in 2014 (Thorn et al., 2015).¹⁷ The study identified a range of cost-containment practices State agencies were using at that time and the percentage of State agencies using each type of practice. Most commonly, State agencies implemented LEB restrictions for milk, cheese, and eggs; restrictions on organic foods (other than fruits and vegetables); and restrictions on cage-free and enriched eggs.
- A recent audit by USDA's Office of the Inspector General (OIG) recommended FNS study voluntary cost-containment practices used in State agencies to assess their effectiveness in reducing costs and understand potential adverse participant outcomes. The audit also recommended FNS share with State agencies practices that showed promise for reducing food costs and providing additional savings to WIC if implemented in more State agencies (USDA OIG, 2014). In response, FNS surveyed State agencies about the range of food cost-containment practices they had in place and asked the agencies to review their current practices to determine if additional practices could be implemented to further reduce food costs.

Although they represented important contributions to the literature and FNS's understanding, none of the above-mentioned efforts or studies conducted since 2003 comprehensively examined the effectiveness of these cost-containment practices in reducing food costs or the impact of these practices on participant outcomes. To address this gap, FNS conducted the WIC Food Cost-Containment Practices Study; its goal was to provide the type of analyses required to respond to the OIG report and identify best practices for food cost-containment that could be implemented more broadly.

¹⁶ See USDA FNS (2020d) for which State agencies have implemented EBT systems as of February 2020.

¹⁷ Most of the changes in food packages were initially made under the interim rule on food packages at 73 Fed. Reg. 14153 (Special Supplemental Nutrition Program for Women, Infants and Children (WIC): Revisions in the WIC Food Packages; Delay of Implementation Date, 2009).

B. Organization of the Report

The subsequent chapters of this report describe and analyze information collected through this study to provide a comprehensive assessment of cost-containment practices and their effect on food costs and participant outcomes:

- Chapter 2 describes the data sources and methodology used to address the research objectives of the study.
- Chapter 3 presents a national picture of the cost-containment practices used by State agencies to address objective 1, including a description of each practice, the percentage of State agencies that have implemented each practice by food category, and both the strengths of the practice and barriers to its implementation. It also discusses the role of EBT in cost-containment practices, and State agency perspectives on the most effective of these practices.
- Chapters 4 through 10 present quantitative findings on seven program outcomes associated with cost-containment practices by food category to address objective 2. The program outcomes are as follows:
 - Food costs (chapter 4, "Food Costs and Savings")
 - Access to and availability of prescribed foods (chapter 5, "Participant Shopping Experience")
 - Participant satisfaction with and consumption of prescribed foods (chapter 6, "Participant Satisfaction, Purchases, and Consumption")
 - Program participation (chapter 7, "Reasons Former WIC Participants Left WIC")
 - Accommodations for participants with modified diets for health and personal reasons (chapter 8, "Accommodations for Participants with Modified Diets for Health or Personal Reasons")
 - Participant food redemptions (chapter 9, "Participant Food Redemptions")
 - Participant health outcomes (chapter 10, "Participant Health Outcomes")
- Chapter 11 pulls together findings from across the study to draw conclusions and make recommendations for cost-containment practices that are effective at reducing food costs with minimum to no adverse participant outcomes to address objective 3.
- The technical appendices are provided in a separate volume of the report and provide technical details on all aspects of the study. The appendices provide the following information:
 - A detailed description of the complementary data sources used in the study and the file preparation process (appendix A)
 - Data collection instruments (appendix B)
 - Supplemental tables for the national picture of cost-containment practices (appendix C)
 - Analysis details and/or supplemental tables for program outcomes (appendices D–J)

Chapter 2. Methodology

This chapter describes the data sources and methodology used to provide a national picture of voluntary food cost-containment practices and associated cost savings and participant outcomes. Section A describes the two analytic groups of WIC State agencies used in this study, and section B describes the individual data sources. Section C describes the approach used to address each study objective. Appendix A provides a more detailed description of the data sources and file preparation methods. The specific approach used to estimate cost savings and assess each program outcome is described in chapters 4 through 10. An advisory and review panel comprised of WIC directors and operations managers from four State agencies reviewed the study approach, data collection instruments, and draft versions of the report.

A. State Agencies Included in the Study

To address the study objectives, the team collected data from two analytic groups of State agencies:

- 70 study State agencies. In support of objective 1, the team collected information on the costcontainment practices implemented in 70 State agencies, which consisted of all 50 States, the District of Columbia, 5 U.S. territories, and a sample of 14 of the 34 Indian Tribal Organizations (ITOs).¹⁸
- 12 EBT State agencies. In support of objective 2, the team collected information from 12 of the 70 State agencies that had implemented EBT by the end of FY 2015¹⁹ to conduct an in-depth assessment of cost savings and program outcomes associated with cost-containment practices (see figure 2.1). Although the 12 EBT State agencies were purposively selected, they varied considerably by FNS Region, number of participants, and other characteristics, as shown in table 2.1. The team also collected information on former WIC participants from 3 of the 12 State agencies (Florida, Ohio, and Virginia).

Information from both groups was used in support of objective 3, and more specifically to draw conclusions, make recommendations, and describe the prevalence of cost-containment practices that may be appropriate for broad implementation.

¹⁸ In response to a request by the Office of Management and Budget to reduce burden on ITOs, the study team selected 14 of the 34 ITOs. To select the 14 ITOs, all 34 ITOs were divided into 3 strata by size. ITOs were selected from the large and medium strata with 100 percent certainty; the remainder were randomly selected from the smallest strata. The 14 ITOs included 79 percent of participants in all ITOs.
¹⁹ Colorado, which implemented EBT in November 2016, was selected to replace New Mexico after the start of the study because of anticipated difficulties providing data as a result of a system upgrade. New Mexico implemented EBT in December 2007.



Figure 2.1. 12 WIC EBT State Agencies Included in the Study

Source: USDA FNS, n.d.a

Table 2.1. Characteristics of 12 WI	IC EBT State Agencies
-------------------------------------	-----------------------

State	FNS Region	Number of Participants	WIC Food Grant Amount (\$ millions)	EBT Implementation Date
Colorado	Mountain Plains	85,258	\$39.25	November 2016
Florida	Southeast	450,624	\$250.48	April 2014
Kentucky	Southeast	101,743	\$53.29	October 2011
Massachusetts	Northeast	108,593	\$51.21	November 2014
Michigan	Midwest	213,964	\$103.13	March 2009
Nevada	Western	62,531	\$30.30	August 2009
Ohio	Midwest	208,955	\$90.66	August 2015
Texas	Southwest	746,246	\$295.21	April 2009
Virginia	Mid-Atlantic	113,952	\$46.20	May 2014
Wisconsin	Midwest	92,487	\$51.30	September 2015
West Virginia	Mid-Atlantic	35,412	\$19.47	October 2013
Wyoming	Mountain Plains	9,062	\$3.86	January 2002

Notes

Table information is as of FY 2018, which is the period of data collection.

Sources: FNS Regions: USDA FNS, n.d.a; number of participants: USDA FNS, 2020b; WIC food grant amount: USDA FNS, n.d.b; EBT implementation date: USDA FNS, 2020d

B. Data Sources

The study team compiled seven complementary data sources to support the examination of food costcontainment practices. Table 2.2 provides a crosswalk of the data sources, study objectives, and State agencies from which the data were obtained. The sections that follow provide an overview of these data sources (see appendix A for more detail). Appendix B provides the data collection instruments associated with these data sources.

Data Sources	Objective ^a	70 Study State Agencies	12 EBT State Agencies
WIC food lists and policy documents	1. Provide a national picture of food	•	
Interviews with program staff	package cost-containment practices across WIC State agencies	•	
Survey of WIC Participants	2. Eventing the impact of st least sig		•
Survey of Former WIC Participants ^b	2. Examine the impact of at least six food cost-containment practices on		•
EBT data	their ability to contain food package		•
Certification data	costs with little or no adverse impact		•
Administrative cost data	on wic program outcomes		٠

Table 2.2. Crosswalk of Data Sources, Study Objectives, and State Agencies

Notes

^a Objective 3 combines findings from objectives 1 and 2 to identify practices that may be most effective and appropriate for broader use.

^b The Survey of Former WIC Participants was conducted in 3 of the 12 EBT State agencies (Florida, Ohio, and Virginia).

1. Data Obtained From the 70 Study State Agencies

The study team collected two main types of data from the 70 study State agencies:

- WIC food lists and policy documents. Information about food-specific restrictions, manufacturer rebates, and limits on the number of vendors authorized were systematically abstracted from State agency food lists and brochures, State Plans, and other policy documents. State agency food lists were used to obtain detail on authorized and unauthorized brands, container sizes, and forms and types of foods by food category. State Plans and policy documents provided information about the limits on authorized vendors for each State agency. Information about State agency manufacturer rebates was provided by FNS. All data were abstracted via a standardized form for each State agency. Prior to their in-depth interviews (see next bullet), State agencies were asked to review, revise, and return the form.
- Interviews with program staff. In-depth telephone interviews were conducted with WIC State agency program staff, which included directors, nutrition specialists, and vendor managers, between November 2017 and April 2018. During the interviews, respondents discussed and confirmed information abstracted from State agency documents and provided insights on the following:
 - How practices were defined and implemented in the State agency
 - Reasons for implementing certain practices and not others
 - Feedback from participants and vendors about practices
 - Perceived effectiveness of each practice at containing costs
 - Administrative burdens associated with each practice
 - Challenges associated with implementing and maintaining the practices

2. Data Obtained From the 12 EBT State Agencies

The study team collected 5 main types of data from the 12 EBT State agencies, which included survey responses provided by current and former WIC participants for the 12 and 3 State agencies, respectively:

- Survey of WIC Participants. This survey was administered to participants in the 12 EBT State agencies between May and December 2018 using computer-assisted telephone interviews. The target population was households with an active certification as of March 1, 2018. The sampling frames were constructed from State agency-provided lists of households that met the target population definitions.²⁰ The samples were selected through stratified simple random sampling with proportional allocation by State agency to produce overall and State-level estimates. A total of 2,963 respondents across the 12 State agencies completed the survey out of 7,380 individuals contacted (57.8 percent response rate). The survey covered topics such as satisfaction with WIC food items, benefit use, food item purchases and consumption, use of mobile shopping applications, presence of modified diets or food allergies, and demographic characteristics.
- Survey of Former WIC Participants. This survey was administered to participants in 3 of the 12 EBT State agencies between May and December 2018 using computer-assisted telephone interviews. The target population was households that were due to recertify for WIC after a 3-month period but had not.²¹ The sampling frames were constructed from State agency-provided lists of households that met the target population definitions. The samples were selected through stratified simple random sampling with proportional allocation by State agency to produce overall and State-level estimates. Florida, Ohio, and Virginia were selected because they had relatively restrictive practices in place at the time of selection. A total of 380 respondents across the 3 State agencies completed the survey out of 1,569 individuals contacted (38.2 percent response rate). The survey asked about reasons for nonparticipation, satisfaction with WIC food items, and demographic characteristics.
- EBT data. Each of the 12 EBT State agencies provided information on benefit issuance, redemption, and vendors (e.g., address, peer group, vendor type) for the 8-month period between November 1, 2017, and June 30, 2018.²² These data were used to understand and characterize the foods purchased by WIC households by examining redemption rates and the prices paid for purchased items. APLs provided by each of the 12 EBT State agencies were used to standardize the category and subcategory of each WIC food item, container sizes, and units of measure across State agencies. Four extant data sources were merged with the EBT data for analysis purposes: (1) Information Resources, Inc. Consumer Network Panel (IRI) data, (2) the Branded Food Products Database (BFPD) data, (3) The Integrity Profile (TIP) data, and (4) Stores Tracking and Redemptions System (STARS) data (see appendix A for more information on each of these data sources).

²⁰ Households were sampled instead of individual participants because all benefits for a given household were provided via the same EBT card, and shopping for WIC foods was usually done at the household level.

²¹ Former WIC households had participated in WIC as of November 30, 2017, and were due to recertify between December 1, 2017, and February 28, 2018, but had not done so by February 28, 2018.

²² Texas could provide data only for May 2018 through August 2018 because of limitations caused by a change in its management information system and EBT system. Kentucky provided EBT data for January 1, 2018, through August 30, 2018.

Certification data. Each of the 12 EBT State agencies submitted certification data for two reference periods—as of March 1, 2018, and July 1, 2018 (4 months apart).²³ While these data were very similar to the data files State agencies have submitted as part of the biennial WIC Participant and Program Characteristics data collection (WIC PC), the files collected for this study also included a household identifier and contact information. These data were used to identify and sample current and former households and included information on participant characteristics, food package prescriptions, health outcomes, and household income used in the analysis.

C. Approach by Study Objective

Objective 1: Provide a national picture of food package cost-containment practices

The abstracted information from food lists and other policy documents and the results of the semistructured State agency telephone interviews were used to prepare a comprehensive description of voluntary food cost-containment practices nationally. The national picture of cost-containment practices (see chapter 3) details the percentage of State agencies that employed each practice overall and by food category across groups of State agencies (i.e., States and the District of Columbia, ITOs and U.S. territories, and the 12 EBT State agencies).

The national picture also provides information from State agencies on the reasons for implementing each type of practice, associated challenges, administrative burden, feedback they have received from participants and vendors, and perceptions of the relative effectiveness of each practice in saving costs.

Objective 2: Examine the impact of six food cost-containment practices

To examine the impact of food cost-containment practices, the study team first defined a list of foodspecific restrictions. Once this list was finalized, the team used data from the 12 EBT State agencies to analyze the associations between these restrictions and 8 program outcomes (hereafter referred to as the outcomes analysis).

1. Selection of Food-Specific Restrictions

Based on information and input collected from the 70 study State agencies, an advisory panel of WIC program experts, and FNS, the study team identified 6 food cost-containment practices and 29 food-specific restrictions across the 6 practices for the outcomes analysis.

a. Six cost-containment practices

The six cost-containment practices studied in the outcomes analysis were as follows: LEB restrictions, SBO restrictions, manufacturer rebates, container size restrictions, form or type restrictions, and food alternative restrictions. National brand restrictions were excluded from the outcomes analysis because they were generally imposed not to contain costs but rather to comply with Federal nutrition

²³ Texas was unable to provide data for March 1 and July 1 because of limitations caused by a change in its management information system and EBT system. The reference dates for the Texas certification data were April 2018 and September 2018.
requirements (i.e., brands that did not meet these requirements were necessarily restricted) or to make food lists easier to manage while still allowing participant brand choice.

b. Food-specific restrictions across the six practices

The study team then identified the universe of 29 food-specific restrictions across the 6 costcontainment practices for the analysis of outcomes based on the following criteria:

- To ensure sufficient variation across the 12 EBT State agencies and allow for the comparison of outcomes between State agencies with and without the restrictions, food-specific restrictions used by fewer than 2 or more than 10 of the 12 EBT State agencies were excluded from the analysis.
- Because there were more than 100 food-specific form or type restrictions overall, additional criteria were implemented to focus the analysis of form or type restrictions: only form or type food-specific restrictions that met the necessary criteria (detailed in the prior bullet) and accounted for at least 0.5 percent of total food costs (excluding infant formulas and fruit and vegetable cash-value benefits) were included in the analysis.²⁴

Table 2.3 lists the final 29 food-specific restrictions included in the in-depth analysis of outcomes based on these criteria and their prevalence among the 12 EBT State agencies.²⁵

Food	Total State	e Agencies
	N	%
LEB Restricti	ons	
Milk and milk alternatives		
Cow's milk	8	66.7
Cheese ^a	4	33.3
Eggs	4	33.3
Juice	2	16.7
Legumes		
Dry beans	2	16.7
Whole grains		
Whole-grain bread products ^a	2	16.7
Tortillas	2	16.7
Brown rice	2	16.7
SBO Restrict	ions	
Cheese ^a	2	16.7
Juice	3	25.0
Manufacturer R	ebates	
Infant cereal	3	25.0

Table 2.3. Food-Specific Restrictions Included in the In-Depth Analysis of Outcomes by Food Categoryand Type of Practice

²⁴ See appendix A for details on the methodology used to identify the food-specific restrictions used in the analysis, and the approach to calculating the share of total food costs used to identify form or type restrictions.

²⁵ It was not possible to measure satisfaction with, and redemption and consumption of, an alternative food among households residing in State agencies that did not allow a food. For example, in State agencies that did not allow yogurt as an alternative to milk, it was not possible to make comparisons between State agencies that did and did not allow these alternatives. See chapter 4 for more detail.

Food	Total State Agencies	
Fööd	N	%
Infant fruits and vegetables	2	16.7
Infant food meat	2	16.7
Container Size Restriction	ns	
Milk and milk alternatives		
Cow's milk (no quarts allowed)	6	50.0
Yogurt (quarts only)	7	58.3 ^c
Container Size Restriction	ns	
Milk and milk alternatives		
Cheese (16-oz containers only) ^b	9	75.0
Juice (no 48-oz containers)	6	50.0
Form or Type Restriction	15	
Milk and milk alternatives		
Cow's milk (no evaporated)	3	25.0
Cow's milk (no UHT)	5	41.7
Yogurt (no Greek)	7	58.3 ^d
Cheese (no shredded) ^b	6	50.0
Cheese (no string) ^b	4	33.3
Cheese (no Monterey Jack) ^b	2	16.7
Eggs (large eggs only)	5	41.7
Infant fruits and vegetables (no organic)	9	75.0
Alternative Restrictions	5	
Milk and milk alternatives		
Tofu	6	50.0
Yogurt	3	25.0
Whole grains		
Oats	6	50.0
Whole-wheat pasta	2	16.7

UHT = ultra-high temperature

^a Whole-wheat/whole-grain bread/buns/rolls

^b Cheese can also be issued as a substitute for milk. However, because it is issued as its own food category for breastfeeding women, and restrictions on milk are not specific to a participant category (i.e., if a State agency restricts string cheese, the restriction applies to all participants), it was considered separately from milk and milk substitutions for analysis purposes.

^c Among the nine State agencies that authorized yogurt, 77.8 percent restricted quart-sized containers of yogurt.

^d Among the nine State agencies that authorized yogurt, 77.8 percent restricted Greek yogurt.

2. Analysis of Program Outcomes

The study outcomes consisted of food-cost savings; WIC participant shopping experiences; participant satisfaction, purchase, and consumption; reasons former WIC participants stopped buying WIC foods; accommodations for participants with modified diets for health or personal reasons; participant food

redemptions; and participant health outcomes. Table 2.4 summarizes the key data sources and analytic approaches for each outcome. Additional detail and limitations for each outcome are provided in chapters 4–10 and analysis details and/or supplemental tables for each outcome are provided in appendices F–J, respectively.

	Outcome	Primary Data Source(s)	Approach
1	Food costs (see chapter 4 and appendix D)	 EBT data Certification data 	Calculated the average food category cost per participant per month (referred to as per participant month) and estimated food- cost savings from food-specific restrictions. Food-cost savings equaled the difference in food costs incurred without the restriction and food costs incurred with the restriction while accounting for variation in food selections by demographic characteristics and demographic differences across State agencies. Information on food selections, along with item prices, formed the basis for estimation of food-cost savings.
3	Access to and availability of prescribed foods (see chapter 5 and appendix E)	 Survey of WIC Participants 	Examined household attitudes about the WIC shopping experience and whether household that indicated they could not find WIC food items in stores resided in a State agency with a restriction on brand, container size, or form or type for a given food.
4	Participant satisfaction with and consumption of prescribed foods (see chapter 6 and appendix F)	 Survey of WIC Participants 	Examined household satisfaction with, purchase, and consumption of WIC foods and used multivariable regression analysis to assess whether food-specific restrictions were associated with household satisfaction with the allowed WIC foods and their likelihood of fully consuming the foods.
5	Program participation (see chapter 7 and appendix G)	 Survey of Former WIC Participants Survey of WIC Participants 	Examined reasons cited by former WIC households for leaving WIC and difficulties shopping for WIC foods. Compared rates of satisfaction overall and with the brands and container sizes of foods among former and current WIC households and used multivariable regression analysis to assess for potential differential associations of restrictions with household satisfaction among former households compared with current WIC households.
6	Accommodations for participants with modified diets for health or personal reasons (see chapter 8 and appendix H)	 Survey of WIC Participants 	Examined the prevalence of modified diets among the WIC population and used multivariable regression analysis to assess for potential differential associations of restrictions with household satisfaction, full purchase, zero purchase and full consumption among households that followed a modified diet compared with households that did not follow a modified diet.
7	Participant food redemptions (see chapter 9 and appendix I)	EBT dataCertification data	Used multivariable regression analysis to assess whether food- specific restrictions were associated with benefit redemption rates.
8	Participant health outcomes (see chapter 10 and appendix J)	EBT dataCertification data	Used multivariable regression analysis to examine the relationship between redemption rates and participant health, focusing on infant birth weight, child height, child anemia, and child weight. Presented descriptive statistics on the prevalence of these health outcomes.

Regression analyses allowed for the examination of associations between food-specific restrictions and program outcomes. These regressions controlled for differences in household demographics and other State agency food-specific restrictions the team hypothesized were related to each regression outcome.²⁶ For example, regression analysis was used to compare the level of satisfaction with WIC-authorized cow's milk brands between households residing in State agencies with an LEB restriction for cow's milk and households residing in State agencies without this restriction. The findings allowed for an assessment of the association between an LEB restriction for cow's milk and household satisfaction with authorized cow's milk brands. Although these regressions adjusted for important observable participant and program characteristics, the study team could not rule out the possibility of additional unobserved characteristics that could bias these regressions. Therefore, despite controlling for differences in household characteristics and other factors, the model estimates did not allow for causal inference—that is, the findings indicated only the presence, direction, and magnitude of associations.

Objective 3: Identify at least four best practices that are effective at food package cost containment

The findings from objectives 1 and 2 were used to identify practices that might be most effective and appropriate for broader use. Effective practices were defined as those that reduced food costs with few or no adverse participant outcomes that might limit the goals of WIC. Other factors that might affect how easily and successfully each practice could be implemented, such as the prevalence of the practice, administrative burden, State-specific factors, and other challenges identified by State agencies, were also considered to the extent possible.

²⁶ See appendices F–J, associated with chapters 6–10, for a list of specific control variables used in each regression model. The models did not adjust for State agency or other State-level characteristics because there was no within-State variation in the WIC cost-containment practices of interest, making any potential State-level adjustment factors perfectly collinear and not estimable in the regression models.

Chapter 3. National Picture of WIC Food Cost-Containment Practices

This chapter provides a detailed description of the six food cost-containment practices examined through the study, including the strengths and barriers associated with implementing each as described by interview respondents from 70 WIC State agencies. It also describes other cost-containment practices used by the State agencies, the role of EBT in cost containment, and State agency perspectives on the most effective ways to contain costs.

Key Findings

- All State agencies implemented at least one container size and form or type restriction, and more than 90 percent of State agencies restricted at least one food alternative.
- Least expensive brand (LEB) restrictions were the most common brand restrictions implemented by State agencies. About 40 percent of State agencies imposed an LEB restriction for at least one food.
- State agency respondents discussed a variety of cost-containment practices and food-specific restrictions they considered to be most effective. Overall, State agencies most frequently identified LEB restrictions, container size restrictions, and restrictions on organics as being most effective at containing costs.

A. Cost-Containment Practices Used Across 70 State Agencies

This chapter presents a description of the cost-containment practices used across 70 State agencies and their perceived effectiveness based on information obtained from in-depth qualitative interviews and abstracted from State agency food lists.

Of the six voluntary food cost-containment practices examined through this study, three were implemented by all or most State agencies nationally. Specifically, all State agencies imposed at least one container-size restriction and at least one form or type restriction, and most State agencies (98.6 percent) restricted at least one food alternative (see figure 3.1). Brand-related restrictions were less commonly employed. Of the three brand-related restrictions (LEB, SBO, and manufacturer rebates), LEB restrictions were most common—used by nearly 40 percent of State agencies.



Figure 3.1. State Agencies with Food-Specific Restrictions (Percentages)

N = 70 State agencies

Sources: WIC food lists and policy documents; interviews with program staff

The sections that follow provide an overview of each of the six cost-containment practices, the percentage of State agencies that implemented each practice by food category, and both the strengths of each practice and barriers to implementation. When selecting a practice for implementation, State agencies generally must weigh several factors, including cost, participant satisfaction, whether the authorized brand/size/form/type of the food is available across the State agency, and Federal requirements. Decisions about food-specific restrictions were not made in isolation; State agencies considered the implications of the combinations of restrictions on any given food or across food categories when deciding which food-specific restrictions to implement. That is, for example, when considering restrictions for cheese when making a decision about authorizing string cheese. State agencies also recognized that if participants did not like the items on the food list, they might not fully redeem or consume the items, which could adversely affect WIC nutrition goals.

1. Least Expensive Brand Restrictions

Least Expensive Brand can be Confusing and Burdensome

"We find [LEB] to be really burdensome to our retailers [and] confusing to participants, and we have pretty reasonable costs, so... it seems to not be something that we want to pursue."

-State agency staff

Least expensive brand (LEB) restrictions, by definition, are implemented to contain food costs. In State agencies with an LEB restriction, participants must purchase the LEB available at the time of purchase for a WIC-eligible item from the restricted food category. Overall, 38 percent of State agencies had an LEB restriction for at least one food. Interview respondents indicated the LEB was often the store brand but noted it could change based on sale prices or storewide availability. State agencies indicated WIC clinic staff instructed participants on how to select the LEB for WIC-eligible foods. For example, in one State agency, clinic staff instructed participants to scan the

item using the WIC Shopper mobile application to determine the lowest priced item at each vendor. In other State agencies, clinic staff provided more general instruction on cost-conscious shopping or reviewed the food lists with participants to highlight food categories in which participants should be purchasing the lowest cost item. Some State agencies also trained cashiers to identify LEBs at checkout, while others left that responsibility to the vendors. Some State agencies provided vendors with WIC stickers to place on store shelves to help participants identify LEB foods.

LEB is often implemented for foods for which consumers do not have strong brand recognition or preference, such for as milk, eggs, and cheese. Because milk and eggs rarely go on sale, the LEB is unlikely to change from week to week at a given vendor. Figure 3.2 presents the six foods for which State agencies most commonly imposed LEB restrictions. Fewer than 5 percent of State agencies also imposed LEB restrictions on the remaining foods analyzed: yogurt, canned fish, dry beans, canned beans, whole-wheat/whole-grain bread/buns/rolls (whole-grain bread products), tortillas, oats, pasta, and infant cereal (see appendix table C.1).



Figure 3.2. State Agencies with Least Expensive Brand Restrictions (Percentages)

Notes

N = 70 State agencies

Sources: WIC food lists and policy documents; interviews with program staff

Strengths of least expensive brand restrictions and barriers to implementation

State agencies primarily implemented LEB restrictions to contain food costs. For example, State agencies indicated because milk is prescribed in large quantities in many food packages, even a small savings in the cost of each gallon of milk could lead to significant cost savings. Although foodcost savings were the primary motivator, State agencies with LEB restrictions indicated there was little to no administrative burden associated with maintaining the restriction, and they received little to no negative participant feedback regarding the restriction. However, the lack of feedback may have stemmed from appropriately targeting the restriction to specific WIC foods. Although one

Least Expensive Brand May Reduce Participant Satisfaction

"Our participants really like [some] brand items..., especially peanut butter. They like Jif, Peter Pan. They tend to not want to get the store brand. We've kind of left that one alone figuring we would [use LEB instead for other foods]."

-State agency staff

State agency received no negative feedback on its LEB restrictions for milk and eggs, it eliminated an LEB restriction for peanut butter because of participant dissatisfaction. Participants reported the LEB of peanut butter was often of poor quality and tended to separate. Other State agencies reported similar participant dissatisfaction with the quality of LEB foods. This suggests LEB restrictions may not be appropriate for all WIC foods.

The most common reasons State agencies provided for not implementing, or rolling back, LEB restrictions were participant dissatisfaction, increased vendor burden, and difficulty enforcing the LEB. State agencies were worried LEB restrictions would make the WIC shopping experience more difficult and confusing for participants given that many participants already struggled to find the allowed WIC foods in stores. State agencies also expressed concerns about potential negative checkout experiences, such as those stemming from the selection of a non-LEB item. In this case, participants may be instructed by the cashier to go back and select the correct item before completing the transaction.

Some State agencies expressed hesitation about placing additional burden on vendors to enforce LEB restrictions, while other State agencies said they did not know how to enforce the restrictions and did not have the staff and resources to do so. Many State agency respondents discussed the difficulties faced when trying to enforce LEB restrictions in an EBT environment (see section C for further details). Although this caused some State agencies to drop their LEB restrictions upon transitioning to EBT, other State agencies acknowledged the difficulties related to enforcing LEB restrictions but maintained them anyway. Some of the State agencies maintained their LEB restrictions but said they viewed the restrictions more as recommendations than requirements. Others said although they could not enforce LEB restrictions directly, other food cost-containment practices, such as the application of MARLs or not-to-exceed amounts (NTEs), allowed them to monitor overall food category costs and incentivize vendors to steer participants towards the LEB.

2. Store Brand Only Restrictions

Slightly more than 24 percent of State agencies had a store brand only (SBO) restriction for at least one food category at the time of the study. State agencies with SBO restrictions required participants to select the declared store brand of a particular WIC food. Like LEB, this restriction is primarily applied to food categories for which consumers do not have strong brand associations or preferences, such as milk, eggs, and cheese. If a vendor runs out of the store brand for a product, participants may choose a different brand that meets the Federal nutritional requirements. Some State agencies with an SBO restriction required smaller vendors that did not carry a store brand to assign store brand status to an inexpensive national brand. Participants were instructed to purchase the declared store brand at these small vendors. Figure 3.3 presents the six foods for which State agencies most commonly imposed SBO restrictions. Fewer than 5 percent of State agencies also imposed SBO restrictions on the remaining foods analyzed: canned fish, canned beans, whole-grain bread products, tortillas, brown rice, oats, bulgur, barley, pasta, infant fruits and vegetables, and infant food meat (see appendix table C.2).



Figure 3.3. State Agencies with Store Brand Only Restrictions (Percentages)

N = 70 State agencies

Sources: WIC food lists and policy documents; interviews with program staff

Strengths of store brand only restrictions and barriers to implementation

State agencies generally regarded store brands to be cheaper than national brands; they therefore implemented SBO restrictions to contain food costs. However, State agencies tended to base this assertion on their own experiences and the prices they saw at grocery stores rather than through a rigorous cost analysis. SBO restrictions can also make it easy for vendors to keep the correct WIC food in stock, as they only need to stock one store brand for any given food. SBO restrictions also may be easier for

Store Brand Only Restrictions Are Easy to Understand

"With store brand, it's a lot simpler. They know they can always get the store's [brand] or the private label...."

-State agency staff

participants to understand because the store brand is more recognizable and rarely changes, especially in comparison with LEBs. While LEB restrictions can be difficult to enforce in an EBT environment, State agencies can more easily enforce SBO restrictions. They can place only store brand UPCs on the State agency APL, thereby completely restricting participants from purchasing national brands. However, this can be complicated if State agencies need to include national brands on their APLs to allow for participants shopping at small vendors that do not have a store brand and instead have declared a national brand as the store brand.

State agencies described several barriers or concerns related to the implementation of SBO restrictions. Some State agencies placed a high value on participant choice and expressed concern SBO restrictions could give the impression of WIC participants being poor or inferior, or make participants feel that way, leading to participant dissatisfaction. Other State agencies were concerned SBO restrictions could confuse participants because the store brand name is not always the same as the vendor name (e.g., the Wal-Mart store brand is Great Value). State agencies with more participants in rural or remote areas were worried small vendors could face challenges stocking store brands, and in some island territories, respondents indicated store brands were not associated with the same price differential as on the mainland.

3. Manufacturer Rebates for Foods Other Than Infant Formula

State agencies sometimes enter competitive rebate contracts with manufacturers for supplemental foods in addition to infant formula (e.g., infant cereal or infant fruits and vegetables). At the time of the study, 11 percent of State agencies had a manufacturer rebate in place for infant cereal, infant fruits and vegetables, and/or infant food meat. Participants in these State agencies were restricted to purchasing the contracted brand of the infant foods. Figure 3.4 presents the percentage of State agencies with a manufacturer rebate for at least one nonformula infant food (see appendix table C.3 for more detail).



Figure 3.4. State Agencies with Manufacturer Rebates for Foods Other Than Infant Formula (Percentages)

Notes

N = 70 State agencies

Sources: WIC food lists and policy documents; interviews with program staff

Strengths of manufacturer rebates for foods other than infant formula and barriers to implementation

The primary strength of manufacturer rebates is the associated food-cost savings. However, State agencies described several barriers to implementation. Most frequently, State agencies said limited

savings and high administrative costs were a barrier to manufacturer rebate implementation for these infant foods. State agencies acknowledged administrative costs associated with implementing and maintaining the rebate, such as writing the request for proposal and submitting monthly data to the manufacturer, could reduce or even eliminate potential cost savings. Smaller State agencies indicated they potentially would not be able to find a manufacturer willing to enter a rebate contract because of their small populations and subsequently low product demand; manufacturers might not find it advantageous to offer a rebate.

Manufacturer Rebates for Foods Other than Infant Formula Have High Administrative Burden and Low Food Cost Savings

"For something like baby food, you're talking [about a savings of] \$0.05 a jar [and for] juice, \$0.10 per bottle. The return cost benefit of that, the amount that we would actually receive in rebate above the administrative cost to manage the rebate process, just wasn't worth the work..., and it would limit selection and... could [affect WIC] participation."

-State agency staff

Additional barriers to implementation included negative feedback from vendors that would be required to stock a brand that might be unpopular with non-WIC customers, and the hesitancy of some State agencies to implement restrictions that limited participants to a particular brand.

4. Container Size Restrictions

Overall, each of the 70 State agencies included in the study restricted container sizes for at least one food. These restrictions require participants to select larger container sizes because they are generally associated with a lower price per unit. For example, quart-sized containers of yogurt tend to be cheaper per ounce than 4-ounce containers. This practice is most frequently applied to food categories with a variety of container sizes, such as cow's milk, yogurt, cheese, and juice. Figure 3.5 presents the percentage of State agencies with each container size restriction by food category (see appendix table C.4 for more detail).



Figure 3.5. State Agencies with Container Size Restriction (Percentages)

Notes

doz = dozen(s); oz = ounce(s); qt = quart(s)

N = 70 State agencies

Sources: WIC food lists and policy documents; interviews with program staff

Strengths of container size restrictions and barriers to implementation

In addition to containing costs, State agencies discussed other rationales for implementing container size restrictions. For example, although many State agencies said restrictions on quarts of milk or 8-ounce containers of cheese were typically implemented to contain costs, container size restrictions for other foods were sometimes implemented to ensure participants received the full nutritional benefit (FNB), reduce administrative burden, or simplify food lists. For example, State agencies commonly

indicated they did not authorize yogurt in containers smaller than 32 ounces. By limiting participants to larger containers, State agencies thought it would be easier for participants to purchase the amount of food needed to obtain the FNB. Container size restrictions were also implemented to reduce administrative burden by limiting the number of products for which State agencies needed to conduct a nutritional review and reducing the overall number of foods included on the food list.

Food-Cost Savings From Restricting Organic Milk

"[Milk is an example of a food-specific] restriction that contains cost. I don't know how much more expensive a gallon of organic milk is compared with nonorganic milk, but let's say it's a dollar. We have 400,000 participants a month buying 4 gallons of milk every month. That's \$1.6 million a month."

-State agency staff

State agencies generally indicated there were few barriers to implementing container size restrictions. However, State agencies with many small vendors discussed how some of the vendors had difficulty stocking larger container sizes. These small vendors have difficulty fitting larger boxes on their shelves or are unable to sell larger package sizes to non-WIC customers.

5. Form or Type Restrictions

All State agencies restricted the form or type of at least one WIC food, and form or type restrictions were common among all food categories. Importantly, some foods were generally available in more forms or types and thus presented a greater opportunity or need for a State agency to impose restrictions. For example, the study team identified and surveyed State agencies about 23 different forms or types of cheese but only 2 forms or types of whole-grain bread products (see figure 3.6). Among the 23 identified form or type restrictions for cheese, no State agencies implemented restriction

Food-Cost Savings From Container Size Restrictions

"...A 6-ounce cup of yogurt... could be a dollar... versus the 32-ounce container [for] 2 to 3 dollars. Bottom line is, restricting the purchase of the smaller packages [for] all these different food categories is a huge cost savings."

-State agency staff

on block or cheddar cheese, while 90.0 percent restricted organic cheese. For the two identified whole-grain bread product restrictions, 51.4 percent of State agencies restricted light bread, and 75.7 percent restricted organic bread.

In total, State agencies had the choice to restrict more than 100 different form or type combinations (see appendix table C.5 for a full list of these restrictions).

Figure 3.6. Variation of Form or Type Restrictions

Milk 10 restrictions 17.1% restricted dry 95.7% restricted organic	Eggs 6 restrictions 35.7% restricted to large only 95.7% restricted organic	Whole-grain bread products 2 restrictions 51.4% restricted light 75.7% restricted organic	Breakfast cereal 100% restricted at least one form or type
Soy-based beverage 6 restrictions 2.9% restricted refrigerated 61.4% restricted organic	Canned fish 10 restrictions 0% restricted tuna 81.4% restricted pouch packed	Tortillas 5 restrictions 1.4% restricted whole wheat 70% restricted organic	Juice 100% restricted at least one flavor
Tofu 8 restrictions 2.9% restricted bulk 34.3% restricted shelf stable	Dry beans 1 restriction 77.1% restricted organic	Brown rice 9 restrictions 18.6% restricted instant 72.9% restricted organic	Infant cereal 7 restrictions 17.1% restricted oatmeal 97.1% restricted corn
Yogurt 3 restrictions 5.7% restricted flavors 65.7% restricted organic	Canned beans 4 restrictions 18.6% restricted low sodium 74.3% restricted baked	Oats 6 restrictions 0% restricted quick 32.9% restricted organic	Infant fruits and vegetables 2 restrictions 8.6% specified varieties 71.4% restricted organic
Cheese 23 restrictions 0% restricted block or cheddar 90% restricted organic	Peanut butter 9 restrictions 0% restricted creamy or chunky 94.3% restricted organic	Whole-wheat pasta 2 restrictions 27.1% specified shapes 47.1% restricted organic	Infant food meat 8 restrictions 4.3% restricted broth/gravy 92.9% restricted veal

Notes N = 70 State agencies

Sources: WIC food lists and policy documents; interviews with program staff

Strengths of form or type restrictions and barriers to implementation

As described by respondents, the primary motivator for implementing form or type restrictions, and organic restrictions in particular, was cost savings. However, State agencies said form or type restrictions were also used to ensure compliance with Federal nutrition requirements (e.g., not all types of peanut butter comply with Federal guidelines) and to respond to participant preferences (e.g., some State agencies do not allow sardines or mackerel because participants have not expressed interest in these items). State agencies discussed approving only those forms or types of foods available statewide; therefore, foods that were not available statewide, like goat's milk and some juice flavors, might have been restricted. State agencies did not report any barriers to implementing form or type restrictions.

6. Food Alternative Restrictions

Federal regulations allow State agencies to authorize alternative foods for whole-grain bread products, milk, and dry beans:

Milk alternatives consist of soy-based beverage, tofu, and yogurt.

- Canned beans can be authorized as an alternative to dry beans.
- Whole-grain bread product alternatives consist of tortillas, brown rice, oats, bulgur, barley, and whole-wheat pasta.

State agencies with food alternative restrictions limited the number of alternatives participants could select in each food category. More than 98 percent of State agencies restricted at least one alternative (see figure 3.7 and appendix table C.6).



Figure 3.7. State Agencies with Food Alternative Restriction (Percentages)

Notes

N = 70 State agencies

Sources: WIC food lists and policy documents; interviews with program staff

Strengths of food alternative restrictions and barriers to implementation

State agencies primarily implemented restrictions on food alternatives for reasons other than cost savings. State agencies often restricted alternatives such as bulgur, barley, oats, and tofu (the four most commonly restricted alternatives) because of either a lack of demand from participants or a lack of statewide availability. State agencies reported limiting these unpopular alternatives reduced administrative burden because it reduced the time spent reviewing nutritional content, adding them to the APL, and educating participants about options. State agencies did not report any barriers to implementing food alternative restrictions.

B. Other Ways State Agencies Contained Costs

State agencies also limited the number of national brands of breakfast cereal included on the APL. This practice, while discussed during interviews with State agency staff, was not examined in the outcomes analysis (see chapters 4–10).

State agencies primarily restricted national brands of WIC foods to meet Federal nutrition and size requirements. However, some State agencies also limited particularly expensive national brands to contain food costs. For example, State agencies did not allow expensive brands of yogurt, eggs, brown

rice, juice, or whole-grain bread products to contain costs. Multiple State agencies also discussed how they did not authorize expensive brands of some types of cereal. For example, a State agency might have authorized corn puffs, or oat clusters and flakes, but explicitly excluded specific brands that were more expensive than other brands of those breakfast cereal types. Appendix table C.7 provides more information about national brand restrictions on breakfast cereal.

C. The Role of EBT

Many State agencies described EBT as a new tool for containing costs; they also viewed and approached some cost-containment practices differently in an EBT environment. This was particularly true as it related to LEB restrictions. State agencies that transition to EBT must list all possible UPCs allowed for purchase at any WIC-approved vendor in their State agency on the APL; these UPCs may be for multiple brands of a particular item (e.g., both national and store brands of milk). This is both because the LEB differs across vendors and because participants must be allowed to purchase a different brand if the LEB is out of stock. Because UPCs for many products and brands must be included on the APL, it is possible for a participant to purchase a brand that is not the LEB at the time of purchase, even when the LEB is available. Some State agencies that have implemented EBT and require vendors to declare an LEB for each food category can monitor each vendor for the frequency with which items and brands other than the LEB are purchased. However, other State agencies believed LEB restrictions were difficult to enforce or implement in an EBT environment because UPCs on the APL were associated with brands other than the LEB. Although some State agencies removed their LEB restrictions after implementing EBT, others maintained their LEB restrictions and indicated they used NTEs/MARLs to monitor the restriction.

EBT has also provided an opportunity for State agencies to contain costs in a way that was not possible with paper food instruments. In an EBT environment, benefits prescribed to participants in the same household are loaded onto the same EBT card and function like a combined household benefit. For example, if three participants in the household are each prescribed 16 ounces of bread, they can purchase a combined total of 48 ounces of bread. Some EBT State agencies used this as an opportunity to reduce costs by allowing participants to purchase larger container sizes of bread (e.g., 24 ounce) or cheese (e.g., 2 pounds), which generally cost less per unit.

D. State Agency Perspectives on Most Effective Cost-Containment Practices

During the interviews, State agencies were asked whether they thought restrictions for LEB, SBO, container size, and form or type, and manufacturer rebates (for foods other than infant formula), were effective at containing food costs. State agencies were asked for their opinions on the effectiveness of these restrictions only if they had such restrictions in place during the time of the study. Table 3.1 presents the total number of State agencies that identified each practice as effective at containing food package costs.

Overall, most State agencies reported each cost-containment practice was effective at containing costs. In general, practices such as container size and form or type restrictions, which could be implemented for reasons other than cost containment, were reported as less effective than practices such as LEB and SBO restrictions and manufacturer rebates, which were primarily implemented to contain costs.

Practice	Percent of State Agencies That Reported Practices Were Effective	Sample Size (<i>n</i>) ^a		
	Total State Agencies (N = 70)			
LEB restrictions	77.8	27		
SBO restrictions	78.9	19		
Manufacturer rebates	75.0	8		
Container size restrictions	69.1	55		
Form or type restrictions	73.8	61		
	States/District of Columbia (N = 51)			
LEB restrictions	71.4	21		
SBO restrictions	73.3	15		
Manufacturer rebates	75.0	8		
Container size restrictions	67.4	43		
Form or type restrictions	76.1	46		
ITOs/U.S. Territories (N = 19)				
LEB restrictions	100.0	6		
SBO restrictions	100.0	4		
Manufacturer rebates	-	0		
Container size restrictions	75.0	12		
Form or type restrictions	66.7	15		
EBT State Agencies (N = 12)				
LEB restrictions	85.7	7		
SBO restrictions	100.0	3		
Manufacturer rebates	100.0	3		
Container size restrictions	70.0	10		
Form or type restrictions	83.3	12		

Table 3.1. State Agencies That Reported Practices Were Effective in Containing Costs

Notes

^a The sample size is the total number of State agencies who answered the interview questions regarding the effectiveness of each restriction. Sample sizes may not match the total number of State agencies implementing the practice because of missing data. – Indicates no State agencies reported the practice was effective

Source: Interviews with program staff

At the close of each interview, respondents were asked about the cost-containment practices (up to four) they perceived to be most effective in their State agencies. Table 3.2 presents the practices State agencies identified as most effective as well as how many State agencies listed each practice. The agencies were not limited to the six practices discussed in this chapter and, at times, indicated a different practice was most effective at containing costs. Overall, State agencies most frequently identified LEB restrictions, container size restrictions, and restrictions on organics as being most effective at containing costs.

Although not a focus of this study, about 20 percent of State agencies identified two Federal vendorrelated requirements as one of their most effective cost-containment practices: MARLs/NTEs and peer groups.

Practice	Percent of State Agencies
Container size restrictions	37.1
LEB restrictions	31.4
Restrictions on organics	28.6
Form or type restrictions	21.4
SBO restrictions	18.6
Vendor-related practices	18.6
MARLs/NTEs	18.6
Infant formula rebate	5.7
National brand restrictions	5.7
Advisory committee/Cooperation across State agencies	4.3
Food package creation	2.9
Recoupment	2.9
Vendor peer groups	2.9
Participant and vendor training	2.9
Food alternative restrictions	2.9
Manufacturer rebates on foods other than infant formula	1.4
Maximizing choice	1.4
Breastfeeding promotion	1.4
EBT	1.4
Ensuring statewide availability of foods	1.4
Limiting updates to the food list	1.4
Formula audits	1.4

Table 3.2. Most Effective Cost-Containment Practices

Notes

This table provides a comprehensive list of State agency responses to the open-ended interview question "What do you think are the **most effective cost-containment practices your State agency uses?**" The six study food cost-containment practices are shown in **bold** text.

N = 70

Source: Interviews with program staff

E. Limitations

The interview data examined in this chapter have a few limitations. Many of the study State agencies have been using their practices for a long time without much opportunity for evaluation or reassessment, so it was difficult to say why they used a particular practice or did not use another practice, or if there were any challenges associated with implementing the practice. Statements about the strengths of and barriers to implementing each of the six food cost-containment practices and the relative effectiveness of each were based on the personal experiences of respondents and, for the most part, were not based on a rigorous study of the practice. Because of the time constraints of the interviews, not all interview questions were asked of all respondents, which resulted in a small amount of missing data.

Chapter 4. Food Costs and Savings

his chapter describes the distribution of food costs by major food category, average food-category costs per participant month, and estimated food-cost savings from food-specific restrictions.

Key Findings

- Average standardized food package estimates (excluding the cost of fruits and vegetables and infant formula) varied across State agencies, ranging from \$36.97 to \$48.08 per participant per month. Estimates of average actual food package costs were much lower, ranging from \$14.92 to \$26.93, most likely because of the less-than-full redemptions observed across all food categories.
- Of the 29 food-specific restrictions examined through the study, 16 were associated with estimated average cost savings of \$0.01 or more per participant month: least expensive brand (LEB) for cheese, juice, and whole-grain bread; store brand only (SBO) for cheese and juice; manufacturer rebates for infant cereal and infant fruits and vegetables; container size restrictions for yogurt, cheese, and juice; form or type restrictions for cow's milk, yogurt, eggs, and infant fruits and vegetables; and not allowing yogurt and tofu as alternatives for milk.

A. Background and Approach

WIC food-category costs vary across WIC State agencies for numerous reasons, including differences in food prices and the average quantities of WIC foods prescribed per participant. Average quantities depend on caseload composition because maximum monthly allowances vary by participant category. For example, breastfeeding rates vary across State agencies, and women who receive partially or fully breastfeeding food packages are prescribed larger quantities of certain WIC foods and for a longer duration (up to 1 year) than women who do not breastfeed (up to 6 months). Related to cost containment, WIC food costs vary across State agencies because of vendor cost-containment practices (vendor selection and competitive pricing criteria set at the State agency level) and food-specific restrictions that limit the brand, container size, or form or type of foods authorized for purchase within each food category.

Food-specific restrictions voluntarily implemented by State agencies to reduce food costs are the focus of this study. Food-cost savings from these restrictions vary based on food prices, prescribed quantities, and participant preferences (see appendix D for details on participant preferences and food selections by EBT State agency) and yield savings equal to the difference between food costs incurred *without* item restrictions and food costs incurred *with* item restrictions. Using EBT redemption data, food-cost savings were estimated separately for 12 EBT State agencies with and without restrictions.

For State agencies without the restriction, the study team estimated the potential savings from imposing the restriction. All prices were observed, but the distribution of food selections that would be observed under the imposed restriction had to be imputed. To accomplish this, the study team estimated the distribution of food selections across a limited list of items (limited to exclude the restricted items) for State agencies without the restriction using information from State agencies with the restriction. Estimated distributions were weighted to reflect differences by demographic characteristics, which included urbanicity, race, and ethnicity.

For State agencies with the restriction, the study team estimated the savings achieved because of the restriction. Within-State agency prices of restricted items were not observed and had to be imputed. To impute the average price of an item that was not on the State agency APL (e.g., shredded cheese), the study team used EBT data from State agencies without the restriction to create an average price ratio between the restricted item and an allowed item (e.g., ratio of shredded to block cheese).²⁷ The distribution of food selections without the restriction also had to be imputed. To accomplish this, the study team estimated the distribution of food selections across an unconstrained list of items (weighted to reflect differences by demographic characteristics) using information from State agencies without the restriction and applied it to State agencies with the restriction.

The study team used the final amount the State agency paid its vendor to estimate both food-category costs and food-cost savings per participant month, except for Ohio and Texas. Ohio provided only the claimed amount because NTEs were captured in the data submission at the transaction level, so final paid amounts were not available at the item level. Although Texas used a recoupment process to enforce its MARL, it did not include the recoupment amount or final paid amount in the redemption data.²⁸ This limitation is noted when relevant. Table 4.1 summarizes the information that was observed and imputed to estimate cost savings for State agencies with and without each restriction. Refer to table 2.3 in chapter 2 for the complete list of State agencies with and without the various restrictions.

State Agency Status	Observed	Imputed	Estimated Cost Savings
State agency without restriction	 Distribution of food selections across a list of unconstrained items All item prices 	 Distribution of food selections if restriction was imposed 	 Potential savings if restriction was imposed
State agency with restriction	 Distribution of food selections across a list of constrained items Prices for unrestricted items 	 Distribution of food selections across a list of unconstrained items Prices for restricted items 	 Potential savings because of restriction

Table 4.1. Summary of Observed and Imputed Data Used to Estimate Cost Savings

B. Findings

1. Distribution of Food Costs

Table 4.2 presents the percentage of dollars spent on WIC food items by major food category. The food costs associated with benefit redemption were driven both by household choice (the subcategory a household selects) and item prices in the respective subcategories. After excluding infant formula and fruits and vegetables (because they are not the focus of this study), milk and milk alternatives accounted for the greatest percentage of food costs for each State agency—between 23.8 and 34.3 percent across the 12 States. For most State agencies, breakfast cereal accounted for the second greatest share of food costs, followed by juice; in other State agencies, juice accounted for the second greatest share of food

²⁷ Estimating average price ratios from data on nonrestrictive State agencies necessarily imposed identical price ratios on all restrictive State agencies; however, the price levels varied across State agencies. The advantage of using EBT data from nonrestrictive State agencies was the data was limited to vendors that met WIC competitive pricing criteria.

²⁸ In Florida and Texas, recoupment adjustments were employed to enforce their MARLs. These State agencies set an NTE that was applied at the point of sale but then computed a MARL based on all redemptions by peer group at the end of each month. Any paid amount of more than the calculated MARL was recovered through recoupment in the first few days of the following month.

costs, followed by breakfast cereal. For all State agencies, canned fish and infant food meat each accounted for about 1 percent or less of food costs.

	A	Rai	Range	
wic rood Category	Average	Minimum	Maximum	
Milk and milk alternatives ^a	29.0	23.8	34.3	
Cheese	9.7	0.7	13.2	
Eggs	5.4	4.0	6.1	
Juice ^b	13.6	9.6	17.4	
Breakfast cereal	15.5	9.7	18.6	
Canned fish ^c	0.7	0.4	1.1	
Legumes ^d	5.6	4.3	6.8	
Whole grains ^e	8.1	5.8	10.0	
Infant cereal	2.2	1.6	3.0	
Infant fruits and vegetables	9.8	6.8	12.5	
Infant food meat	0.6	0.4	1.0	

	Table 4.2. Distribution of	of Food Expend	litures Across F	Food Categories	(Percentages)
--	----------------------------	----------------	------------------	-----------------	---------------

Food expenditures are based on the final amounts paid to vendors for redeemed foods, except in Texas, where food expenditures reflect the amount paid to vendors up to the NTE amount but do not account for amounts recouped from vendors that were paid more than the MARL. Column percentages may not sum to 100 percent because of rounding.

^a Allowable options for fluid milk substitutions are yogurt, soy-based beverage, tofu, and cheese. WIC EBT redemptions occur at the household level. Because cheese redemptions were not associated with an individual, it was not possible to determine from the data whether cheese was redeemed by a fully breastfeeding woman who was prescribed cheese or by another participant in the household as a substitute for milk. For this reason, cheese purchased as a substitute for milk is included in the cheese category.

^b Combinations of single-strength and concentrated juices may be issued.

^c Allowable options for canned fish are light tuna, salmon, sardines, and mackerel.

^d Allowable options for legumes are dry or canned beans or peas, or peanut butter.

^e Allowable options for whole grains are whole-wheat/whole-grain bread/buns/rolls (whole-grain bread products); soft corn or whole-wheat tortillas; brown rice; oats; bulgur; whole-grain barley; or whole-wheat pasta.

Source: Insight tabulations of WIC EBT data

Table 4.3 presents the distribution of food dollars spent across subcategories within major food categories. In the milk and milk alternatives category, cow's milk accounted for most milk expenditures—between 78.1 and 95.4 percent for State agencies that allowed yogurt as a substitute for milk, and more than 95 percent for all four State agencies that did not allow yogurt. In State agencies that authorized it as a substitute for milk, yogurt accounted for about 2 percent of milk expenditures to nearly 19 percent. Soy-based beverages accounted for 4 percent or less of milk expenditures for all State agencies.

Peanut butter accounted for the greatest share (41 percent or more) of legume expenditures for all but three State agencies where canned beans or dry beans accounted for the greatest share (at least 40 percent, respectively). Whole-wheat/whole-grain bread/buns/rolls (whole-grain bread products) accounted for more than 83 percent of whole-grain expenditures in all State agencies except one where tortillas accounted for approximately one-quarter of all whole-grain expenditures.

Notes

WIC Food		Rar	Range			
Subcategory	Average	Minimum	Maximum			
	Milk and Milk Alterna	tives				
Cow's milk	89.1	78.1	96.9			
Soy-based beverage	3.0	1.7	4.0			
Tofu	0.2	< 0.01	0.3			
Yogurt	11.7	18.8	2.3			
Legumes						
Peanut butter	54.9	28.9	73.9			
Dry beans/peas	16.6	7.5	40.0			
Canned beans	28.5	18.5	48.4			
Whole Grains						
Whole-grain bread products	89.1	60.4	96.1			
Brown rice	1.6	0.3	5.7			
Oats	2.4	0.1	10.0			
Tortillas, corn or wheat	6.7	2.8	25.8			
Whole-wheat pasta	1.9	1.0	3.7			

Table 4.3. Distribution of Food Expenditures Across Subcategories Within Major Food Categories

Notes

Food expenditures are based on the final amounts paid to vendors for redeemed foods, except in Texas, where food expenditures reflected the amount paid to vendors up to the NTE amount but do not account for amounts recouped from vendors that were paid more than the MARL. The percentages of each subcategory used the total costs of the category as a denominator. Column percentages within each food category may not sum to 100 percent because of rounding. Six State agencies did not allow tofu as an alternative to milk. Three State agencies did not allow yogurt as an alternative to milk. Six State agencies did not allow oats as an alternative to whole-grain bread products. Two State agencies did not allow whole-wheat pasta as an alternative to whole-grain bread products. Source: Insight tabulations of WIC EBT data

2. Estimated Food-Category Costs

Average estimated food-category costs are the product of total monthly quantities redeemed and the average price of items within the category.²⁹ Average price is the per-unit price of allowed items weighted by the distribution of food selections, both of which may be influenced by State agency-imposed food-specific restrictions. Because total food costs increase with caseload size, cost estimates were calculated and are presented in terms of costs per participant month. The estimated actual State agency costs per participant month reflect variations in total quantity because of differences in caseload composition and redemption rates, while standardized costs per participant month allow for cross-State agency comparisons because they assume a standard caseload distribution (taken from national data), issuance of Federal maximum monthly allowances without tailoring (see appendix table D.10), and full benefit redemption.³⁰ Variation in the estimated actual and standardized costs per participant month by State agency may also reflect geographic or regional differences in average food prices.

The estimated actual costs—excluding the cash-value benefit and infant formula—varied from a low of \$14.92 per participant month to a high of \$26.93 per participant month (see table 4.4). After standardizing costs (e.g., assuming standard issuance of Federal Maximum Monthly Allowances and full benefit redemption) to enable comparisons across State agencies, the total estimated costs per

²⁹ The estimates of actual costs take redemption rates as given. The estimates of standardized costs and cost savings assume full redemption and do not attempt to model the impact of cost containment on redemption. The estimates thus provide an upper bound on cost savings. ³⁰ See Kirlin et al. (2003)

Insight • WIC Food Cost-Containment Practices Study: Final Report

participant month were \$41.95 on average and ranged from \$36.97 to \$48.08 (see table 4.4). Partial WIC purchases (i.e., participants not purchasing all the foods prescribed in their food package), largely explain the substantial difference between estimated actual costs and standardized costs (see chapter 9 for participant food redemptions).

Food Catagony	Average	Range	
roou Category	Average	Minimum	Minimum
Estimate	ed Actual Food Costs (Dollars	;)	
Milk and milk alternatives	5.84	4.21	9.23
Cow's milk	5.17	3.56	8.25
Soy-based beverage	0.17	0.12	0.21
Tofu	0.01	0.01	0.03
Yogurt	0.74	0.12	1.52
Cheese	1.96	0.10	2.96
Eggs	1.09	0.74	1.56
Juice	2.70	1.73	3.65
Breakfast cereal	3.09	1.51	4.16
Canned fish ^a	0.13	0.08	0.23
Legumes	1.12	0.73	1.59
Peanut butter	0.61	0.21	0.85
Dry beans/peas	0.18	0.08	0.35
Canned beans	0.33	0.19	0.75
Whole grains	1.60	1.06	2.12
Whole-grain bread products	1.45	0.64	1.96
Brown rice	0.02	0.01	0.07
Oats	0.03	0.01	0.11
Tortillas	0.10	0.03	0.27
Whole-wheat pasta	0.03	0.01	0.06
Infant cereal	0.44	0.25	0.57
Infant fruits and vegetables	1.91	1.36	2.36
Infant food meat	0.11	0.07	0.18
Total, excluding CVB and formula	19.99	14.92	26.93

Table 4.4. Average	e Estimated Actua	l and Standardized	Food-Category Co	ts per Participant Month ^a
			. cou cutegoly co	

Food Category	Average	Range		
Food Category	Average	Minimum	Minimum	
Estimated Standa	ardized Food Costs (Dol	lars)	•	
Milk and milk alternatives	11.05	8.41	14.67	
Cow's milk	9.84	7.39	13.22	
Soy-based beverage	0.32	0.26	0.37	
Tofu	0.02	0.01	0.03	
Yogurt	1.30	0.66	2.09	
Cheese	3.78	2.59	4.73	
Eggs	1.47	1.07	1.88	
Juice	4.69	3.70	5.35	
Breakfast cereal	5.96	4.06	6.57	
Canned fish	0.22	0.18	0.30	
Legumes	2.58	2.08	2.81	
Peanut butter	1.42	0.93	1.61	
Dry beans/peas	0.42	0.27	0.48	
Canned beans	0.74	0.65	0.91	
Whole grains	3.34	2.30	3.83	
Whole-grain bread products	2.98	2.05	3.53	
Brown rice	0.04	0.02	0.08	
Oats	0.08	0.04	0.15	
Tortillas, corn or wheat	0.23	0.15	0.29	
Whole-wheat pasta	0.06	0.04	0.10	
Infant cereal	1.80	1.68	1.94	
Infant fruits and vegetables	6.08	4.29	7.05	
Infant food meat	0.98	0.93	1.05	
Total, excluding CVB and formula	41.95	36.97	48.08	

Average food-category costs may not sum to total due to rounding. Food expenditures are based on the final amounts paid to vendors for redeemed foods, except in Texas, where food expenditures reflect the amount paid to vendors up to the NTE amount but do not account for amounts recouped from vendors that were paid more than the MARL.

^a "per participant month" = per participant per month

indicates no purchases of item

Source: Insight tabulations of WIC EBT data

3. Estimated Food Cost Savings

For a given food category, total monthly savings were estimated by the following process: (1) calculating total food costs as described in section 2 using the average price of all items within a food category, which included items on the State agency APL and restricted items; (2) calculating total food costs using the average price of only the items on the State agency APL; and (3) subtracting these totals to find the difference. The average price, in both cases, was a weighted average that accounted for the distribution of food selections within a food category. For State agencies without the restriction, cost savings associated with implementing the restriction were estimated using the same approach, but additional data needed to be imputed as described in section A. Average cost savings estimates presented in this chapter were calculated for each restriction using resampled distributions of the State agency-level cost savings estimates weighted for variation in urbanicity, race, and ethnicity. Statistical tests were based on

a two-sided *t*-test of the overall estimate of cost savings per participant month against the null hypothesis that there was no cost savings.

a. Least expensive brand restrictions

Table 4.5 presents estimated actual and standardized food-cost savings by food category and subcategory for foods subject to LEB restrictions. LEB restrictions on cheese and juice resulted in estimated food-cost savings: an average of \$0.27 and \$0.50 per participant month (p < 0.001 and p < 0.01), respectively, based on standardized estimates. Standardized cost savings were also estimated for LEB restrictions on two whole-grain subcategories: whole-grain bread products (\$0.19; p < 0.001) and brown rice. Although statistically significant, the average estimated standardized cost savings for brown rice was marginal (less than \$0.01 per participant month; p < 0.001).

The estimated standardized cost savings associated with an LEB restriction for cow's milk varied substantially by State agency. Of the 12 State agencies included in the study, 8 saved or could have saved an estimated \$0.39 to \$1.45 per participant month because of an LEB restriction for cow's milk, while 3 of the State agencies saw or could have seen an estimated increase in costs. Because of these differences in estimated standardized costs savings across the 12 EBT State agencies, the average savings for cow's milk was not statistically significant.

The estimated actual and standardized cost savings indicate that for several State agencies, imposing an LEB restriction for some food categories or subcategories may increase rather than decrease perparticipant-month costs (data not shown). Although possible, especially given that LEB restrictions are more difficult to enforce than other food-specific restrictions, the unexpected results may be because of data limitations. Unlike other restrictions for which unauthorized foods can be easily identified in the data (e.g., restrictions on container sizes), LEBs are generally determined by a WIC participant at the time of purchase based on items available in the store and therefore cannot be identified in the data. To estimate cost savings for LEB restrictions, the study team assumed the store brands were the LEBs and developed counterfactuals accordingly. The store brand is not always the least expensive option available, so although this is the best approach given the available data, it may underestimate cost savings.

Food Category	Average	95 Percent Confidence Interval	Sample Size
Estimat	ed Actual Food-Cost Saving	gs (Dollars)	
Milk and milk alternatives			
Cow's milk	0.14	(0.15), 0.39	11
Cheese	0.15***	0.11, 0.20	9
Eggs	(< 0.01)	(0.04), 0.02	11
Juice	0.25***	0.20, 0.31	9
Legumes			
Dry beans	< 0.01**	< 0.01, < 0.01	11
Whole grains	·		
Whole-grain bread products	0.08***	0.06, 0.11	11
Tortillas	< 0.01	(< 0.01), < 0.01	11
Brown rice	< 0.01***	< 0.01, < 0.01	11

Table 4.5. Estimated Actual and Standardized Food-Cost Savings per Participant Month^a From LeastExpensive Brand Restrictions Food Category

Insight = WIC Food Cost-Containment Practices Study: Final Report

Food Category	Average	95 Percent Confidence Interval	Sample Size
Estimated S	standardized Food-Cost Sa	vings (Dollars)	
Milk and milk alternatives			
Cow's milk	0.30	(0.20), 0.75	11
Cheese	0.27***	0.16, 0.37	9
Eggs	(< 0.01)	(0.06), 0.03	11
Juice	0.50**	0.39, 0.62	9
Legumes			
Dry beans	< 0.01	(< 0.01), 0.02	11
Whole grains			
Whole-grain bread products	0.19***	0.12, 0.25	11
Tortillas	< 0.01	(< 0.01), 0.01	11
Brown rice	< 0.01***	< 0.01, 0.01	11

Savings from brand restrictions were evaluated assuming no changes to State agency APL regarding allowed container sizes, forms, types, or substitutions. Standardized cost savings were estimated based on a standardized distribution of participants among certification categories. Numbers in parentheses represent a negative value. Sample size represents the number of State agencies included in the analysis. Eight State agencies had an LEB restriction on cow's milk. Four State agencies had an LEB restriction on eggs. Four State agencies had an LEB restriction on juice. Two State agencies had an LEB restriction on dry beans, whole-grain bread products, tortillas, and brown rice.

^a "per participant month" = per participant per month

*p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight tabulations of WIC EBT data

b. Store brand only restrictions

SBO restrictions on cheese and juice resulted in estimated standardized food-cost savings of \$1.08 and \$0.65 per participant month, respectively (p < 0.001). Although the two State agencies with SBO restrictions for cheese saved an estimated \$0.26 and \$0.20 per participant month, respectively, five State agencies that did not have a brand restriction (SBO or LEB) in place might have saved as much as \$1.11 per participant month if they had restricted cheese to only store brands (data not shown).

Table 4.6. Estimated Actual and Standardized Food-Cost Savings per Participant Month ^a From Stor	е
Brand Only Restrictions	

Food Category	Average	95 Percent Confidence Interval	Sample Size	
	Estimated Actual	Food-Cost Savings (Dollars)		
Cheese	0.61***	0.35, 0.86	8	
Juice	0.39***	0.29, 0.49	10	
Estimated Standardized Food-Cost Savings (Dollars)				
Cheese	1.08***	0.66, 1.51	8	
Juice	0.65***	0.52, 0.80	10	

Notes

Savings from brand restrictions were evaluated assuming no changes to State agency APL regarding allowed container sizes, forms, types, or substitutions. Standardized cost savings were estimated based on a standardized distribution of participants among certification categories. Numbers in parentheses represent a negative value. Sample size represents the number of State agencies included in the analysis. Two State agencies had SBO restrictions for cheese. Three State agencies had SBO restrictions for juice. State agencies with restriction for a given food category were excluded from the analysis of food-cost savings for that food category. a "per participant month" = per participant per month

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight tabulations of WIC EBT data

c. Manufacturer rebates

Pre-rebate estimates reflect savings associated with restricting to the manufacturer rebate brand before accounting for the value of the rebate. At least for infant fruits and vegetables, pre-rebate standardized estimates indicate that manufacturer rebate brands may be more expensive than non-rebate brands— costs were \$0.72 per participant month higher when authorized foods were constrained to the manufacturer brand before accounting for the rebate value (p < 0.001; see table 4.7). Although statistically significant, average estimated actual pre-rebate food cost savings for infant food meat were less than \$0.01 (p < 0.001).

Food Category	Average	95 Percent Confidence Interval	Sample Size	
	Estimated Actual Food-Cost	Savings (Dollars)		
Infant cereal	< 0.01	(< 0.01), < 0.01	3	
Infant fruits and vegetables	(0.22)***	(0.27), (0.18)	2	
Infant food meat	< 0.01***	< 0.01, < 0.01	2	
Estimated Standardized Food-Cost Savings (Dollars)				
Infant cereal	< 0.01	(0.03), 0.02	3	
Infant fruits and vegetables	(0.72)***	(0.82), (0.63)	2	
Infant food meat	0.04***	0.03, 0.06	2	

Table 4.7. Estimated Actual and Standardized Food-Cost Savings per Participant Month^a From Manufacturer Rebates for Foods Other Than Infant Formula (Pre-Rebate)

Notes

Per-participant-month food-cost savings from manufacturer rebates (i.e., restricting all but the contract brand) for foods other than infant formula were estimated only for State agencies with rebates. The estimates do not account for the value of the State agency's rebate with the manufacturer. Standardized cost savings were estimated based on a standardized distribution of participants among certification categories. Numbers in parentheses represent a negative value. Sample size represents the number of State agencies included in the analysis.

^a "per participant month" = per participant per month

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight tabulations of WIC EBT data

Post-rebate estimates reflect savings associated with restricting to the manufacturer rebate brand after also accounting for the value of the rebate. Standardized post-rebate estimates indicate rebates for infant fruits and vegetables, infant cereal, and infant food meat saved State agencies an average of \$0.86, \$0.55 and \$0.18 per participant month (p < 0.001), respectively. Estimated actual savings were much less, although still statistically significant (p < 0.001; see table 4.8). This may be related to the low frequency with which these items were prescribed (i.e., infant fruits and vegetables and infant cereal are only prescribed to infants aged 6–11 months, and infant food meat is only prescribed to fully breastfeeding infants aged 6–11 months) and redeemed within each State agency (see redemption rates presented in table 9.2 of chapter 9).

Food Category	Average	95 Percent Confidence Interval	Sample Size	
	Estimated Actual Food-Cost	Savings (Dollars)		
Infant cereal	0.14***	0.13, 0.16	3	
Infant fruits and vegetables	0.27***	0.20, 0.33	2	
Infant food meat	0.02***	< 0.01, 0.02	2	
Estimated Standardized Food-Cost Savings (Dollars)				
Infant cereal	0.55***	0.53, 0.57	3	
Infant fruits and vegetables	0.86***	0.76, 0.95	2	
Infant food meat	0.18***	0.17, 0.19	2	

Table 4.8. Estimated Actual and Standardized Food-Cost Savings per Participant Month^a From Manufacturer Rebates for Foods Other Than Infant Formula (Post-Rebate)

Notes

Per-participant-month food-cost savings from manufacturer rebates (i.e., restricting all but the contract brand) for foods other than infant formula were estimated only for State agencies with rebates. The estimates account for the value of the State agency's rebate with the manufacturer at the time of data collection. Food prices were adjusted by the rebate value prior to estimating savings. Standardized cost savings were estimated based on a standardized distribution of participants among certification categories. Numbers in parentheses represent a negative value. Sample size represents the number of State agencies included in the analysis.

^a "per participant month" = per participant per month

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

Source: Insight tabulations of WIC EBT data

d. Container size restrictions

Of the four container size restrictions examined, three resulted in statistically significant estimated average standardized food-cost savings: only allowing quart-sized containers of yogurt, not allowing container sizes smaller than 16 ounces for cheese, and not allowing 48-ounce containers of juice.³¹ These restrictions were estimated to save an average of \$0.19 to \$0.72 per participant month, respectively (p < 0.001; see table 4.9); estimated actual food-cost savings were substantially lower.

Table 4.9. Estimated Actual and Standardized Food-Cost Savings per Participant Month	' From
Container Size Restrictions	

Food-Specific Restriction	Average	95 Percent Confidence Interval	Sample Size
Estima	ted Actual Food-Cost Savir	ngs (Dollars)	
Milk and milk alternatives			
Cow's milk (quarts restricted)	(0.08)*	(0.18), (< 0.01)	12
Yogurt (quarts only)	0.09***	0.05, 0.14	8
Cheese (16-ounce containers only)	0.37***	0.33, 0.42	12
Juice (no 48-ounce containers)	0.28***	0.17, 0.39	12

³¹ Typically, 48-ounce containers are prescribed to women to enable them to receive their full nutritional benefit. In State agencies with a restriction on 48-ounce juice containers, only frozen concentrate was allowed for women's juice.

Food-Specific Restriction	Average	95 Percent Confidence Interval	Sample Size
Estimated	Standardized Food-Cost S	avings (Dollars)	
Milk and milk alternatives			
Cow's milk (quarts restricted)	(0.15)	(0.51), 0.13	12
Yogurt (quarts only)	0.19***	0.15, 0.23	8
Cheese (16-ounce containers only)	0.72***	0.65, 0.79	12
Juice (no 48-ounce containers)	0.46***	0.33, 0.59	12

Savings from each restriction was evaluated assuming no other changes to the State agency APL. Savings were calculated as the increase in cost to remove the restriction when it had been implemented and decrease in cost to add the restriction when it had not been implemented. Standardized cost savings were estimated based on a standardized distribution of participants among certification categories. Numbers in parentheses represent a negative value. Sample size represents the number of State agencies included in the analysis. For six State agencies, milk quarts were a separate subcategory and prescribed only to a subset of WIC households. Seven State agencies allowed only quart-sized containers of yogurt. Three State agencies did not authorize yogurt. Nine State agencies allowed only 16-ounce containers of cheese. Six State agencies did not allow 48-ounce containers of juice.

^a "per participant month" = per participant per month

*p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight tabulations of WIC EBT data

e. Form or type restrictions

Not allowing Greek yogurt; allowing only large eggs (e.g., no extra-large eggs); and not allowing organic infant fruits and vegetables resulted in average standardized food-cost savings, ranging from \$0.08 to \$0.53 per participant month (p < 0.001, p < 0.01, and p < 0.001, respectively; see table 4.10). Average actual cost savings per participant month were estimated for five of the eight form or type food-specific restrictions examined through the study, but the magnitude of these savings were more modest, ranging from less than \$0.01 (p < 0.05) for not allowing string cheese to \$0.16 (p < 0.001) for not allowing organic infant fruits and vegetables. Small but significant actual food cost increases were estimated relative to restrictions on UHT (ultra-high temperature) milk, Monterey Jack cheese, and shredded cheese. This finding indicates either a restriction on these forms or types may push households toward more expensive options, or State agencies with a restriction on these forms or types are similar in some way not measured through this study.

Food-Specific Restriction	Average	95 Percent Confidence Interval	Sample Size
Estim	nated Actual Food-Cost Sav	ings (Dollars)	
Milk and milk alternatives			
Cow's milk (no evaporated)	0.10***	0.01, 0.22	12
Cow's milk (no UHT)	(0.05)**	(0.12), (< 0.01)	12
Yogurt (no Greek)	0.15***	0.11, 0.18	8
Cheese (no shredded)	(0.01)*	(0.02), (< 0.01)	12
Cheese (no string)	< 0.01*	< 0.01, 0.01	12
Cheese (no Monterey Jack)	(0.03)***	(0.03), (0.02)	12
Eggs (large only)	0.06***	0.02, 0.10	12
Infant fruits and vegetables (no organic)	0.16***	0.10, 0.22	12

Table 4.10. Estimated Actual and Standardized Food-Cost Savings per Participant Month^a from Restrictions on Form or Type

Food-Specific Restriction	Average	95 Percent Confidence Interval	Sample Size
Estimate	d Standardized Food-Cost	Savings (Dollars)	
Milk and milk alternatives			
Cow's milk (no evaporated)	0.27	(0.12), 0.64	12
Cow's milk (no UHT)	(0.08)	(0.28), 0.06	12
Yogurt (no Greek)	0.24***	0.21, 0.28	8
Cheese (no shredded)	(0.03)	(0.12), 0.02	12
Cheese (no string)	(< 0.01)	(0.10), 0.09	12
Cheese (no Monterey Jack)	(0.06)	(0.16), 0.03	12
Eggs (large only)	0.08**	0.02, 0.14	12
Infant fruits and vegetables (no organic)	0.53***	0.37, 0.69	12

Savings from each restriction was evaluated assuming no other changes to the State agency APL. Savings were calculated as the increase in cost to remove the restriction when it had been implemented and decrease in cost to add the restriction when it had not been implemented. Standardized cost savings were estimated based on a standardized distribution of participants among certification categories. Sample size represents the number of State agencies included in the analysis. Three State agencies did not allow evaporated milk. Six State agencies did not allow UHT milk. Seven State agencies did not allow Greek yogurt. Three State agencies did not allow shredded cheese. Four State agencies did not allow string cheese. Two State agencies did not allow organic infant fruits and vegetables.

UHT = ultrahigh temperature

a "per participant month" = per participant per month * p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight tabulations of WIC EBT data

f. Food alternative restrictions

Not allowing tofu and yogurt as alternatives for milk resulted in an estimated average cost savings of 0.31 and 0.44 per participant month, respectively (p < 0.001; see table 4.11). Standardized estimates, which represent the maximum State agencies could expect to save from these restrictions, were substantially greater than estimated actual costs. Unlike tofu and yogurt, restrictions on oats and whole-wheat pasta as alternatives for whole-grain bread products did not result in cost savings.

Table 4.11. Estimated Actual and Standardized Food-Cost Savings per Participant Month ^a from No
Allowing Alternatives

Food-Specific Restriction	Average	95 Percent Confidence Interval	Sample Size
E	stimated Actual Food-Cost S	avings (Dollars)	
Milk and milk alternatives			
Tofu	0.31***	0.07, 0.58	12
Yogurt (quarts only)	0.44***	0.39, 0.49	12
Whole grains			
Oats	(< 0.01)	(< 0.01), < 0.01	12
Whole-wheat pasta	(0.02)**	(0.02), (0.01)	12

Food-Specific Restriction	Average	95 Percent Confidence Interval	Sample Size
Estin	nated Standardized Food-Co	st Savings (Dollars)	
Milk and milk alternatives			
Tofu	1.01***	0.61, 1.46	12
Yogurt (quarts only)	1.60***	1.13, 1.97	12
Whole grains			
Oats	< 0.01	(0.04), 0.05	12
Whole-wheat pasta	(0.01)	(0.06), 0.04	12

Savings from each restriction was evaluated assuming no other changes to the State agency APL. Savings were calculated as the increase in cost to remove the restriction when it had been implemented and decrease in cost to add the restriction when it had not been implemented. Estimated cost savings were based on a standardized distribution of participants among certification categories. Numbers in parentheses represent a negative value. Sample size represents the number of State agencies included in the analysis. Six State agencies did not allow tofu as an alternative. Three State agencies did not allow yogurt as an alternative to milk. Six State agencies did not allow oats as an alternative to whole-grain bread products. Three State agencies did not allow whole-wheat pasta as an alternative to whole-grain bread products.

^a "per participant month" = per participant per month

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

Source: Insight tabulations of WIC EBT data

C. Limitations

The food-cost savings estimated for food-specific restrictions are subject to several limitations:

- The estimates relied heavily on counterfactual information, or more specifically, imputed prices and food selection distributions. To the extent these imputed values did not adequately represent what would be observed in the presence of a specific condition (i.e., food item restriction or lack thereof), the estimates could be biased. However, to minimize bias, average price ratios of allowed to restricted items were used to impute unobserved unit prices (i.e., unit prices for items not on a State agency APL), thereby eliminating the influence of geographic or regional variation in price. Also to minimize bias, estimated distributions of food selections in the presence or absence of a condition were weighted to reflect differences by demographic characteristics, which included urbanicity, race, and ethnicity.
- The limited sample size in some State agencies for certain demographics used to weight food selection distributions made the development of counterfactuals impossible or potentially biased. However, the impact of any related bias should be minimal because cost saving estimates did not change substantially when weighted to account for differences in food selections by demographic characteristics.
- The estimates could not account for potentially important unobserved factors such as the cumulative or interactive effect of policies, vendor pricing within a State agency in response to changes in policy, and variation in the effect of purchasing distribution by vendor type.
- The methodology employed to estimate cost savings was not optimized for estimating savings associated with the restriction of alternatives. These estimates incorporated the prices and purchases of many other subcategories, thereby introducing the potential for bias from other subcategory restrictions or State agency-level factors related to these subcategories but otherwise unrelated to the alternative restriction.
- Post-rebate cost savings were estimated only for State agencies that held rebate contracts for foods other than infant formula during the study period; estimates based on this limited universe are likely not representative.

Chapter 5. WIC Participant Shopping Experience

This chapter describes the WIC participant shopping experience, perceived ease of shopping for WIC foods, and prevalence of negative WIC shopping experiences among survey respondents. This chapter also examines whether respondents in WIC State agencies with food-specific restrictions, such as container size restrictions for juice, reported partial purchases more often than respondents in State agencies without the restriction because they could not find an item in the store or the item was out of stock.

Key Findings

- In total, more than 72 percent of households indicated the WIC shopping experience was either easy or very easy.
- When asked about the shopping difficulties they had experienced, more than 76 percent of households reported they selected the wrong item at least once and had been asked by the cashier to retrieve the correct item; more than 72 percent found the WIC food was unavailable or out of stock at the store.
- Among the small number of households that indicated shopping for WIC foods was difficult, more than 50 percent attributed this to difficulties in finding the allowed form or type of food or the allowed container size (66.3 and 56.0 percent, respectively).
- A greater percentage of households in State agencies with brand restrictions for eggs (i.e., LEB or SBO), as compared with households in State agencies without these restrictions, reported partial egg purchases because they could not find the item in the store or the store did not stock the item (8.9 versus 2.3 percent).
- A smaller percentage of households in State agencies with a container size restriction for juice, as compared with households in State agencies without the restriction, reported difficulties finding the correct container size (1.3 versus 5.7 percent).

A. Background and Approach

Food-specific restrictions implemented for purposes of cost containment may limit the accessibility or availability of WIC foods in stores. Specifically, these restrictions could make it more difficult for WIC participants to find an item in the store or increase the likelihood an item will be unavailable or out of stock. Using data from the Survey of WIC Participants, this chapter presents descriptive statistics³² for household attitudes about the WIC shopping experience and examines the frequency with which households reported they could not find a WIC food in the store, overall and by the presence of a brand, container size, or form or type restriction.

In addition to questions about shopping experience, the Survey of WIC Participants also collected demographic data on all respondent households. Table 5.1 presents the distribution of survey respondents by household characteristic.

³² The study team did not conduct any regression analyses regarding the availability of WIC foods outcome because none of the survey questions asked respondents about their perceptions of the shopping experience by food category. Therefore, regression analysis to assess the relationship between food restrictions and access to WIC foods was not possible.

Characteristic	со	FL	KY	MA	МІ	NV	ОН	тх	VA	WI	WV	WY	Total
					Adults i	n House	hold						
1	23.7	27.8	26.2	36.6	29.5	32.0	34.6	22.1	31.3	33.5	26.6	21.3	27.6
2	56.2	53.5	61.2	46.0	58.7	50.9	53.4	57.7	53.9	58.8	60.2	66.7	55.7
3 or more	20.1	18.7	12.6	17.4	11.8	17.1	12.0	20.2	14.8	7.8	13.1	12.0	16.8
				C	Children	in House	ehold						
0	1.8	3.0	0.9	4.5	2.5	0.5	1.7	0.8	3.4	3.2	3.1	1.1	2.1
1	67.9	67.8	69.2	73.4	60.2	60.4	61.7	64.7	64.8	63.3	60.5	66.8	65.2
2	25.3	25.0	24.7	18.3	31.7	30.3	31.2	27.5	25.8	28.5	32.2	27.9	27.1
3 or more	4.9	4.2	5.1	3.8	5.6	8.9	5.3	7.0	6.0	5.0	4.2	4.2	5.6
Infants in Household													
0	76.6	79.4	72.7	82.1	77.6	70.4	73.1	75.3	78.5	75.5	76.0	78.8	76.6
1 or more	23.4	20.6	27.3	17.9	22.4	29.6	26.9	24.7	21.5	24.5	24.0	21.2	23.4
				Educ	ation Lev	vel of Re	sponder	nt					
No high school diploma or GED	21.2	12.5	13.8	15.4	15.8	24.8	8.6	33.8	18.9	14.8	17.6	14.1	20.7
High school diploma/GED	51.0	50.9	61.7	52.6	60.9	56.8	75.7	53.4	57.1	64.3	60.5	63.3	56.7
Associate's degree	15.4	18.8	11.0	14.9	11.2	12.7	9.9	6.3	14.2	11.7	15.3	13.9	11.8
Bachelor's degree	9.5	13.7	11.2	13.2	8.7	4.9	4.7	5.4	6.6	5.7	4.5	7.4	8.3
Other ^a	2.6	4.1	1.9	3.9	2.5	0.4	1.2	1.1	3.1	3.1	1.8	1.4	2.3
Not reported	0.3	< 0.1	0.4	0.0	0.8	0.4	< 0.1	< 0.1	< 0.1	0.4	0.4	< 0.1	0.1
				Employ	ment St	atus of I	Respond	ent					
Full time	19.9	25.9	29.5	23.1	23.4	29.2	24.7	23.4	25.0	25.8	24.1	25.9	24.5
Part time	18.6	17.9	17.2	31.8	26.1	21.9	20.3	16.7	25.2	24.2	18.0	16.1	20.2
Not employed	60.3	56.2	52.9	44.4	50.5	48.8	54.7	59.9	49.9	49.6	57.8	58.0	55.2
Not reported	1.2	< 0.1	0.4	0.8	< 0.1	< 0.1	0.4	< 0.1	< 0.1	0.4	< 0.1	< 0.1	0.2
					Race of	Respon	dent						
Asian	2.6	3.1	0.7	6.9	4.7	5.8	2.5	2.0	5.1	4.9	1.6	0.8	3.2
Black	7.4	30.5	16.0	21.9	29.3	24.1	28.6	15.3	42.4	21.0	7.2	6.3	23.2
Native American	4.0	0.8	0.0	2.0	4.6	4.9	3.8	1.4	2.1	4.2	2.0	4.9	2.2
Pacific Islander	1.2	0.8	0.9	1.6	0.4	3.4	0.0	0.5	1.6	0.0	0.4	0.8	0.7
White	78.3	58.8	82.8	53.9	61.4	54.9	65.5	71.7	49.5	65.3	92.1	86.7	65.4
Other ^a	9.7	7.7	2.5	17.3	5.6	20.0	3.0	11.5	8.2	7.8	0.7	5.4	8.9
Not reported	8.4	3.7	1.4	5.3	2.6	6.5	1.3	6.9	6.0	4.2	0.3	3.3	4.8
				Et	thnicity	of Respo	ndent						
Hispanic/Latino	49.1	41.8	10.8	49.6	13.6	52.6	7.1	71.9	29.4	25.7	2.6	21.0	43.0
Non-Hispanic/ Latino	50.9	58.2	89.2	50.4	86.4	47.4	92.9	28.1	70.6	74.3	97.4	79.0	57.0

Table 5.1. Distribution of Household Characteristics of WIC Current Participant Survey Respondents byState Agency (Percentages)

Characteristic	СО	FL	KY	MA	МІ	NV	ОН	ТΧ	VA	WI	WV	WY	Total
Automobile Ownership for the Household													
Yes	65.2	61.8	70.2	51.2	59.0	51.7	63.2	58.4	56.4	64.3	68.6	74.3	60.1
No	34.4	38.2	29.8	48.0	40.6	48.3	36.8	41.6	43.6	35.3	31.4	25.1	39.8
Not reported	0.4	< 0.1	< 0.1	0.8	0.3	< 0.1	< 0.1	< 0.1	< 0.1	0.4	< 0.1	0.6	0.1
				Hous	sehold S	NAP Par	ticipatio	n					
Yes	40.1	52.1	48.2	58.6	52.8	59.2	58.9	54.7	48.1	59.1	61.8	34.1	53.7
No	59.9	47.9	51.8	41.0	46.8	40.3	41.1	45.3	51.9	40.9	38.2	65.9	46.3
Not reported	< 0.1	< 0.1	< 0.1	0.4	0.4	0.4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sample size (n)	260	269	236	264	265	209	231	211	269	254	277	218	2963

All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies. The sample size is unweighted.

Percentages may not add up to 100.0 because of rounding.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

GED = general educational diploma; SNAP = Supplemental Nutrition Assistance Program; TANF = Temporary Assistance for Needy Families

Source: Insight tabulations of Survey of WIC Participants, questions I2a, G1, G2, G3, G5, G6, G7, G8, G9, G10

B. Findings

1. WIC Shopping Experience

In total, 72.5 percent of households indicated shopping for WIC foods was either easy or very easy (see figure 5.1 and appendix table E.1). These results differed by State agency; the percentage of households that reported an easy or very easy WIC shopping experience ranged from 55.2 percent in Wyoming to 78.4 percent in Michigan. More than 88 percent of households shopped for WIC foods at the same stores where they purchased other foods, and 72.4 percent of these households indicated shopping for WIC foods was either easy or very easy (see appendix table E.2). This finding suggests shopping at the same store for WIC and non-WIC foods is not associated with the ease or difficulty of the WIC shopping experience.





Note

Sample sizes include all survey respondents who provided a response to the question. Respondents who answered "don't know" or refused to answer were not included. All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies.

Total N = 2,962; see appendix table E.1 for State agency sample sizes

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

Source: Insight tabulations of Survey of WIC Participants, question A4

Regardless of their views on the ease or difficulty of the WIC shopping experience, respondents were asked questions about whether they ever had an adverse WIC shopping experience (see figure 5.2 and appendix table E.3). In total, 90.0 percent of households reported at least one negative shopping event. Specifically, 76.9 percent of households indicated they selected the wrong item on at least one occasion and were sent back at checkout to retrieve the correct item, 72.1 percent found a WIC item was out of stock or unavailable in the correct container size, and 33.8 percent reported they had been embarrassed while shopping for WIC foods. Responses varied slightly by State agency. The percentage of households indicating they had on at least one occasion selected the wrong item and were sent back at checkout ranged from 70.2 percent in West Virginia to 84.6 percent in Nevada. While 69.1 percent of households in Texas reported a WIC item was out of stock or unavailable, 81.1 percent of households in Nevada reported the same experience. The percentage of households who reported embarrassment while shopping for WIC foods ranged from 26.9 percent in Massachusetts to 46.1 percent in Wyoming.





Sample sizes include all survey respondents who provided a response to the question. Respondents who answered "don't know" or refused to answer were not included. All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies.

Total N = 2,963; see appendix table E.3 for State agency sample sizes

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

Source: Insight tabulations of Survey of WIC Participants, questions A6, A7, and A8

Although almost three-quarters of households indicated the WIC shopping experience was easy or very easy, 90.0 percent also indicated they had experienced a negative WIC shopping event. For example, more than half of respondents who indicated the shopping experience was "easy or "very easy" also said they had selected the wrong item and been sent back at checkout to find the correct item or were unable to purchase a WIC item because it was out of stock or not available in the correct container size. To the extent respondents were not comfortable sharing their honest opinions about their WIC shopping experiences when responding to the survey or faced challenges assessing the totality of the experience (when some aspects were difficult but others were easy), these findings may have overestimated household satisfaction with the WIC shopping experience. Alternatively, participants may have had negative shopping experiences in the past but by the time they took the survey were more familiar with shopping for WIC foods and viewed it as "easy" or "very easy."

2. Reasons Associated with Difficulty Shopping for WIC Foods

Across the 12 EBT State agencies, 9.5 percent of respondents reported the WIC shopping experience was difficult, 2.0 percent reported it was very difficult, and 1.6 percent reported it was sometimes easy and sometimes difficult (see appendix table E.1). These respondents were then asked whether any of the reasons listed in table 5.2 contributed to their difficulty shopping for WIC foods. Among this small sample of households, reasons related to food-specific restrictions (e.g., finding the allowed brand),

were more commonly reported than other reasons (e.g., knowing the remaining balance). Overall, 83.5 percent of these households reported difficulties finding an allowed brand while shopping for WIC foods, and more than 50 percent reported difficulties finding an allowed form or type of food or an allowed container size (66.3 percent and 56.0 percent, respectively). Only 32.7 percent and 3.8 percent of households, respectively, indicated that knowing their EBT balance or remembering their personal identification number (PIN) contributed to shopping difficulties.

Reason for Difficulty Shopping	со	FL	KY	MA	МІ	NV	ОН	тх	VA	WI	WV	WY	Total
Finding allowed brand	81.0	82.2	90.0	77.2	85.4	90.8	88.4	81.3	85.4	84.2	84.8	69.3	83.5
Finding WIC foods in store	58.0	87.3	89.0	66.7	73.1	83.5	75.7	76.4	81.9	73.3	80.7	79.4	78.7
Finding allowed form or type	73.2	68.8	78.9	62.5	78.0	76.3	67.2	53.8	69.7	79.0	71.0	64.3	66.3
Finding allowed container size	69.3	52.9	49.5	46.3	59.9	64.0	48.6	59.8	54.6	62.5	53.8	64.1	56.0
Knowing remaining balance	19.5	26.5	24.3	14.1	28.7	23.9	29.3	51.8	23.1	27.2	26.2	28.3	32.7
Remembering PIN	7.3	2.3	4.6	1.9	3.6	2.8	3.8	3.7	7.3	6.2	7.3	5.5	3.8
Sample size ^a	71	87	80	58	56	59	78	49	83	66	76	97	859

Table 5.2. Reasons for Difficulty Shopping for WIC Foods (Percentages)

Notes

All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

^a Sample sizes include households that reported a difficult, very difficult, neither easy nor difficult, or sometimes easy and sometimes difficult WIC shopping experience. The sample size in unweighted.

Source: Insight tabulations of Survey of WIC Participants, question A5

3. Prevalence of Partial Purchases of WIC Foods Related to Reported Problems with Availability of Foods

The study team examined whether households residing in State agencies with brand, container size, or form or type restrictions more often reported availability-related reasons for not purchasing all of their prescribed WIC foods (i.e., not being able to find the item in a store or the item being out of stock). Compared with households in State agencies without these restrictions, households in State agencies with least expensive brand (LEB) or store brand only (SBO) restrictions were more likely to report availability-related reasons for not purchasing their full egg benefits (8.9 versus 2.3 percent; p < 0.05); see table 5.3). This finding suggests LEB or SBO restrictions may lead to greater difficulties in finding and purchasing the authorized brand of eggs. However, although these differences were significant, the overall percentage of households that reported availability-related reasons for not purchasing in State agencies with and without container size or form or type restrictions suggesting these two types of restrictions did not contribute to respondents reporting availability-related reasons for not purchasing all of their WIC foods (see appendix table E.4).
Table 5.3. Households That Reported Availability Reasons for Not Purchasing All Their WIC Foods
by Practice

Food	Households in All State Agencies (Percent)	Households in State Agencies with Brand Restrictions (Percent)	Households in State Agencies without Brand Restrictions (Percent)	Percentage- Point Difference	Sample Sizeª
		Brand Restriction	s ^b		
Milk and milk alternatives					
Cow's milk	5.3	5.7	3.1	-2.6	608
Cheese	7.9	8.3	7.2	-1.2	338
Eggs	5.5	8.9	2.3	-6.6*	273
Juice	8.9	9.4	7.3	-2.1	497
Legumes					
Dry beans	11.2	15.5	8.1	-7.4	357
Whole grains					
Whole-wheat/whole- grain bread/buns/rolls	16.5	18.1	15.5	-2.6	594
Tortillas	9.3	7.6	10.6	3.0	272
Brown rice	1.4	0.0	2.3	2.3^	203
Infant cereal	2.9	3.1	2.6	-0.6	273
Infant fruits and vegetables	7.7	8.1	7.6	-0.5	216

All percentages are weighted to be representative of all WIC households in the State agencies included in each column.

^a Sample sizes include respondents reporting partial WIC purchases (i.e., participants not purchasing all the foods prescribed in their food package), in that food category. The sample size is unweighted.

^b Brand restrictions include LEB, SBO, and manufacturer rebates.

* Indicates a statistically significant difference between percentages for households in a State agency with a food-specific restriction versus households in a State agency with a food-specific restriction at the 95 percent confidence level (p < 0.05). For this bivariate comparison, the study team conducted chi-squared tests to determine whether the average distribution within State agencies with food-specific restrictions was statistically different from the average distribution within the remaining State agencies. ^ Indicates a chi-squared test could not be performed because one value was zero

Sources locidate to bulletions of Survey of MIC Participants, question C2

Source: Insight tabulations of Survey of WIC Participants, question C2

4. Prevalence of Partial Purchases of WIC Foods Related to Reported Problems Finding the Correct Container Size

Fewer than 3 percent of households reported not being able to find the correct container size as a reason for not purchasing all their WIC foods (see appendix table E.5). The prevalence of problems finding the correct container size was similar among households in State agencies with and without a container size restriction for all examined food categories, except for juice. A greater percentage of households in State agencies *without* a container size restriction for juice³³ than households in State agencies *withaut* a container size restriction for juice reported not being able to find the correct container size (5.7 versus 1.3 percent; p < 0.05; see table 5.4). This may be because, as State agencies described during interviews, 48-ounce container sizes of liquid juice are relatively uncommon in stores, hence respondents' difficulty in locating them. This finding suggests that allowing more container sizes did not equate to WIC participants more easily locating an allowable container size. In State agencies that allow 8-ounce packages of cheese (i.e., do not restrict the container size of cheese), for example, respondents may have difficulty finding this container size in stores if it is not commonly stocked.

³³ State agencies with a restriction do not authorize purchase of 48-ounce containers of juice.

Insight = WIC Food Cost-Containment Practices Study: Final Report

Table 5.4. Household Inability Finding the Correct Container Size by Whether the State Agency Had aContainer Size Restriction

Foodª	Households in All State Agencies (Percent)	Households in State Agency with Container Size Restriction (Percent)	Households in State Agency without Container Size Restriction (Percent)	Difference	Sample Size⁵
Milk and milk alternative	25				
Cow's milk	2.9	2.7	3.6	0.9	608
Yogurt	1.7	2.0	1.1	-0.9	560
Cheese	1.0	1.2	0.5	-0.7	338
Juice	4.6	1.3	5.7	4.3*	497

All percentages are weighted to be representative of all WIC households in the State agencies included in each column.

^a Foods are included if at least two State agencies had a container size restriction for the food. See appendix A for a full list of LEB restrictions by food and State agency.

^b Sample sizes include only households that bought some or none of the food. The sample size is unweighted.

* Indicates a statistically significant difference between percentages for households in a State agency with a container size restriction versus households in a State agency without a container size restriction at the 95 percent confidence level (p < 0.05). For this bivariate comparison, the study team conducted chi-squared tests to determine whether the average distribution within States agencies with the restriction was statistically different from the average distribution within the remaining State agencies. Source: Insight tabulations of Survey of WIC Participants, question C2

C. Limitations

Because questions regarding difficulty shopping for WIC foods were not asked relative to each food category, multivariable regression analysis could not be used to examine whether any food-specific restrictions were associated with shopping difficulties or with other negative WIC shopping experiences. Therefore, it was not possible to know or make any claims about whether shopping experiences were different for households residing in State agencies with or without a given food-specific restriction. Instead, only descriptive statistics showing the overall number of households that faced challenges in shopping for WIC foods were examined.

Chapter 6. Participant Satisfaction, Purchases, and Consumption

This chapter examines satisfaction with WIC foods and self-reported purchase and consumption of WIC foods among WIC households. This chapter also presents findings from multivariable regression analyses that estimate associations between food-specific restrictions and the probability of satisfaction with and full consumption of WIC foods.

Key Findings

- More than 90 percent of households were satisfied or very satisfied with the WIC foods they purchased with their benefits.
- Least expensive brand (LEB) restrictions, store brand only (SBO) restrictions, and manufacturer rebates were not significantly associated with brand satisfaction for WIC foods.
- Container size restrictions were not significantly associated with container size satisfaction for WIC foods.
- LEB restrictions on bread and tortillas, SBO restrictions on juice, container size restrictions on yogurt, and restrictions on shredded cheese were negatively associated with full consumption of WIC foods.
- Restrictions on 48-ounce containers of juice and Monterey Jack cheese were positively associated with full consumption.

A. Background and Approach

Food-specific restrictions can adversely affect satisfaction, WIC food purchases, and consumption in several ways. For example, restrictions that limit the brands WIC households can purchase may lower brand satisfaction, particularly if households have strong brand preferences within a food category. Container size restrictions, such as limiting yogurt to quart-size containers, may lower satisfaction with yogurt container sizes if households prefer smaller containers or reduce consumption if households are unable to finish the entire quart of yogurt. Form or type restrictions, such as those on shredded or string cheese or Greek yogurt, may reduce the likelihood households with preferences for these forms or types will purchase their full benefits.

Using data from the Survey of Current WIC Participants, this chapter examines the following:

- Overall household satisfaction with WIC foods (section B.1)
- Participant satisfaction with the brands and container sizes of WIC foods (sections B.2 and B.3) through both descriptive analyses and multivariable regressions
- Reasons households did not purchase all their WIC benefits (sections B.4)
- Reasons households did not consume all their WIC benefits and the relationship between full consumption (i.e., consuming all the WIC foods purchased) and food-specific restrictions (section B.5)

For all regressions, the dependent variable was a food-specific binary indicator (e.g., satisfied or not with milk brands); a value of 1 indicated satisfaction with or full consumption of the WIC food (see table 6.1).

For the satisfaction regressions, the sample included households that indicated they could purchase the food of interest with their WIC benefits. For the consumption regressions, only households that reported purchasing all or some of their WIC food benefits were included in the analysis. Appendix F provides detailed model specifications. Table 5.1 in chapter 5 presents the distribution of survey respondents by household demographics.

Variable	Definition
Brand satisfaction	Equaled 1 if the respondent was satisfied or very satisfied with the brands of foods that could be bought with WIC; equaled zero if the respondent was dissatisfied or very dissatisfied with the brands of the foods
Container size satisfaction	Equaled 1 if the respondent was satisfied or very satisfied with the container sizes of selected WIC foods; equaled zero if the respondent was dissatisfied or very dissatisfied with the container sizes of the foods
Full consumption	Equaled 1 if the respondent reported consuming all the WIC food purchased in a specific food category; equaled zero for reported partial or nonconsumption

Table 6.1. Dependent Variable Definitions

B. Findings

1. Overall Satisfaction with WIC Foods

More than 90 percent of households across each of the 12 EBT State agencies reported they were either "very satisfied" or "satisfied" with the foods purchased with WIC benefits (see figure 6.1 and appendix table F.1). The percentage that reported being "very satisfied" ranged from 39.9 percent in Nevada to 54.6 percent in West Virginia. Fewer than 1 percent of households for each State agency reported being "very dissatisfied," while the percentage that reported being "dissatisfied" ranged from 1.3 percent in West Virginia to 5.8 percent in Virginia.

Households were also asked to name what is most important to them when shopping for milk, cheese, and juice.³⁴ For cheese and juice, most households reported "form or type" as most important.³⁵ For milk, half of all households (49.8 percent) reported "ease of finding item in store" as most important (see figure 6.2 and table F.2). These data mirrored the findings from interviews with State agency staff. Interviewees indicated WIC participants were brand-agnostic for items such as milk, cheese, or eggs; this viewpoint is connected to the higher prevalence of brand-related food-specific restrictions for these three foods as noted in chapter 3. State agency interviewees described strong participant preferences for specific forms and types of cheese (e.g., string cheese).

Insight = WIC Food Cost-Containment Practices Study: Final Report

³⁴ Households were asked, "When you shop for WIC milk/cheese/juice, which of the following is most important to you?" Response options for milk were "the brand of milk," "being able to buy half-gallons or quarts," "being able to find WIC milk quickly in the store," and "other." Response options for cheese were "the brand of cheese," "the type or flavor of cheese," "whether the cheese is a block or sliced," "being able to find WIC cheese quickly in the store," and "other." Response options for juice were "the brand of juice," "the flavor of juice," "whether juice is frozen, refrigerated, canned, or bottled," "being able to find WIC juice quickly in the store," and "other."

³⁵ For cheese, the response option "the type or flavor of cheese" was classified as "form or type." For juice, the response option "the flavor of juice" was classified as "form or type."





All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies.

Total N = 2,852; see appendix table F.1 for State agency sample sizes

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

^a Sample sizes include only households prescribed the food category.

Source: Insight tabulations of Survey of WIC Participants, question A1 4a

Figure 6.2. Criteria Reported as Most Important by Households When Shopping for WIC Foods Across State Agencies



Notes

N for cow's milk = 2,148; *N* for cheese = 2,194; *N* for juice = 2,517

All percentages are weighted to be representative of all WIC households in the 12 EBT State agencies.

For milk, common "other" responses include expiration date, fat content, and alternative milks (such as lactose-free). For juice,

common "other" response options include the amount of sugar in the juice and the container size. "Other" responses for cheese could not be easily grouped.

Source: Insight tabulations of Survey of WIC Participants, questions C5a, C5d, and C5f

2. Brand Satisfaction with WIC Foods

Table 6.2 presents brand satisfaction with WIC foods among all respondents who were prescribed the WIC food. On average, more than 86 percent of respondents were satisfied or very satisfied with the brands of WIC foods. Respondents were most satisfied with brands of eggs and infant fruits and vegetables (95.6 and 95.4 percent, respectively) and least satisfied with brands of whole-wheat/whole-grain bread/buns/rolls (whole-grain bread products) and breakfast cereal (86.4 and 87.3 percent, respectively).

Food Category	CO	FL	KY	MA	MI	NV	OH	ТΧ	VA	WI	WV	WY	Total
Milk and milk alternatives													
Cow's milk	90.4	90.2	91.0	93.6	94.6	94.9	89.6	93.3	91.2	95.9	95.9	92.6	92.4
Cheese	95.4	90.8	96.5	92.9	97.4	94.4	93.6	96.2	95.4	92.8	98.2	93.0	94.7
Eggs	93.7	91.1	96.8	95.4	97.1	98.6	97.0	96.9	98.3	96.2	97.1	96.1	95.6
Juice	90.6	86.9	95.0	89.8	97.9	88.6	94.5	91.6	91.1	92.3	90.2	91.0	91.4
Whole grains													
Whole-grain bread products	90.4	84.1	83.1	86.1	84.6	87.0	79.3	91.4	88.8	79.4	81.2	87.5	86.4
Tortillas	89.2	90.3	89.2	91.4	93.3	94.4	88.8	93.9	95.0	90.4	98.7	93.7	92.4
Brown rice	98.3	91.5	93.8	93.0	93.6	92.8	96.7	93.8	95.6	97.0	97.2	98.3	93.7
Infant cereal	94.7	97.0	98.4	87.3	92.3	92.4	93.9	95.0	87.6	95.4	97.1	92.2	94.3
Infant fruits and vegetables	94.4	98.5	92.6	86.9	98.2	90.4	92.1	96.9	94.6	90.1	96.6	84.7	95.4
Breakfast cereal	86.2	83.5	83.9	89.3	87.8	87.1	86.1	89.3	90.0	86.3	94.8	89.3	87.3
Sample size (n)	260	269	236	264	265	209	231	211	269	254	277	218	2,963

Table 6.2. Household Satis	faction with Brands o	f WIC Foods by St	ate Agency ((Percentaaes)
Tubic 0.2. Household Julis	juction with brands o	j wichous by St	all Agency (r creentuges,

Notes

Satisfaction is defined as a response of "satisfied" or "very satisfied." The survey did not ask questions about brand satisfaction with dry beans. All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies. Sample size is unweighted.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

Source: Insight tabulations of Survey of WIC Participants, question $\ensuremath{\mathsf{A2}}$

The relationships between brand satisfaction³⁶ and brand-related food-specific restrictions such as LEB, SBO, and manufacturer rebates, were also examined using a multivariable regression analysis that controlled for other State agency food-specific restrictions and household demographics.³⁷ There were no statistically significant relationships between LEB restrictions, SBO restrictions, or manufacturer rebates and brand satisfaction (see tables 6.3–6.5). Although small differences in the percentage of households reporting brand satisfaction were observed by State agency, the differences in satisfaction did not appear to be related to these restrictions. For example, after controlling for other factors, households residing in State agencies with an LEB restriction for cheese were no more or less satisfied with cheese brands than households in State agencies without the restriction.

³⁶ Brand satisfaction is defined as a response of "satisfied" or "very satisfied."

³⁷ The coefficient presented in the "Estimate" column is the relationship between the food-specific restriction and the satisfaction with or full consumption of the food listed in the row. For example, in table 6.3, "Estimate" equals -2.7. This can be interpreted as the following: Households located in State agencies with an LEB practice for milk were 2.7 percentage points less likely to be satisfied with brands of milk than households located in State agencies without an LEB practice for milk. However, because this value does not have an asterisk, it is not statistically significant, and the study team cannot conclude there is a relationship between LEB restrictions for milk and brand satisfaction with milk. Tables showing relationships between food-specific restrictions and container size satisfaction and full consumption can be interpreted in a similar way.

Food Category	Mean (Percent)	Estimate	95 Percent Confidence Interval	Sample Size ^a	
Milk and milk alternatives					
Cow's milk	92.9	-2.7	(-6.1, 0.6)	2,449	
Cheese	94.8	-1.2	(-4.3, 1.9)	2,152	
Eggs	96.3	-0.8	(-3.0, 1.4)	2,482	
Juice	91.7	0.1	(-3.1, 3.2)	2,470	
Whole grains					
Whole-grain bread products	85.2	-2.2	(-6.9 <i>,</i> 2.5)	2,364	
Tortillas	95.2	-0.5	(-4.4, 3.5)	1,258	
Brown rice	93.1	-2.4	(-7.3 <i>,</i> 2.5)	1,529	

Table 6.3. Estimated Relationship Between Household Brand Satisfaction and Least Expensive BrandRestrictions

Redemption of whole grains was underreported in the survey. Survey respondents were asked whether they redeemed some, all, or none of each whole-grain alternative available to them. For example, if respondents in a State agency that authorized whole-grain bread products, brown rice, and tortillas redeemed only whole-grain bread products, they would respond as having redeemed no brown rice or tortillas, even if they redeemed their full whole-grain allotments for whole-grain bread products. Estimates are OLS regression coefficients showing the association between the LEB restriction and the probability of brand satisfaction. The mean is the percentage of respondents who were satisfied or very satisfied with the brands of each WIC food. OLS = ordinary least squares

^a Sample sizes include only households prescribed the food category.

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

Source: Insight analysis of Survey of WIC Participants, question A2

Table 6.4. Estimated Relationship Between Household Brand Satisfaction and Store Brand Only Restrictions

Food Category	Mean (Percent)	Estimate	95 Percent Confidence Interval	Sample Size ^a
Cheese	94.8	-1.2	(-4.8, 2.3)	2,152
Juice	91.7	-1.2	(-4.0, 1.5)	2,470

Notes

Estimates are OLS regression coefficients showing the association between the SBO restriction and the probability of brand satisfaction. Foods with SBO restrictions used by fewer than 2 or more than 10 of the 12 EBT State agencies were excluded from the analysis. The mean is the percentage of respondents who were satisfied or very satisfied with the brands of each WIC food. a Sample sizes include only households prescribed the food category.

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight analysis of Survey of WIC Participants, question A2

Table 6.5. Estimated Relationship Between Household Brand Satisfaction and Manufacturer Rebates

Food Category	Mean (Percent)	Estimate	95 Percent Confidence Interval	Sample Size [®]
Infant cereal	93.7	-1.6	(-6.1, 2.9)	698
Infant fruits and vegetables	93.0	-2.1	(-8.4, 4.2)	653

Notes

Estimates are OLS regression coefficients showing the association between the manufacturer rebate and the probability of brand satisfaction. The mean is the percentage of respondents who were satisfied or very satisfied with the brands of each WIC food.

^a Sample sizes include only households prescribed the food category.

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

Source: Insight analysis of Survey of WIC Participants, question A2

3. Container Size Satisfaction with WIC Foods

Survey respondents were also asked about their satisfaction with authorized container sizes of milk, cheese, yogurt, and juice (see table 6.6). Participants were generally satisfied with container sizes for all four foods.

Food Category	со	FL	КҮ	MA	МІ	NV	ОН	тх	VA	WI	WV	WY	Total
Milk and milk altern	natives												
Cow's milk	96.0	93.3	96.9	94.1	95.8	94.1	95.0	97.0	96.7	94.9	94.6	95.8	95.5
Yogurt	89.6	88.1	90.4	89.7	92.6	-	-	95.0	92.1	92.0	-	89.4	91.9
Cheese	90.8	94.4	95.3	94.0	92.9	94.7	97.9	96.3	94.6	91.2	97.9	89.3	94.8
Juice	93.6	89.6	90.0	93.3	96.1	92.3	94.5	92.9	93.8	88.9	95.6	92.3	92.6
Sample size (n)	260	269	236	264	265	209	231	211	269	254	277	218	2,963

Table 6.6. Satisfaction with Container Sizes by State Agency (Percentages)

Notes

Satisfaction is defined as a response of "satisfied" or "very satisfied." All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies. Sample size is unweighted.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

- Indicates the State agency did not authorize the food

Source: Insight tabulations of Survey of WIC Participants, question A3

The relationship between container size satisfaction³⁸ and four container size restrictions were also examined using multivariable regression analysis that controlled for other State agency food-specific restrictions and household demographics. Similar to brand satisfaction, these findings indicated no statistically significant relationships between container size restrictions and container size satisfaction (see tables 6.7). Although small differences in the percentage of households reporting brand satisfaction were observed by State agency, the differences in satisfaction do not appear to be related to these restrictions. For example, after controlling for other factors, households in State agencies that restricted 48-ounce containers of juice were no more or less satisfied with juice container sizes than households residing in State agencies that allowed 48-ounce containers of juice.³⁹

Table 6.7. Estimated Relationship Between Household Satisfaction with Container Sizes and ContainerSize Restrictions

Food Category	Mean (Percent)	Estimate	95 Percent Confidence Interval	Sample Size [®]
Milk and milk alternatives				
Cow's milk (restricted quarts)	95.3	-0.1	(-3.3, 3.1)	2,453
Yogurt (only quarts)	90.6	-1.2	(-5.4, 3.0)	1,452

³⁸ Container size satisfaction is defined as a response of "satisfied" or "very satisfied."

³⁹ Typically, 48-ounce containers are prescribed to women so they may receive their full nutritional benefit. For study purposes, State agencies identified as having a restriction on 48-ounce juice containers allow only frozen concentrate containers that reconstitute to 48 ounces.

Food Category	Mean (Percent)	Estimate	95 Percent Confidence Interval	Sample Size ^a
Cheese (16 oz or larger)	94.0	1.8	(-2.9, 6.5)	2,157
Juice (no 48-oz containers) ^b	93.2	1.7	(-0.4, 3.8)	2,474

Estimates are OLS regression coefficients showing the association between the container size restriction and the probability of container size satisfaction. The mean is the percentage of respondents who were satisfied or very satisfied with the container sizes of each WIC food. The container size restriction of interest is listed in parentheses next to the WIC food.

^a Sample sizes include only households prescribed the food category.

^b Typically, 48-ounce containers of juice were prescribed to women.

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight analysis of Survey of WIC Participants, question A3

4. Purchases of WIC Foods

Households were also asked whether they purchased all, some, or none of each prescribed WIC food during the last calendar month. The percentage of households that purchased all their benefits varied greatly by food (see table 6.8). While 90.8 percent of respondents reported purchasing all their eggs, only 63.1 percent reported the full purchase of cow's milk or yogurt. There were large differences in the reported full purchase for some foods (e.g., yogurt and dry beans) by State agency but less variation for others (e.g., cow's milk or eggs). For example, while the percentage of households that reported the full purchase of yogurt ranged from 50.5 percent in Virginia to 80.5 percent in Wisconsin, the percentage for the full purchase of eggs had a much smaller range, from 86.0 percent in Michigan to 95.3 percent in Texas.

Food Category	CO	FL	KY	MA	MI	NV	ОН	ТΧ	VA	WI	WV	WY	Total
Milk and milk alternatives													
Cow's milk	65.6	62.4	61.3	67.6	52.8	60.9	62.4	67.3	59.0	64.7	57.8	66.2	63.1
Yogurt	56.3	68.8	56.4	64.2	71.9	-	-	58.2	50.5	80.5	-	61.3	63.1
Cheese	90.1	84.0	83.7	84.3	84.6	88.3	62.5	86.2	82.3	86.8	88.9	81.3	84.8
Eggs	91.3	88.4	88.7	92.7	86.0	89.7	88.4	95.3	89.4	87.1	88.3	87.4	90.8
Juice	77.9	83.7	79.4	85.0	84.1	82.1	88.0	83.3	78.8	85.3	69.5	68.6	83.1
Legumes													
Dry beans	64.5	81.1	65.5	74.9	55.3	72.2	59.3	76.4	61.5	59.5	59.1	42.3	72.7
Whole grains													
Whole-grain bread products	70.8	58.7	53.3	71.4	71.3	71.4	61.7	62.3	64.6	62.5	51.7	64	63.3
Tortillas	22.4	25.5	14.5	20.1	12.1	28.7	10.3	49.5	16.5	17.5	13.7	16.5	31.3
Brown rice	9.6	19.1	8.2	17.1	8.6	24.0	7.9	16.7	8.4	9.0	12.4	9.4	14.9

Table 6.8. Full Purchase of Prescribed Food by State Agency (Percentages)

Food Category	со	FL	КҮ	MA	МІ	NV	ОН	тх	VA	WI	WV	WY	Total
Infant cereal	53.8	64.5	66.6	68.2	64.9	78.2	56.6	47.4	51.1	62.1	64.2	56.0	57.3
Infant fruits and vegetables	68.5	69.2	68.2	65.1	70.9	67.3	64.6	58.3	62.4	65.3	83.4	55.1	64.4
Breakfast cereal	61.0	58.0	61.2	65.6	58.5	60.5	66.5	73.7	55.4	60.7	57.4	60.7	64.5
Sample size (n)	260	269	236	264	265	209	231	211	269	254	277	218	2,963

Redemption of whole grains was underreported in the survey. Survey respondents were asked whether they redeemed some, all, or none of each whole-grain alternative available to them. For example, if respondents in a State agency that authorized whole-grain bread, brown rice, and tortillas redeemed only whole-grain bread, they would respond as having redeemed no brown rice or tortillas, even if they redeemed their full whole-grain allotments for whole-grain bread.

All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies. The sample size is unweighted.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

Indicates the State agency did not authorize the food

Source: Insight tabulations of Survey of WIC Participants, question C1

Households that did not purchase all their prescribed foods (i.e., responded they redeemed some or none) were asked about the reasons for their underredemption. Among the 12 EBT State agencies, 47.4 percent of respondents provided a reason related to food preference (e.g., they did not like the WIC food, did not normally eat or drink it, or the food was not consistent with their modified diet) and 45.1 percent provided a reason related to the food's container size (i.e., they would not be able to finish the food before it went bad, they did not have room in their refrigerator, or they did not like the container size (see table 6.9). More than half of respondents also provided other reasons for their underredemption (see appendix tables M.5–M.25). For example, several respondents indicated the fat content of allowed WIC milk was a reason they did not purchase all their milk. Other respondents cited the high amount of sugar in WIC juice as a reason for not purchasing all their juice. Across multiple food categories, many respondents indicated the following reasons for not fully purchasing a WIC food: they forgot to purchase the item in the last month, they forgot to bring their EBT card when they last went to the store, or they still had some of the food at home and did not need the food.

Type of Reason	СО	FL	KY	MA	МІ	NV	ОН	тх	VA	WI	WV	WY	Total
Brand-related reasons ^a	17.2	20.2	18.8	17.6	10.1	14.1	14.6	29.4	21.6	13.2	12.7	19.3	20.7
Size-related reasons ^b	56.6	44.1	50.4	47.7	52.5	56.6	48.1	35.0	53.8	57.7	47.2	57.8	45.1
Form- or type-related reasons ^c	11.0	15.9	10.7	9.0	11.7	11.0	15.5	10.2	14.8	10.8	12.5	12.2	12.4
Organics-related reasons ^d	2.4	0.6	0.0	1.1	1.0	2.3	0.6	0.0	0.5	1.2	0.6	0.7	0.6
Availability-related reasons ^e	20.4	22.0	20.9	14.5	18.7	24.3	20.5	14.8	26.2	16.0	19.8	26.5	18.8

Table 6.9. Reasons for Not Fully Purchasing WIC Foods by State Agency (Percentage)

Type of Reason	со	FL	KY	MA	МІ	NV	ОН	ТΧ	VA	WI	WV	WY	Total
Food preference-related reasons ^f	53.2	43.9	60.3	47.2	44.9	49.1	37.7	52.3	44.4	42.8	42.9	41.6	47.4
Other ^g	49.3	55.0	55.8	60.7	57.0	45.4	45.0	56.7	58.4	51.0	49.4	51.3	54.6
Sample size ^h (n)	197	186	169	179	187	142	170	145	202	177	204	166	2,124

Percentages may not add to 100 because respondents were able to select more than one reason per food item.

All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

^a Brand-related reasons included not liking the brands WIC allows and confusion about the foods or brands WIC allows.

^b Size-related reasons included not being able to use all the food before it went bad, not having a refrigerator, not having room in the refrigerator, buying 1 quart of milk instead of a gallon, not liking the container size, or the container sizes not adding up.

^c Form- or type-related reasons included not liking the type/flavor of the food or not liking the form of the food.

^d Organics-related reasons included preferring organic foods.

^e Availability-related reasons included not being able to find the food in stores, not being able to find the LEB, not being able to find the correct container size, or stores not stocking the food.

^f Food preference-related reasons included not liking the food, not normally eating or drinking the food, the body not being able to tolerate the food, or the food not being consistent with a modified diet.

^g All open-ended responses are included in the other category, as well as responses not related to the above listed categories, such as difficulty with shopping logistics. See appendix tables M.5 to M.25 for a list of all open-ended responses.

^h Sample sizes include only households prescribed the food category. The sample size is unweighted.

Source: Insight tabulations of Survey of WIC Participants, question C2

5. Consumption of WIC Foods

Households that purchased some or all their prescribed benefits for each WIC food were asked whether they consumed all, some, or none of the food they bought. Across all food categories at least 90 percent of households reported consuming all or some of their purchased food. The percentage of households that reported consuming all their food varied by food category and ranged from 53.2 percent for brown rice to 79.1 percent for juice (see table 6.10). The percentage of households that reported consuming some of their purchased food ranged from a low of 18.5 percent for juice to a high of 42.4 percent for breakfast cereal. Only 1.4 percent of households reported consuming none of their purchased infant fruits and vegetables, and 9.0 percent reported not consuming any of their brown rice.

Food Category	со	FL	КΥ	MA	МІ	NV	ОН	ТΧ	VA	WI	WV	WY	Total
Milk and milk alternatives													
Cow's milk	71.3	69.5	72.8	72.8	67.9	82.4	64.4	65.6	69.1	64.6	67.0	67.1	68.1
Yogurt	52.5	73.5	61.8	65.6	73.3	-	-	60.3	60.3	71.0	-	63.2	65.9
Cheese	69.6	71.2	58.4	74.1	61.5	72.5	65.4	64.1	68.6	66.3	67.5	65.0	66.6
Eggs	66.8	75.1	62.9	74.2	64.0	79.4	65.8	74.7	71.2	61.6	68.8	66.8	71.4
Juice	66.6	78.7	75.8	79.9	76.3	78.9	87.6	80.6	77.8	76.9	70.7	73.4	79.1
Legumes													
Dry beans	65.4	72.6	52.8	67.7	46.7	63.9	57.1	64.9	57.9	53.8	37.6	35.6	64.1
Whole grains													
Whole-grain bread products	62.7	55.8	46.8	65.4	55.0	67.7	55.4	51.0	57.8	56.2	44.9	62.0	55.3
Tortillas	49.2	58.0	48.9	74.9	54.3	64.4	33.2	68.0	43.7	59.3	33.6	36.5	62.5
Brown rice	33.5	69.6	37.6	63.7	53.9	68.7	21.4	45.5	55.7	47.0	36.8	26.5	53.2

Table 6.10. Full Consumption of Purchased WIC Foods by State Agency (Percentages)

Food Category	со	FL	KY	MA	МІ	NV	ОН	ΤХ	VA	WI	WV	WY	Total
Infant cereal	38.6	72.5	57.6	66.0	62.7	56.1	54.0	55.9	46.7	43.8	46.1	47.5	58.6
Infant fruits and vegetables	64.8	83.7	70.5	71.2	83.5	65.0	58.0	72.0	72.7	62.2	67.7	71.1	72.9
Breakfast cereal	56.1	53.6	55.3	59.9	56.9	55.7	52.1	55.0	59.2	52.7	42.1	44.0	55.0
Sample size (n)	260	269	236	264	265	209	231	211	269	254	277	218	2,963

All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies. The sample size is unweighted.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

- Indicates the State agency did not authorize the food

Source: Insight tabulations of Survey of WIC Participants, question C3

Households that did not consume all their purchased food (i.e., consumed only some or none) were asked why they did not consume all of it. The percentage of households that reported consuming some or none of their purchased WIC foods varied by food category and ranged from 20.8 percent for juice to 46.8 percent for brown rice. Among the 12 EBT State agencies, 59.2 percent of households provided a food-preference related reason for not consuming all their food (e.g., they did not like the food or did not normally eat or drink it) and 55.3 percent of households provided a size-related reason (e.g., they were unable to use all the food before it went bad or were unable to eat or drink that much; see table 6.11). Many respondents also provided other reasons for not consuming all their purchased WIC foods (see appendix tables M.26–M.57). For example, several respondents indicated their children received breakfast at school or daycare and therefore did not consume all their WIC-purchased breakfast cereal. Respondents also noted not liking the fat content of authorized milk, egg allergies, too much sugar in authorized juices, and receiving more cheese than their child could eat as reasons for not fully consuming their purchased WIC foods. Across multiple food categories, respondents indicated their children their children were picky eaters and therefore did not consume all the food.

Type of Reason	CO	FL	KY	MA	МІ	NV	ОН	ТΧ	VA	WI	WV	WY	Total
Food preference-related reasons ^a	45.9	51.9	65.0	58.2	55.4	59.7	52.2	70.4	53.7	52.5	52.5	48.3	59.2
Size-related reasons ^b	57.7	53.0	47.5	51.6	55.3	43.8	55.1	60.6	47.7	55.9	50.6	57.6	55.3
Form- or type-related reasons ^c	23.0	25.0	16.1	19.3	12.8	19.6	17.1	16.5	16.9	13.1	18.0	15.9	18.2
Other ^d	57.3	55.5	52.1	49.5	58.9	52.4	57.3	58.4	53.9	57.0	57.4	55.0	56.5
Sample size ^e (n)	205	195	185	192	206	158	184	165	204	206	231	179	2,310

Notes

Percentages may not add to 100 because respondents were able to select more than one reason per food item. All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

^a Food preference-related reasons included not normally eating or drinking the food or not liking the food.

^b Size-related reasons included not being able to use all the food before it went bad, not having a refrigerator, and not being able to eat/drink that much.

^c Form- or type-related reasons included not liking the type or flavor.

^d All open-ended responses are included in the other category, as well as responses not related to the above-mentioned categories, such as difficulty with shopping logistics. See appendix tables M.26 to M.57 for a list of all open-ended responses.

^e Sample sizes include only households that redeemed some or all the food category. The sample size is unweighted.

Source: Insight tabulations of Survey of WIC Participants, questions C4

The relationship between food cost-containment practices and full consumption was examined using multivariable regression analysis that controlled for other State agency food-specific restrictions and household demographics. Related findings are described below and presented in tables 6.12–6.16.

a. Least expensive brand restrictions

After controlling for other factors, LEB restrictions for whole-grain bread products and tortillas were negatively associated with full consumption (see table 6.12). Both associations were significant and large in magnitude. An LEB restriction for whole-grain bread products was associated, on average, with a 9.5-percentage-point decrease in the likelihood that households would fully consume their purchased bread (p < 0.05). Households residing in State agencies with LEB restrictions for tortillas were, on average, 17.3 percentage points less likely to fully consume their purchased tortillas (p < 0.05).

Food Category	Mean (Percent)	Estimate	95 Percent Confidence Interval	Sample Size [®]
Milk and milk alternatives				
Cow's milk	69.0	-0.5	(-7.1, 6.2)	2,055
Cheese	66.6	-5.2	(-11.9, 1.5)	1,960
Eggs	68.3	1.4	(-4.7, 7.6)	2,351
Juice	76.6	4.0	(-0.8, 8.7)	2,273
Legumes	· · · · · · · · · · · · · · · · · · ·			
Dry beans	57.1	-2.8	(-12.3,6.6)	819
Whole grains	· · · · · · · · · · · · · · · · · · ·			
Whole-grain bread products	56.2	-9.5*	(-16.9, -2.1)	1,891
Tortillas	53.2	-17.3*	(-33.9, -0.8)	419
Brown rice	47.4	-16.3	(-38.0,5.4)	249

Table 6.12. Estimated Relationship Between Full Consumption and Least Expensive Brand Restrictions

Notes

Estimates are OLS regression coefficients showing the association between the LEB restriction and the probability of fully consuming purchased WIC foods. The mean is the percentage of respondents who indicated they fully consumed each WIC food.

^a Sample sizes include only households that reported purchasing all or some of the food category.

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight analysis of Survey of WIC Participants, question C3

b. Store brand only restrictions

After controlling for other factors, households residing in State agencies with SBO restrictions for juice were, on average, 7.2 percentage points less likely than households in State agencies without SBO restrictions for juice to fully consume their purchased juice (p < 0.01; see table 6.13).

Table 6.13. Estimated Relationship Between Full Consumption and Store Brand Only Restrictions

Food Category	Mean (Percent)	Estimate	95 Percent Confidence Interval	Sample Size [®]
Cheese	66.6	-3.3	(-10.6, 4.1)	1,960
Juice	76.6	-7.2**	(-11.6, -2.7)	2,273

Notes

Estimates are OLS regression coefficients showing the association between the SBO restriction and the probability of fully consuming purchased WIC foods. The mean is the percentage of respondents who indicated they fully consumed each WIC food. Foods with SBO restrictions used by fewer than 2 or more than 10 of the 12 EBT State agencies were excluded from the analysis.

^a Sample sizes include only households that reported purchasing all or some of the food category.

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight analysis of Survey of WIC Participants, question C3

c. Manufacturer rebates

After controlling for other factors, no associations between manufacturer rebates for foods other than infant formula and full consumption of WIC foods were observed (see table 6.14).

	Table 6.14. Estimated Relationshi	ip Between Full Consum	ption and Manu	facturer Rebates
--	-----------------------------------	------------------------	----------------	------------------

Food Category	Mean (Percent)	Estimate	95 Percent Confidence Interval	Sample Size ^a
Infant cereal	54.1	2.7	(-7.8, 13.1)	543
Infant fruits and vegetables	69.7	-6.8	(-18.1, 4.6)	564

Notes

Estimates are OLS regression coefficients showing the association between the manufacturer rebate and the probability of fully consuming purchased WIC foods. The mean is the percentage of respondents who indicated they fully consumed each WIC food. The estimates were not statistically significant at the 5-percent level.

^a Sample sizes include only households that reported purchasing all or some of the food category.

Source: Insight analysis of Survey of WIC Participants, question A3

d. Container size restrictions

Households residing in State agencies that restricted yogurt to quart-size containers were 14.2 percentage points less likely than households residing in State agencies without this restriction to fully consume their purchased yogurt (p < 0.001; see table 6.15). Conversely, households residing in State agencies that restricted 48-ounce containers of liquid juice were 3.9 percentage points more likely to fully consume their purchased juice (p < 0.05).⁴⁰ Because this container size accounts for less than 24 percent of juice ounces redeemed (see appendix table D.4) across all State agencies, it is likely not a popular food among WIC participants. This may mean that only respondents who have a strong preference for concentrate juice and are more likely to consume their juice would even purchase 11.5–12-ounce containers of juice, thereby resulting in the positive association.

⁴⁰ Typically, 48-ounce containers are prescribed to women so they may receive their full nutritional benefit. For study purposes, State agencies identified as having a restriction on 48-ounce juice containers, only allow frozen concentrate containers that reconstitute to 48 ounces.

Food Category	Mean (Percent)	Estimate	95 Percent Confidence Interval	Sample Size [®]
Milk and milk alternatives				
Cow's milk (restricted quarts)	69.0	2.3	(-5.1, 9.6)	2,055
Yogurt (only quarts)	64.4	-14.2***	(-21.6, -6.8)	1,095
Cheese (16 ounces or larger)	66.6	4.9	(-3.5, 13.3)	1,960
Juice (no 48-ounce containers) ^b	76.6	3.9*	(0.3, 7.5)	2,273

Table 6.15. Estimated Relationship Between Full Consumption and Container Size Restrictions

Notes

Estimates are OLS regression coefficients showing the association between the container size restriction and the probability of fully consuming purchased WIC foods. The mean is the percentage of respondents who indicated they fully consumed each WIC food. The container restriction of interest is listed in parentheses next to the WIC food.

^a Sample sizes include only households that reported purchasing all or some of the food category.

^b 48-ounce juice is primarily prescribed to women.

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

Source: Insight analysis of Survey of WIC Participants, question C3

e. Form or type restrictions

Households residing in State agencies that restricted shredded cheese were 8.0 percentage points (p < 0.05) less likely to fully consume their purchased cheese, while households residing in State agencies that restricted Monterey Jack cheese were 9.8 percentage points (p < 0.05) more likely to do so. Although the reasons for this increased likelihood are not clear, the finding could indicate the presence of an unmeasured factor both associated with cheese consumption and present only in the two State agencies with a Monterey Jack restriction.

Food Category	Mean (Percent)	Estimate	95 Percent Confidence Interval	Sample Size ^a
Milk and milk alternatives				
Cow's milk (no evaporated)	69.0	3.0	(-5.2, 11.1)	2,055
Cow's milk (no UHT)	69.0	-4.7	(-9.5, -0.0)	2,055
Yogurt (no Greek)	64.4	5.7	(-1.6, 12.9)	1,095
Cheese (no shredded)	66.6	-8.0*	(-14.5, -1.5)	1,960
Cheese (no string)	66.6	-3.7	(-11.9, 4.5)	1,960
Cheese (no Monterey Jack)	66.6	9.8*	(0.1, 19.6)	1,960
Eggs (large only)	68.3	2.0	(-3.4, 7.5)	2,351
Infant fruits and vegetables (no organic)	69.7	1.2	(-8.9, 11.2)	564

Notes

The form or type restriction of interest is listed in parentheses next to the WIC food. For example, the row "Cheese (no string)" can be interpreted as the difference in household consumption with cheese among households in State agencies that did not allow string cheese and households in State agencies that did allow string cheese. The mean is the percentage of respondents who indicated they fully consumed each WIC food.

^a Sample sizes include only households that reported purchasing all or some of the food category.

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

Source: Insight analysis of Survey of WIC Participants, question C3

6. Organics

Although households were not asked directly whether they preferred organic WIC foods, the survey did capture data on households that reported redeeming less than their full food benefits because they would have preferred an organic item. A relatively small percentage (between 4.9 and 5.9 percent) of households in 5 of the 12 EBT State agencies cited the lack of organics as a reason they did not fully redeem their benefits for infant fruits and vegetables. Preferences for organic eggs and infant cereal were identified as reasons for purchasing less than the full prescribed amount of these foods by approximately 7 percent of households in Colorado.

Food Category	CO	FL	KY	MA	МІ	NV	ОН	ТΧ	VA	WI	WV	WY	Total
Milk and milk alternatives													
Cow's milk	1.8	0.0	0.0	0.0	0.8	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Yogurt	1.2	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Eggs	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	0.0	0.0	0.5
Juice	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Legumes													
Canned beans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.2
Peanut butter	1.4	0.0	0.0	1.3	0.0	3.5	0.0	0.0	0.0	0.0	1.7	0.0	0.2
Breakfast cereal	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.1
Infant cereal	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Infant fruits and vegetables	5.9	5.8	0.0	5.2	0.0	0.0	0.0	0.0	4.9	0.0	0.0	5.8	1.7
Sample size ^a (n)	260	269	236	264	265	209	231	211	269	254	277	218	2,963

Table 6.17. Preference for Organics as Reason for Partial WIC Food Purchase, by State Agency(Percentages)

Notes

No respondents indicated lack of organics was a reason for their less-than-full purchases of soy-based beverage, cheese, tofu, wholegrain bread products, brown rice, tortillas, oats, whole-wheat pasta, canned fish, and dry beans. All percentages are weighted to be representative of all WIC households in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

^a Sample sizes include only households that partially purchased their prescribed food. Sample size is unweighted.

Source: Insight tabulations of Survey of WIC Participants, question C2

When households were asked what other brands or types of milk, cheese, yogurt, breakfast cereal, whole grains, and peanut butter they would like to buy but could not, some named an organic brand or noted they would prefer organics in general. An average of 3.6 and 1.6 percent of households across the State agencies said they would prefer organic milk and organic peanut butter, respectively (data not shown). Fewer than 1 percent of households across the State agencies indicated they would prefer organic products, whole-wheat pasta, and breakfast cereal.

C. Limitations

There are several limitations associated with these analyses. First, the four response choices (satisfied, very satisfied, dissatisfied, very dissatisfied)⁴¹ may not have fully captured the nuance of respondent attitudes surrounding brand satisfaction with WIC foods. Respondents were able to indicate only whether they consumed all, some, or none of their purchased WIC foods. This lack of precision may have limited the detection of small but meaningful differences between groups. Additionally, the survey design resulted in underreporting of whole grain purchases; however, survey data were not used to make conclusions regarding food purchases so this limitation does not affect study findings.

Second, although the regression analysis did control for other food-specific restrictions and respondent demographics, other variables could have influenced satisfaction or consumption but were not controlled for in the models, such as the type of store at which households shopped (e.g., convenience store or supermarket); education received at the local clinic about how to shop for WIC foods; other State-agency level characteristics; and household-level food preferences. Last, because the food-specific restrictions were implemented at the State-agency level, these variables might be highly correlated with other State-agency specific characteristics. This could have led to positive results, such as for the positive association between full consumption and restrictions on Monterey Jack cheese, but rather than measuring the association of the restriction, the model could have accounted for other characteristics the restrictive agencies had in common.

⁴¹ Respondents that did not respond to the question or provided a response of "don't know" were removed from the analytic sample.

Chapter 7. Reasons Former WIC Participants Left WIC

This chapter examines the reasons former WIC households left WIC and compares the reasons cited by current and former WIC households for difficulties shopping for WIC foods, general satisfaction with WIC foods, and brand and container size satisfaction with specific WIC foods. It also presents findings from multivariable regression analysis to explore whether differential associations with foodspecific restrictions were observed for former households compared with current households.

Key Findings

- When asked about general satisfaction with foods purchased through WIC, the vast majority (90.3 percent) of former households indicated they were satisfied. However, satisfaction with WIC foods was greater among current WIC households (95.0 percent).
- More than one-third of former WIC households reported they stopped buying WIC foods at least in part because they did not like the kinds of food they could obtain through WIC.
- A greater percentage of former than current WIC households reported being embarrassed while purchasing WIC foods because of confusion about allowable foods (48.8 and 38.0 percent, respectively).
- Lower brand and container size satisfaction was observed among former compared with current WIC households when examined by food category.
- Only one of the food-specific restrictions that could be examined using regression analysis (least expensive brand [LEB] restrictions for whole-grain bread products) was associated with a disproportionately lower likelihood of satisfaction with the food among former WIC households compared with current households.

A. Background and Approach

Cost-containment practices such as restrictions on the brand and container size of allowed WIC foods could adversely affect program participation if, for example, participants became dissatisfied with available choices and stopped buying the foods. To better understand the possible role of food-specific restrictions on WIC participation, former WIC households were asked about why they stopped buying WIC foods, what made shopping for the foods difficult, and how satisfied they were with the brands and container sizes of foods they could buy with WIC when they were participating.

The findings presented in this chapter are based on data from the Survey of Former WIC Participants, and when relevant for comparison, data from the Survey of (current) WIC Participants. The Survey of Former WIC Participants was administered to a randomly selected sample of former WIC households residing in three WIC State agencies (Florida, Ohio, and Virginia). The target population was households that had recently participated in WIC and had not recertified within a 3-month period.⁴² A total of 380 respondents across the three State agencies completed the survey.⁴³ Comparisons of former and current WIC households were made across the three State agencies that were included in both surveys (Florida, Ohio, and Virginia).

⁴² Former WIC households had participated in WIC as of November 30, 2017, and were due to recertify between December 1, 2017, and February 28, 2018, but had not done so.

⁴³The surveys did not ask about satisfaction with forms or types of foods, so restrictions on forms or types of foods were not included in the analysis.

The study team used multivariable regressions to examine potential differential associations of restrictions with household satisfaction among former WIC households relative to current WIC households. Appendix G provides details on the multivariable regression analysis and includes supplemental tables associated with this chapter.

Figure 7.1 compares key demographic characteristics of survey respondents in former and current WIC households. Respondents in former WIC households were generally more likely to have at least one infant, be White, and be employed, and less likely to have at least one child and be participating in SNAP than respondents in current WIC households (p < 0.05). See appendix table G.1 for detailed demographic characteristics.



Figure 7.1. Demographic Characteristics of Former and Current WIC Households (Percentages)

Notes

N for former participants = 380; *N* for current participants = 769

Comparisons are between survey respondents in former and current WIC households in Florida, Ohio, and Virginia. Percentages are weighted to be representative of all WIC participants in the three State agencies included in the former participant analysis. GED = general educational diploma

* Indicates a statistically significant difference between total percentages for former WIC households and current WIC households at the 95 percent confidence level (p < 0.05).

Sources: Insight tabulations of Survey of Former WIC Participants, questions F_D1–F_D9; Survey of Current WIC Participants, questions G1–G10

B. Findings

1. Reasons Former WIC Households Stopped Buying WIC Foods

Former WIC households were asked why they "stopped buying WIC foods."⁴⁴ More than one-third of former households (35.2 percent) volunteered (unprompted) or agreed with the statement they

⁴⁴ The survey question was, "People stop buying WIC foods for different reasons. Why did you stop buying WIC foods? You can give me more than one reason." Interviewers first checked off any of 12 responses volunteered unprompted by respondents and then asked whether any of the other possible responses was also a reason (yes or no). Both unprompted and prompted responses were combined into the five categories shown in figure 7.2 (see appendix table G.2 for the distribution of responses within each category, and appendix table G.3 for the distribution of unprompted-only responses). When unprompted, the percentage of former WIC households that said they did not like the kind of food they could obtain from WIC (16.3 percent) was almost identical to the percentage that said they did not need the food (18.2 percent) or had a negative WIC clinic experience (18.0 percent).

stopped buying WIC foods because they "did not like the kinds of food they could get from WIC" (see figure 7.2). About half of former households volunteered or agreed as follows:

- They stopped buying WIC foods because they did not need the food and/or others needed the food more (54.6 percent).
- A negative shopping or retailer experience was a reason they stopped buying WIC foods (51.3 percent). More specifically, they indicated having trouble finding WIC foods in the store (41.3 percent) or a lack of conveniently located stores where they could use WIC (15.4 percent; data not shown).⁴⁵
- A negative WIC clinic experience was a reason they stopped buying WIC foods (48.1 percent), which included problems traveling to a WIC clinic (35.8 percent) or receiving poor service at a clinic, long wait times, or crowded waiting areas (27.1 percent; data not shown).⁴⁶

Figure 7.2. Reasons Former WIC Households Stopped Buying WIC Foods (Percentages)



Notes

Percentages are weighted to be representative of all WIC participants in the three State agencies included in the former participant analysis. Reasons indicate the percentage of former WIC households that volunteered (unprompted) or agreed with statements for why they stopped buying WIC foods. Reasons were combined into the five categories shown. Percentages sum to more than 100 because respondents could provide more than one response.

Source: Insight tabulations of Survey of Former WIC Participants, questions F_B1-F_B13

Most respondents indicated multiple reasons for why they stopped buying WIC foods, with more than two-thirds identifying three or more reasons (see appendix table G.2). Other reasons former households said they stopped buying WIC foods included a change in household income (9.5 percent), missed WIC appointments or no time for appointments (8.1 percent), no longer categorically eligible (5.0 percent), or moving (2.8 percent; data not shown; see appendix table G.4).⁴⁷

N = 380

⁴⁵ Former households were also identified as having a negative shopping or retailer experience if they reported feeling that being in WIC labeled them as poor, not liking the stores where they could use WIC, or having trouble using their EBT card.

⁴⁶ Former households were also identified as having a negative WIC clinic experience if they reported that clinic staff did not speak their primary language or they were no longer able to obtain infant formula.

⁴⁷ Because of the elapsed time between when households were eligible to recertify and the fielding of the survey, their circumstances may have changed, or respondents may simply have misremembered.

Reasons respondents cited for why they stopped buying WIC foods were similar across the three State agencies, although a greater percentage of former households in Ohio than in Virginia or Florida did not like the kinds of food they could obtain through WIC (43.0 percent versus 38.9 and 30.3 percent, respectively; see appendix table G.2). A much higher percentage of respondents in Virginia compared with Florida and Ohio also did not like the stores where they could use WIC (21.9 versus 10.6 and 11.0 percent, respectively).

2. Difficulties Shopping for WIC Foods

Both former and current WIC households were asked how easy or difficult it was to shop for WIC foods. Although a majority of households replied shopping for WIC foods was either very easy or easy, the percentage was smaller for former households than current households (60.0 versus 67.5 percent; p < 0.05; see figure 7.3). Responses were similar across the three State agencies (see appendix table G.5).



Figure 7.3. Ease or Difficulty Shopping for WIC Foods Among Former and Current WIC Households (Percentages)

Notes

N = 379

Comparisons are between survey respondents in former and current WIC households in Florida, Ohio, and Virginia. Percentages are weighted to be representative of all WIC participants in the three State agencies included in the former participant analysis. * Indicates a statistically significant difference between total percentages for former WIC households and current WIC households at the 95 percent confidence level (*p* < 0.05).

Sources: Insight tabulations of Survey of Former WIC Participants, question F_B14; Survey of WIC Participants, question A4

Households that indicated shopping for WIC foods was neither easy nor difficult, either difficult or very difficult, or sometimes easy and sometimes difficult were asked whether any of the reasons listed in figure 7.4 contributed to their difficulty shopping for WIC foods. The percentages of former and current WIC households were similar with respect to the issues that contributed to perceived difficulties. For example, a similar percentage of former and current households said finding WIC foods or the allowed brand in the store made shopping difficult (see figure 7.4). However, a greater percentage of former than current households said not knowing their remaining WIC benefit balance (37.7 versus 26.6 percent; p < 0.05) made shopping difficult (see figure 7.4).⁴⁸ Detailed findings are provided in appendix table G.6.





Notes

N for former participants = 154; *N* for current participants = 248

Comparisons are between survey respondents in former and current WIC households in Florida, Ohio, and Virginia. Percentages are weighted to be representative of WIC participants in the three 84State agencies included in the former participant analysis that reported shopping for WIC foods was neither easy nor difficult, either difficult or very difficult, or sometimes easy and sometimes difficult in questions F_B14 or A4, as shown in figure 7.3.

* Indicates a statistically significant difference between total percentages for former WIC households and current WIC households at the 95 percent confidence level (*p* < 0.05).

Sources: Insight tabulations of Survey of Former WIC Participants, question F_B15; Survey of WIC Participants, question A5

All former and current WIC households were also asked about three types of negative shopping experiences (see figure 7.5). The two groups differed in only the percentage indicating they were embarrassed while purchasing WIC foods because of "confusion about allowable foods" (48.8 and 38.0 percent, respectively; p < 0.05). Detailed findings are provided in appendix table G.7.

⁴⁸ Note the sample sizes of households that were asked the follow-up questions about what made shopping difficult were small; most households (59.3 percent of former and 67.5 percent of current WIC households) reported an easy or very easy shopping experience and so were not asked the follow-up questions (see sample sizes in appendix table G.6).



Figure 7.5. Negative WIC Shopping Experiences Reported by Former and Current WIC Households (Percentages)

N for former participants = 380; *N* for current participants = 769

^a Sample sizes include all survey respondents who provided a response to the question. Respondents who answered "don't know" or refused to answer were not included.

* Indicates a statistically significant difference between total percentages for former WIC households and current WIC households on reported reason for difficulties shopping for WIC foods at the 95 percent confidence level

Sources: Insight tabulations of Survey of Former WIC Participants, questions F_B16, F_B17, F_B18; Survey of WIC Participants, questions A6, A7, A8

3. Overall Satisfaction with WIC Foods

General satisfaction with prescribed WIC foods was lower for former than current households overall (90.3 percent and 95.0 percent, respectively; p < 0.05; see figure 7.6 and appendix table G.8).⁴⁹ However, this result may be driven by the large discrepancy in satisfaction between former and current households in Ohio. In general, the percentage of former households that reported being satisfied was similar across the three State agencies (ranging from 87.5 percent in Ohio to 91.7 percent in Florida).

⁴⁹ The study team combined responses of "very satisfied" and "satisfied" for the analysis because from a policy perspective, being satisfied versus being very satisfied with WIC foods would not likely have a different effect on a WIC household's decision to stay in or leave the program.



Figure 7.6. Former and Current WIC Household Satisfaction with WIC Foods by State Agency (Percentages)

Total *N* for former participants = 378; Total *N* for current participants = 741; see appendix table G.8 for State agency sample sizes Satisfaction is defined as a response of "satisfied" or "very satisfied."

* Indicates a statistically significant difference between percentages for former and current households at the 95 percent confidence level

Sources: Insight tabulations of Survey of Former WIC Participants, question F_C1_0; Survey of WIC Participants, question A1_4a

4. Brand and Container Size Satisfaction by Food Category

Former households were also asked about satisfaction with the brands and container sizes of foods they could buy with WIC when they were participating. Former households were most satisfied with brands of eggs and infant fruits and vegetables. More than 79 percent of former households were satisfied with the brands of WIC foods except for whole-wheat/whole-grain bread/buns/rolls (whole-grain bread products; see table 7.1). Similarly, more than 80 percent of former households were satisfied with the container sizes of the four WIC foods assessed, ranging from 80.6 percent satisfied with container sizes of juice to 90.5 percent satisfied with container sizes of cow's milk.

A similar trend of lower satisfaction among former compared with current WIC households was observed when examined by food category. For example, satisfaction with the brands of cheese, juice, whole-grain bread products, tortillas, infant cereal, and infant fruits and vegetables purchased with WIC was lower for former than current WIC households (p < 0.05). Satisfaction with container sizes of cheese and juice was lower for former than current WIC households (p < 0.05).

Food Category	Former WIC Households (Percent)	Current WIC Households (Percent)	Percentage- Point Difference	Sample Sizeª	
	Brand-Related Sa	atisfaction			
Milk and milk alternatives					
Cow's milk	85.7	90.2	4.5	999	
Cheese	83.3	92.0	8.7*	823	
Eggs	93.4	93.7	0.4	1,018	
Juice	79.3	89.4	10.1*	773	
Whole grains			· · · · · · ·		
Whole-grain bread products	66.2	83.8	17.6*	988	
Tortillas	84.1	90.8	6.7*	673	
Brown rice	87.0	92.8	5.8	601	
Infant cereal	82.7	94.5	11.8*	322	
Infant fruits and vegetables	85.3	96.0	10.7*	318	
	Container Size Sa	tisfaction	·		
Milk and milk alternatives					
Cow's milk	90.5	94.3	3.8	1,002	
Yogurt	83.7	88.7	5.0	536	
Cheese	86.3	94.7	8.4*	819	
Juice ^c	80.6	91.5	10.9*	1,015	

Table 7.1. Differences in Brand and Container Size Satisfaction Among Former and Current WICHouseholds

Satisfaction is defined as a response of "very satisfied" or "satisfied."

^a Sample sizes include only households prescribed the food category.

* Indicates a statistically significant difference between percentages for former WIC households and current WIC households at the 95 percent confidence level

Sources: Insight analysis of Survey of Former WIC Participants, questions F_C1 and F_C2; Survey of WIC Participants, questions A2 and A3

Because of the bivariate nature of the findings presented in table 7.1, it is unclear whether the observed differences between former and current households relate to the presence of a food-specific restriction. To examine these associations and, more importantly, explore potential differential associations between food-specific restrictions and household satisfaction among former WIC households compared with current WIC households, the study team estimated multivariable regressions that adjusted for WIC household characteristics and other State agency food-specific restrictions. In each regression, the dependent variable was a food-specific binary indicator of satisfaction. Values of 1 indicated satisfaction with the allowed brands or container sizes of the WIC food. A binary indicator of household participation (e.g., former or current household) was also included in each model and interacted with the food-specific restriction of interest.

This interaction term was of primary importance because it indicated whether the association with a restriction was different between former and current households. Table 7.2 presents the following information:

- Predicted probability of reporting satisfaction: For each group as defined by population (former household or not) and presence of the restriction (yes or no), the probability of reporting satisfaction with the brand or container size of the WIC food category
- First difference: Among both former and current households, the difference in the probability of reporting satisfaction with the WIC food between households that resided in a State agency with the restriction and households that resided in a State agency without the restriction. For example, the first difference for former households was the difference in the predicted probability of reporting satisfaction with the brand of whole-grain bread products between those in State agencies with and without an LEB restriction for whole-grain bread products.
- Second difference: The difference between the differences in probabilities between the two subpopulations. For example, the second difference was the difference between (1) the difference in the probability of reporting satisfaction for *former* WIC households in State agencies with and without an LEB restriction for the food, and (2) the difference in the probability of reporting satisfaction for *current* WIC households in State agencies with and without an LEB restriction for the food, and (2) the difference in the probability of reporting satisfaction for *current* WIC households in State agencies with and without the restriction for the food.

With only three State agencies included in the former household sample, the regressions for many foods were limited because variables identifying food-specific restrictions were perfectly collinear across State agencies. That is, the same number of State agencies implemented more than one policy, meaning there was not enough variation to conduct the regression analysis (see limitations section and appendix G for more details). These collinearity problems limited the number of brand restrictions that

Food-Specific Restrictions Examined in Multivariable Regressions

LEB: Whole-grain bread products, tortillas, and brown rice

Manufacturer rebates: Infant cereal, and infant fruits and vegetables

could be analyzed to five: LEB restrictions for whole-grain bread products, tortillas, and brown rice, and manufacturer rebates for infant cereal and infant fruits and vegetables (all container size restrictions were dropped because of collinearity).

Among former households, only LEB for whole-grain bread products was associated with brand satisfaction (see first difference column in table 7.2). The probability of reporting brand satisfaction for whole-grain bread products was significantly lower among former households residing in a State agency with an LEB restriction compared with former households residing in a State agency without the restriction (64.2 versus 78.2 percent; p < 0.05). As shown in the second difference column of table 7.2, the association of a LEB restriction for whole-grain bread products with satisfaction was also statistically different between former and current households.

To summarize, former households in State agencies with LEB restrictions had a disproportionately lower likelihood of satisfaction with whole-grain products relative to current households in these States. None of the other four food-specific restrictions examined in this analysis were associated with brand satisfaction among former households, nor were there differential associations of food-specific restrictions with satisfaction among former households relative to current households.

Population	Restriction	Predicted Probability of Reporting Satisfaction	First Difference	Second Difference	
	LEB	Restriction for Whole-Grain	Bread Products		
Former WIC	No restriction	78.2	14.0*		
household	Restriction	64.2	-14.0	10.4*	
Current WIC	No restriction	90.6	1.6	12.4*	
household	Restriction	89.0	-1.0		
		LEB Restriction for To	ortillas		
Former WIC	No restriction	84.1	1 5		
household	Restriction	82.6	-1.5		
Current WIC	No restriction	90.7		-0.2	
household	Restriction	89.1	-1.6		
		LEB Restriction for Bro	wn Rice		
Former WIC	No restriction	93.3	1.0		
household	Restriction	88.6	-4.8		
Current WIC	No restriction	99.2		4.0	
household	Restriction	-0.8			
		Manufacturer Rebate for I	nfant Cereal		
Former WIC	No restriction	75.1	C F		
household	Restriction	81.5	6.5		
Current WIC	No restriction	83.2	1.0	-8.3	
household	Restriction	81.4	-1.8		
	Manut	facturer Rebate for Infant Fr	uits and Vegetables		
Former WIC	No restriction	81.4			
household	Restriction	75.7	-5.7		
Current WIC	No restriction	86.2		2.7	
household	Restriction	83.2	-3.0		

Table 7.2. Probability of Households Reporting Satisfaction with Brands by Participation Status and Presence of a Restriction

* p < 0.05, ** p < 0.01, *** p < 0.001

Sources: Insight analysis of Survey of Former WIC Participants, questions F_C1 and F_C2; Survey of Current WIC Participants, questions A2 and A3

C. Limitations

In addition to the general analysis limitations described in chapter 6, section C, the former household regressions were limited because of collinearity between restrictions on many foods across the three State agencies. For example, all three State agencies had both LEB and container size restrictions for milk. In such cases, the restrictions could not be separately identified in regression models, and major foods had to be dropped from the analysis, which included milk, cheese, eggs, yogurt, and juice. As a result, only a limited number of restrictions could be analyzed in the multivariable regressions, which limited their usefulness for the study. Had data for former households been available across all 12 EBT State agencies, the study team could have examined all restrictions included in the analysis of current households.

Chapter 8. Accommodations for Participants with Modified Diets for Health or Personal Reasons

This chapter examines the prevalence of modified diets (for health or personal reasons) among WIC households, the frequency with which modified diets are cited as the reason for partial purchase, and the frequency with which households that follow a modified diet (i.e., households in which at least one WIC household member reported following a modified diet for health or personal reasons) reported problems finding appropriate WIC-allowable foods. This chapter also presents findings from multivariable regression analysis to assess differential associations of restrictions with satisfaction, purchases, and consumption among households that followed a modified diet for health or personal reasons (i.e., religious, cultural, and other personal choice diets) compared with households that did not follow a modified diet.

Key Findings

- Nearly 22 percent of surveyed WIC households followed a modified diet, most commonly because of a health condition such as diabetes or a food allergy.
- Among those following a modified diet, about 11 percent reported problems finding appropriate WIC foods because of their dietary needs.
- Of the 12 examined food-specific restrictions, only a least expensive brand (LEB) restriction for eggs was associated with a disproportionately lower likelihood of full purchases among households that followed a modified diet.
- Of the 12 examined food-specific restrictions, only an LEB restriction for cheese was associated with a disproportionately lower likelihood of full consumption among households that followed a modified diet.

A. Background and Approach

WIC accommodates certain modified diets through the issuance of Food Package III. Food Package III is reserved for participants with a documented qualifying condition that requires the use of a WIC formula (nonexempt infant formula, exempt formula, or WIC-eligible nutritionals); it also provides conventional foods as appropriate for the condition and participant category to meet the participant's nutritional needs. All supplemental foods in this food package (both WIC formula and conventional foods) require medical documentation for issuance.

Federal WIC regulations also authorize nutrition tailoring or the modification of food packages to better meet the supplemental nutrition needs of individual participants based on a nutrition assessment. Nutrition tailoring entails making changes or substitutions to food types (e.g., dry beans versus peanut butter) and physical food forms (e.g., dry milk versus fluid milk). Nutrition tailoring may also involve eliminating foods because of an allergy, medical, or nutritional condition, or in situations when a participant cannot use or refuses the item.

Importantly, the study did not look specifically at the issuance of Food Package III or tailored food packages to individual WIC participants but rather examined associations with food-specific restrictions among households that self-reported following a modified diet and differences in the associations among these households relative to households that did not follow a modified diet. There are two

mechanisms by which food-specific restrictions may adversely affect WIC households that follow a modified diet:

- First, WIC households that follow a modified diet may need to research the foods on their State agency WIC-approved food list (e.g., to the extent the food list does not include specific items or brands they typically purchase within a WIC food category) to determine whether they are appropriate for consumption given their dietary needs.
- Second, for those who modify their diets because of a health condition, it is possible foodspecific restrictions may limit a household's ability to use its entire WIC food benefit.

However, to the extent (1) most WIC food items already meet the dietary restriction, or (2) substitute or alternative foods are available to WIC participants, food-specific restrictions implemented by WIC State agencies should not adversely affect this population. For example, WIC offers a variety of foods that are high in protein, so participants who follow a high-protein diet for health-related reasons should not be adversely affected by brand or other food-specific restrictions. Likewise, most WIC foods are already low in sugar, so food-specific restrictions should not materially affect participants on a low-sugar diet. The WIC food package is supplemental and is not intended to provide all the food needed for an individual's total nutrient needs.

Data from the Survey of Current WIC Participants were used to identify households that followed a modified diet and, through a multivariable regression analysis, assess for potential differential associations of food-specific restrictions with satisfaction, purchases, and consumption among households that followed a modified diet compared with households that did not follow a modified diet. Because of the cross-sectional nature of the study, differential associations cannot be used to infer causality. For study purposes, households were identified as following a modified diet if at least one WIC household member reported following a modified diet related to health or personal reasons (see table 8.1). Because container size (e.g., 16 ounces versus other container sizes of cheese) and form or type (e.g., shredded versus string cheese, large versus other size eggs) restrictions should not adversely affect those with modified diets, the focus of this chapter is on brand-related food-specific restrictions. Appendix H provides details on the multivariable regression analysis and includes supplemental tables associated with this chapter.

Modified Diet Category		Qualifying Reason Provided by at Least One WIC Household Member ^a
	•	Follows a modified diet because of an allergy or other health condition
Health related		Was diagnosed with a food allergy by a doctor
	•	Had a severe reaction within an hour after consuming a certain food
	•	Follows a kosher diet
Deveenel		Follows a halal diet
Personal		Follows a Seventh-Day Adventist diet
		Follows a vegetarian or vegan diet

Note

^a Respondents were also able to indicate they followed some other type of modified diet. A full list of all the other responses is provided in appendix table M.68.

Figure 8.1 compares key demographic characteristics of survey respondents in WIC households with and without a modified diet. Households that followed a modified diet were less likely to be Hispanic and more likely to have at least a high school diploma or general education diploma (known as a GED) than households that did not follow a modified diet (p < 0.05). See appendix table H.1 for detailed demographic characteristics.





Notes

N for households with modified diet = 660; N for households without modified diet = 2,303

Percentages are weighted to be representative of all WIC households in the 12 EBT State agencies included in the study.

Households were identified as following a modified diet if at least one WIC household member reported following a modified diet for health or personal reasons.

* Indicates a statistically significant difference between total percentages for households that followed a modified diet and households that did not at the 95 percent confidence level (*p* < 0.05)

Source: Insight tabulations of Survey of WIC Participants, questions G1-G10

B. Findings

1. Prevalence of Modified Diets

When all dietary restrictions were considered, approximately 21.7 percent of surveyed WIC households reported having a modified diet (see table 8.2). Diet modifications resulting from a food allergy or other health-related condition were by far the most common, reported by 12.3 percent of households across the EBT State agencies. Religious and vegetarian diets were much less common, reported by only 3.1 and 2.3 percent of households, respectively.

Type of Modified Diet	со	FL	КҮ	MA	МІ	NV	ОН	ТΧ	VA	WI	WV	WY	Total
Any modified diet	19.7	27.0	16.6	29.2	24.0	22.1	24.0	15.8	25.8	20.0	17.9	27.3	21.7
Food allergy or other health- related condition	10.6	16.0	8.7	14.0	13.1	12.8	14.3	8.6	16.2	13.4	12.3	19.7	12.3
Religious	4.4	3.6	1.2	6.8	6.9	2.5	1.6	1.7	3.4	0.7	0.8	1.7	3.1
Vegetarian	1.7	3.1	1.1	2.6	3.2	4.1	3.0	1.4	2.9	1.8	1.4	0.6	2.3
Other/Unspecified ^a	5.4	7.6	6.2	8.3	4.6	5.8	6.1	4.7	5.5	5.3	5.0	6.0	5.8
Sample size ^b	260	269	236	264	265	209	231	211	269	254	277	218	2,963

Table 8.2. WIC Households with Modified Diet (Percentages)

All percentages are weighted to be representative of all WIC participants in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies.

Households were identified as following a modified diet if at least one WIC household member reported following a modified diet for health or personal reasons.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

^a full list of all other responses is provided in appendix table M.68.

^b Sample sizes include all households that responded to relevant questions. The sample size is unweighted.

Source: Insight tabulations of Survey of WIC Participants, questions F1, F4, and F5

On average, 12.9 percent of surveyed WIC households reported having a food allergy, but the proportion ranged from 9.0 percent in Texas to 18.7 percent in Wyoming (see table 8.3). Respondents who reported having a diagnosed food allergy were asked about the food(s) to which they were allergic.⁵⁰ Among those with a food allergy, cow's milk was the most frequently reported allergen, affecting nearly 5 percent of all surveyed WIC households. Among households reporting allergies other than those specifically asked about in the survey, cheese, dairy products in general, and specific fruits or vegetables were some of the most common responses.

Surveyed WIC households were also asked about lactose or milk intolerances, celiac disease or sprue, and sulfite sensitivity. Overall, approximately one in seven surveyed households reported a diagnosed food intolerance. Most of these were attributed to lactose or milk intolerance (see table 8.3). However, food-specific restrictions should not affect households with lactose or milk intolerance because their food packages can be tailored to avoid cow's milk. For this reason, and because there were very few reported instances of celiac disease or sulfite sensitivity for any State agency, households that reported a food intolerance were not categorized as following a modified diet.

Type of Allergy or Intolerance	CO	FL	KY	MA	МІ	NV	ОН	ТΧ	VA	WI	WV	WY	Total
Any food allergy	11.2	17.6	12.6	17.2	12.1	14.2	15.0	9.0	12.3	12.7	12.4	18.7	12.9
Cow's milk	4.6	6.3	4.4	6.9	5.2	6.3	5.6	3.7	3.9	4.9	3.2	9.1	4.9
Eggs	1.2	1.3	0.5	3.1	1.9	1.5	2.2	0.4	2.2	2.5	0.4	1.3	1.3
Wheat	0.8	1.2	0.9	0.4	0.0	0.5	0.8	0.5	1.1	0.5	0.6	0.9	0.7
Peanuts	2.1	2.1	0.9	3.0	0.9	1.5	2.1	0.4	1.1	2.4	0.6	0.8	1.4
Soy	0.9	0.7	0.5	0.4	1.2	0.6	0.4	0.0	0.8	0.4	1.0	2.4	0.5
Corn	0.0	0.0	0.5	0.4	0.8	0.5	0.0	0.0	0.0	0.0	0.0	1.4	0.1
Fish	0.0	0.4	0.9	0.7	0.0	1.6	0.6	0.6	0.5	0.8	0.6	0.5	0.5

Table 8.3. Food Allergies or Intolerances Among WIC Households (Percentages)

⁵⁰ This question was not asked of respondents who were identified as having a food allergy because of a severe reaction.

Type of Allergy or Intolerance	со	FL	KY	MA	МІ	NV	ОН	тх	VA	WI	WV	WY	Total
Fruit or vegetable	0.0	1.9	0.8	0.4	0.7	1.1	5.8	1.6	3.1	0.4	1.0	0.6	1.8
Other ^a	1.5	4.5	1.2	2.7	0.7	1.2	3.6	1.1	2.1	0.9	2.1	1.0	2.2
Unspecified	3.8	5.4	3.1	2.7	0.8	5.5	1.9	2.3	2.2	1.2	3.2	2.6	2.9
Any intolerance	11.7	19.9	12.8	17.2	13.2	16.1	18.5	11.7	18.5	15.5	15.2	23.9	15.3
Lactose or milk intolerance	11.3	19.4	12.4	16.5	12.5	16.1	18.0	11.7	18.2	13.6	15.2	21.9	14.9
Sulfite sensitivity	0.8	0.4	0.0	1.1	0.7	0.0	0.4	0.5	1.1	1.1	0.0	2.4	0.6
Celiac disease or sprue	0.8	0.8	0.7	0.4	0.7	0.0	0.4	1.0	0.0	0.8	0.0	1.3	0.7
Sample size ^b	260	269	236	264	265	209	231	211	269	254	277	218	2,963

All percentages are weighted to be representative of all WIC participants in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies.

Households were identified as following a modified diet if at least one WIC household member reported following a modified diet for health or personal reasons.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

^a Includes respondents who reported shellfish or other nut allergies.

^b Sample sizes include only households prescribed the food category. The sample size is unweighted.

Source: Insight tabulations of Survey of WIC Participants, questions F1 and F2

2. Partial Purchases for Diet-Related Reason Among All Households

All households that reported buying less than the prescribed amount of a WIC food item (not just those who followed a modified diet) were asked about the reasons for their partial purchase. Overall, 3.7 percent of surveyed households cited a diet-related reason (i.e., body could not tolerate the food, or food was not consistent with modified diet; see table 8.4). Households in Nevada were most likely to cite a diet-related reason (5.1 percent), whereas households in Kentucky were least likely (1.7 percent).

Partial Purchases	со	FL	КΥ	MA	МІ	NV	ОН	ТΧ	VA	WI	WV	WY	Total
Partial purchase for diet-related reason	4.4	4.8	1.7	2.9	4.5	5.1	3.0	3.1	4.8	3.2	3.3	3.3	3.7
Sample size ^a	260	269	236	264	265	209	231	211	269	254	277	218	2,963

Table 8.4. Partial Purchases for Diet-Related Reason Among WIC Households (Percentages)

Notes

All percentages are weighted to be representative of all WIC participants in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

^a Sample sizes include all households that reported buying less than the prescribed amount of a WIC food item. The sample size is unweighted. Source: Insight tabulations of Survey of WIC Participants, question C2

3. Problems Finding Appropriate Foods Among Households That Followed a Modified Diet

Households that reported following a modified diet were asked whether they had experienced problems finding appropriate WIC foods because of dietary restrictions. Across the EBT State agencies, about one in nine surveyed WIC households with a modified diet reported issues finding foods. The prevalence of problems ranged from 5.3 percent in Virginia to 22.3 percent in Nevada (see table 8.5). Among this group, "other" was the most often cited reason for problems finding appropriate WIC foods because of a modified diet, affecting 9.7 percent of WIC households across the EBT State agencies that followed a modified diet. Examples of other problems cited by households that followed a modified diet included

concerns about the inability to buy the appropriate type of milk and the amount of sugar in some WIC foods.

Type of Problem	CO	FL	KY	MA	МІ	NV	ОН	тх	VA	WI	WV	WY	Total
Any problem	18.1	14.4	13.6	8.9	16.1	22.3	7.0	6.0	5.3	14.2	14.2	16.4	11.2
Did not know whether allowed brands were safe to eat	0.0	1.2	2.6	1.3	0.0	4.2	3.5	0.0	4.0	0.0	0.0	2.0	1.2
Did not know how to find out about ingredients in store brand food items	2.2	0.0	0.0	0.0	3.0	0.0	0.0	3.0	2.6	0.0	0.0	0.0	1.3
Could not find cereals high enough in iron and folic acid/folate	0.0	0.0	0.0	0.0	0.0	1.9	0.0	3.0	2.6	0.0	0.0	0.0	0.9
Could not buy calcium- fortified juice	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Could not find lactose- free/reduced milk	2.2	1.2	3.1	2.5	6.8	0.0	0.0	0.0	0.0	1.8	2.0	4.0	1.6
Could not find special kosher or halal foods	2.2	1.2	0.0	0.0	1.6	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Vegetarian/vegan options were not available	0.0	0.0	0.0	1.3	1.4	4.2	0.0	0.0	1.4	0.0	0.0	0.0	0.5
Other	18.1	13.3	13.6	5.1	12.8	16.2	7.0	6.0	1.3	14.2	12.2	14.4	9.7
Sample size ^a	50	72	38	77	64	44	55	33	68	50	50	59	660

Table 8.5. Problems Finding Appropriate WIC Foods Because of Dietary Needs Among WIC Householdswith Modified Diet (Percentages)

Notes

All percentages are weighted to be representative of all WIC participants in the State agency. The total column is a weighted average representative of all WIC households in the 12 EBT State agencies.

Households were identified as following a modified diet if at least one WIC household member reported following a modified diet for health or personal reasons.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

^a Sample sizes include all households with modified diets that reported problems findings appropriate WIC food because of dietary needs; excludes respondents whose only dietary restriction was a food intolerance. The sample size is unweighted. Source: Insight tabulations of Survey of WIC Participants, questions F6 and F7

4. Satisfaction, Reported Purchase Patterns, and Consumption of WIC Foods

To assess for differential associations of food-specific restrictions with satisfaction, purchases, and consumption among households that followed a modified diet relative to households that did not follow a modified diet, the study team estimated multivariable regressions that adjusted for WIC household characteristics. Again, the study did not look specifically at households issued Food Package III or tailored food packages but rather examined households that self-reported following a modified diet. In each regression, the dependent variable was

Food-Specific Restrictions Examined in Multivariable Regressions

LEB restrictions: Milk, cheese, eggs, juice, dry beans, whole-grain bread products,^a tortillas, and brown rice

SBO restrictions: Cheese and juice

Manufacturer rebates: Infant cereal, and infant fruits and vegetables

^a Whole-wheat/whole-grain bread/rolls/buns

a food-specific binary indicator. Values of 1 indicated satisfaction with allowed brands, full

purchase (i.e., reported full redemption of benefit), zero purchases, and full consumption of the WIC food. Zero purchases were examined in addition to full purchases because, particularly in the case of a modified diet, households may choose to purchase none of their benefit in a particular category (e.g., milk), especially if the household is not satisfied with authorized substitutes or alternatives. See chapter 5 for a definition of each dependent variable and sample descriptions. Importantly, a binary indicator of modified diet was included in each model and interacted with the food-specific restriction of interest. Tables in this section present the following information:

- Probability of reporting full purchase or zero purchase: For each group, as defined by population (modified diet or not) and presence of the restriction (yes or no), the probability of reporting an outcome (e.g., full purchase)
- First difference: Among both households that followed a modified diet and households that did not, the difference in the probability of reporting the outcome between households that resided in a State agency with the restriction and households that resided in a State agency without the restriction
- Second difference: The difference between the difference in probabilities between the two subpopulations

While the first difference identifies whether there is an association between the outcome and a foodspecific restriction for both households with and without a modified diet (i.e., two first differences are calculated for each food-specific restriction and outcome combination), the second difference identifies whether the associations are *different* between the two groups.

a. Brand satisfaction

No associations between food-specific restrictions examined through this study (see text box) and brand satisfaction were observed among households that followed a modified diet. Complete findings are provided in appendix table H.5.

b. Full purchases

Among households that followed a modified diet, only 1 of the 12 food-specific restrictions examined through this study was associated with the full purchase of WIC foods (LEB for whole-wheat/whole-grain bread/rolls/buns (whole-grain bread products); see table 8.6). Only an LEB restriction for eggs, however, was associated with a disproportionately lower likelihood of full purchases among households that followed a modified diet relative to households that did not (by 10.7 percentage points; p < 0.05; see table 8.6). Complete findings are provided in appendix table H.6.

Population	Restriction	Probability of Reporting Full Purchase	First Difference	Second Difference			
LEB Restriction for Eggs							
Modified diet	No restriction	76.9	7 1	10.7*			
	Restriction	69.8	-7.1				
No modified diet	No restriction	66.8	2.5				
	Restriction	70.3	3.5				
LEB Restriction for Whole-Grain Bread Products							
Modified diet	No restriction	62.6	14.7*				
	Restriction	48.3	-14.3*	C 2			
No modified diet	No restriction	78.0	0.0*	0.3			
	Restriction	70.0	-8.0**				

Table 8.6. Probability of Households Reporting Full Purchase by Diet and Presence of a Restriction

Households were identified as following a modified diet if at least one WIC household member reported following a modified diet for health or personal reasons.

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight analysis of Survey of WIC Participants, questions A2, C2, and C4

c. Zero purchases

Among households that followed a modified diet, only 1 of the 12 food-specific restrictions examined through this study was associated with reporting zero purchases of WIC foods (LEB for whole-grain bread products; p < 0.05). However, the association with zero purchases was similar for households that did and did not follow a modified diet (see table 8.7). Complete findings are provided in appendix table H.7.

Table 8.7. Probability of Households Reporting Zero Purchases by Diet and Presence of a Restriction

Population	Restriction	Probability of Reporting Zero Purchases	First Difference	Second Difference			
LEB Restriction for Whole-Grain Bread Products							
Modified diet	No restriction	25.4	10 7*				
	Restriction	39.1	13.7	6.9			
No modified diet	No restriction	18.4	C 0*	-0.0			
	Restriction	25.3	0.9				

Notes

Households were identified as following a modified diet if at least one WIC household member reported following a modified diet for health or personal reasons.

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

Source: Insight analysis of Survey of WIC Participants, questions A2, C2, and C4

d. Consumption

Three of the 12 food-specific restrictions examined through this study were associated with a lower likelihood of reported full consumption of WIC foods among households that followed a modified diet: LEB restriction for cheese, SBO restriction for cheese, and SBO restriction for juice. However, only an LEB restriction for cheese was associated with a disproportionately lower likelihood of consumption among households that followed a modified diet relative to household that did not. Complete findings are provided in appendix table H.8.

Households that followed a modified diet and resided in a State agency with an LEB restriction for cheese were significantly less likely to report consuming all their cheese compared with similar households that resided in a State agency without an LEB restriction (50.2 versus 70.0 percent; p < 0.01). This lower likelihood of full cheese consumption among households that followed a modified diet and resided in a State agency with an LEB restriction for cheese was also disproportionate relative to households that did not follow a modified diet and resided in a State agency with the restriction (by 18.1 percentage points; p < 0.05; see table 8.6).

Although store brand only (SBO) restrictions for cheese and juice were associated (p < 0.05) with full consumption among households that followed a modified diet, the associations with full consumption were similar for households that did and did not follow a modified diet (see table 8.8).

Population	Restriction	Probability of Reporting Full Consumption	First Difference	Second Difference			
LEB Restriction for Cheese							
Modified diet	No restriction	70.0	10.0**				
	Restriction	50.2	-19.9	10.1*			
No modified diet	No restriction	63.5	63.5	10.1			
	Restriction	61.7	-1.7				
SBO Restriction for Cheese							
Modified diet	No restriction	68.4	16 6*	16.0			
	Restriction	51.8	-10.0				
No modified diet	No restriction	62.9	0.0				
	Restriction	62.3	-0.6				
SBO Restriction for Juice							
Modified diet	No restriction	81.3	10.4*				
	Restriction	70.9	-10.4**	4.2			
No modified diet	No restriction	80.9	C 2*	4.2			
	Restriction	74.6	-0.3*				

Table 8.8. Probability of Households Reporting Full Consumption by Diet and Presence of a Restriction

Notes

Households were identified as following a modified diet if at least one WIC household member reported following a modified diet for health or personal reasons.

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight analysis of Survey of WIC Participants, questions A2, C2, and C4

C. Limitations

In addition to the general analysis limitations described in chapter 6, section C, the modified diet regressions are subject to additional limitations. First, although associations between modified diets and food-specific restrictions could have varied by type of modified diet, all households with any type of modified diet were grouped together for analysis purposes to ensure enough statistical power. This limited the potential to detect some associations and could have resulted in an overestimate of the population to which an observed association applied (e.g., even if only a particular modified diet was associated with a specific restriction, associations were examined among and assigned to all households that followed any type of modified diet).

Second, households that followed a modified diet were not explicitly asked whether reported partial purchases were because of their modified diets. It is possible that statistically significantly associations
observed between full and zero purchases and presence of a modified diet were related to some underlying factor that was common among households that followed a modified diet but not measured through the study; however, this is unlikely given the number of factors for which multivariate models controlled.

Finally, the study did not look specifically at the issuance of tailored food packages to individual WIC participants but rather examined associations of food-specific restrictions with adverse outcomes among households that self-reported following a modified diet. This limited any potential conclusions drawn about the frequency with which participants received tailored food packages and the extent to which tailored food packages may circumvent negative associations with food-specific restrictions.

Chapter 9. Participant Food Redemptions

This chapter examines the redemption rate of WIC foods across the 12 WIC State agencies using EBT data. It presents findings from multivariable regression analysis exploring the association between food-specific restrictions and redemption rates.

Key Findings

- Across the EBT State agencies, redemption rates were lowest for infant food meats and tofu (33.0 percent and 35.8 percent, respectively) and highest for eggs and cheese (74.7 and 70.4 percent, respectively).
- Store brand only (SBO) restrictions for cheese and juice, container sizes restrictions for yogurt (only quarts), and form or type restrictions for cheese (no shredded) and eggs (large only) were all associated with lower redemption rates. These results were also relatively large in magnitude.
- Least expensive brand (LEB) restrictions for both cow's milk and cheese were associated with higher redemption rates.

A. Background and Approach

Food cost-containment practices can adversely affect redemptions of WIC foods. For example, some State agencies require the purchase of store-brand cheese. If household members do not like storebrand cheese, they may choose not to redeem all of their cheese benefit (e.g., participants in a household are issued 2 pounds of cheese but redeem only 1 pound). EBT data indicate the total number of units of WIC foods issued to all participants in a household and redeemed by each household. These data allow for an in-depth understanding of WIC purchasing patterns, including the rate at which prescribed foods are redeemed. Most State agencies issue benefits for a food category (e.g., legumes or whole grains). Depending on the State agency, for certain foods, participants may select items in different subcategories while shopping at the store (e.g., tortillas and brown rice are examples of wholegrains subcategories). In other States, participants are issued food at the subcategory level and must decide which subcategory they would like to redeem while at the clinic (e.g., soy-based beverage is issued at the subcategory level for milk and milk alternatives). For example, Florida and Ohio issue legumes at the subcategory level and thus limit participant choice at the time of redemption.

Redemption rates, or the number of units redeemed by a household for a given food divided by the total number of units of that food issued to all participants in the household, were calculated using WIC EBT data from the 12 study State agencies. These data were combined with WIC certification data to conduct a regression analysis and examine the relationship between food redemption and each food-specific restriction. In each regression, the dependent variable was a food-specific measure of the percentage of the WIC benefit the household redeemed in March 2018.⁵¹ Household demographics from WIC certification data are presented in table 9.1. These demographic variables were used as controls in the regression models, with the exception of program participation and income, which were omitted from the regressions because of the large percentage of missing data for some State agencies. Appendix I provides additional details on the specified models and descriptive redemption rates by State agency and food category.

⁵¹ The data are from March 2018 for all State agencies except Texas, which submitted data as of June 2018.

Characteristic	СО	FL	KY	MA	МІ	NV	ОН	VA	ТΧ	WI	WV	WY
			Num	per of W	C Partici	pants in	Househo	ld				
One	51.6	57.4	57.9	60.5	54.7	52.0	51.7	54.7	46.7	53.9	54.7	44.0
Two	35.5	32.1	31.6	30.7	32.8	35.2	34.7	34.1	37.4	32.7	33.7	36.9
Three or more	12.8	10.6	10.4	8.7	12.5	12.8	13.6	11.1	15.9	13.4	11.6	19.1
Household Category												
One child	35.6	39.9	34.8	41.7	37.7	35.0	29.0	33.7	33.1	36.7	32.8	32.6
Woman only	8.2	8.5	10.4	7.8	7.4	8.0	9.0	9.1	8.0	7.1	9.8	8.4
Includes infant	38.6	37.3	39.8	38.0	37.3	40.5	47.9	43.1	43.0	38.4	42.5	38.2
Multiple participants, no infants	17.7	14.3	15.0	12.6	17.6	16.5	14.1	14.1	15.9	17.8	15.0	20.8
					Race	a						
American Indian	31.1	1.9	0.5	1.2	3.6	22.6	1.7	5.9	2.5	5.1	1.2	6.0
Asian	4.1	2.3	2.4	7.0	3.2	5.9	4.4	5.9	2.7	6.6	1.0	1.3
Black	11.7	34.4	17.6	26.4	35.2	19.2	36.2	37.4	17.1	27.1	11.7	5.0
Pacific Islander	1.6	0.8	0.4	0.6	0.4	2.5	0.5	0.5	0.3	0.7	0.5	0.9
White	71.1	69.8	86.2	72.2	69.9	65.4	69.4	61.4	83.3	72.0	95.3	95.3
Two or more races	18.3	8.8	7.0	7.2	11.6	14.5	11.7	10.5	5.6	10.9	9.2	8.0
Not reported	_	< 0.1	_	< 0.1	0.3	< 0.1	_	_	< 0.1	_	_	_
	Ethnicity											
Hispanic/Latino	57.5	47.6	9.1	48.5	14.3	56.7	11.1	30.0	74.1	28.4	3.5	28.4
Non-Hispanic/Latino	42.5	52.4	90.9	51.5	85.7	43.3	88.9	70.0	25.9	71.6	96.5	71.6
			Part	icipation	in Other	Benefit	Program	5				
Participates in TANF, Medicaid, or SNAP	62.2	86.8	89.5	91.1	83.4	53.2	89.4	71.8	80.6	69.1	89.7	61.8
No other program	12.2	13.2	10.5	8.9	16.0	38.9	10.6	28.2	19.4	30.8	10.3	11.8
Not reported	25.6	-	-	_	0.6	7.9	_	_	< 0.1	< 0.1	_	26.4
		Inc	ome as a	Percent	of the Fe	ederal Po	overty Gu	idelines				
Zero income	0.5	< 0.1	0.2	0.2	1.3	0.9	1.3	0.9	1.1	2.7	0.5	2.4
0–50 percent	25.7	23.5	7.5	23.2	30.4	30.5	27.2	35.6	27.3	25.9	65.1	24.2
51–100 percent	32.7	38.1	9.5	35.5	30.7	33.9	27.0	17.5	35.9	27.9	5.7	30.4
101–130 percent	16.1	14.2	4.8	16.8	13.6	14.9	13.2	6.2	11.4	14.4	3.0	16.1
131–150 percent	8.0	5.6	2.5	6.0	5.6	6.8	5.9	3.3	5.2	7.4	2.0	7.7
151–185 percent	9.8	6.8	3.6	9.1	7.3	7.3	7.5	5.2	5.4	9.3	3.3	9.9
More than 185 percent ^b	3.2	3.0	0.5	4.3	4.4	1.2	4.0	2.1	4.1	4.3	0.9	3.7
Not reported	4.1	8.8	71.4	5.0	6.7	4.4	14.0	29.2	9.6	8.1	19.5	5.6

Table 9.1. Distribution of WIC Caseloads by Household Characteristics in EBT Data (Percentages)

Characteristic	СО	FL	KY	MA	МІ	NV	ОН	VA	тх	WI	WV	WY
Urban/Rural Location												
Urban	54.2	61.1	20.9	75.0	47.9	76.7	46.1	47.8	47.7	43.3	3.2	< 0.1
Mixed	40.5	37.0	54.7	24.4	40.6	22.2	46.7	40.8	48.6	44.8	67.9	86.5
Rural	5.2	1.9	24.4	0.6	11.5	1.2	7.2	11.5	3.7	12.0	28.9	13.4
WIC vendor in ZCTA ^c	87.8	94.1	83.6	92.4	92.5	89.0	85.9	85.4	90.4	91.0	68.3	92.7
WIC supermarket in ZCTA ^d	59.2	85.8	57.2	59.3	52.3	62.2	53.9	69.2	65.5	28.4	38.5	63.7
Total households (n)	50,081	252,726	59,047	67,661	124,504	32,193	118,651	64,995	404,224	53,145	19,490	4,976

Notes

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

SNAP = Supplemental Nutrition Assistance Program; TANF = Temporary Assistance for Needy Families

^a Percentages do not add to 100 because households include participants of more than one race.

^b Because Medicaid permits recipients to have income equal to or greater than 185 percent of the Federal Poverty Guidelines, it is possible some WIC participant household incomes exceed this threshold.

^c ZCTA = ZIP Code Tabulation Area (where the household resides).

^d The definition of supermarket was derived from the USDA FNS Store Tracking and Redemption System data store type variable. Source: Insight tabulations of WIC certification data as of March 2018 for all State agencies except Texas, which submitted data as of June 2018

B. Findings

1. Redemption of WIC Foods

Table 9.2 presents redemption rates for each State agency and food category. Overall, redemption rates were lowest for infant food meats and tofu (33.0 percent and 35.8 percent, respectively) and highest for eggs and cheese (74.7 and 70.4 percent, respectively). Redemption rates also varied by State agency. Excluding Florida and Massachusetts, where redemption rates were somewhat overestimated,⁵² redemption rates varied the most for soy-based beverage and tofu (differences of 31.2 and 23.8 percentage points, respectively) and the least for yogurt and cow's milk (differences of 12.1 and 13.2 percentage points, respectively) among the other 10 State agencies. Appendix tables I.1 and I.2 provide redemption data by household characteristics.

Insight = WIC Food Cost-Containment Practices Study: Final Report

⁵² Redemption rates for Florida and Massachusetts were somewhat overestimated because of data limitations and were excluded from this comparison of redemption rates across State agencies. Data from Florida and Massachusetts were included in all remaining descriptive and regression analyses in this section.

Food Category ^a	со	FL	КΥ	MA	МІ	NV	ОН	тх	VA	WI	WV	WY	Total
Percent of Units Redeemed													
Milk and milk alternatives													
Cow's milk	62.3	74.7	55.3	71.0	52.2	50.3	55.1	63.5	54.6	58.6	61.4	55.9	62.6
Soy-based beverage	19.8	55.3	41.6	55.7	34.0	37.6	39.1	51.0	34.7	39.2	44.0	38.1	43.5
Tofu	39.2	_	47.5	62.2	_	26.6	23.7	27.2	-	-	_	_	35.8
Yogurt	39.5	89.5	39.3	52.8	49.1	-	-	40.2	42.5	51.4	-	45.7	60.4
Cheese	67.0	86.9	57.6	70.4	59.0	63.7	57.0	70.5	57.3	57.2	69.4	58.1	70.4
Eggs	71.6	91.9	65.3	79.8	62.5	65.9	63.6	76.0	65.8	65.1	68.8	61.8	74.7
Juice	55.0	85.3	60.3	73.4	59.0	50.2	65.5	66.2	50.1	63.4	51.0	46.3	67.0
Breakfast cereal	54.1	77.4	47.6	60.4	46.5	47.1	47.8	62.9	39.9	50.4	51.2	44.6	58.6
Legumes ^b	51.6	87.1	40.4	62.3	43.9	37.6	44.7	53.3	37.2	43.5	42.1	41.8	55.8
Whole grains ^c	52.0	80.8	37.3	58.1	45.6	50.5	43.1	58.3	40.7	42.6	40.7	45.5	55.8
Canned fish ^d	48.5	84.8	40.9	55.5	40.3	38.9	45.9	56.0	40.4	41.6	48.5	39.3	54.7
Infant cereal	43.2	81.1	45.3	55.8	43.7	36.5	48.3	49.5	42.0	38.0	49.3	34.0	53.3
Infant fruits and vegetables	56.4	73.9	58.2	65.8	52.5	41.6	50.0	45.2	54.3	47.9	63.4	47.4	55.7
Infant food meat	28.2	62.2	24.5	28.2	23.2	19.3	25.7	33.7	21.7	20.5	31.6	21.5	33.0

Table 9.2. Average Monthly Household Redemption Rates by Major Food Category

Notes

Average monthly rates were equal to the unweighted average across multiple months: 4 months for Texas, 5 months for Massachusetts and Wisconsin, and 6 months for all other State agencies. Because of data limitations, calculated rates for Florida and Massachusetts were overestimated. The total column is a weighted average across the 12 State agencies.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

^a It was not possible to present redemption of whole-grains and legumes at the subcategory level because most State agencies issued the whole grains and legumes at the category level. That is, State agencies did not specify which whole grains or legumes the participant could redeem and allowed the participant to redeem any of the whole grains authorized by the State agency. This is unlike the milk and milk alternatives category, for which State agencies specifically issued foods at the subcategory (cow's milk, soy-based beverage, tofu, and yogurt) level. ^b Allowable options for legumes were dry or canned beans or peas, or peanut butter.

^c Allowable options for whole grains are whole-wheat/whole-grain bread/buns/rolls (whole-grain bread products); soft corn or whole-wheat tortillas; brown rice; oats; bulgur; whole-grain barley; or whole-wheat pasta.

^d Allowable options for canned fish were light tuna, salmon, sardines, and mackerel.

- Indicates the State agency did not authorize the food

Source: Insight tabulations of WIC EBT data

2. Relationship Between Food-Specific Restrictions and Redemption

Tables 9.3 through 9.7 present sample means and multivariable results of the estimated relationship between food-specific restrictions and WIC redemption rates.

a. Least expensive brand restrictions

After controlling for demographic factors and other milk restrictions, residing in a State agency with an LEB restriction for milk was associated with a higher milk redemption rate (30.7-percentage-points; p < 0.01; see table 9.3). Likewise, residing in a State agency with an LEB restriction for cheese was associated with a higher cheese redemption rate (8.8-percentage-point; p < 0.05).

It is possible State agencies with already high milk and cheese redemption rates implemented LEB practices for these foods to reduce costs. One or more large State agencies with high redemption rates for the given categories that implement an LEB restriction may be driving this positive result. WIC-approved milk and cheese may also be more easily identified in stores by shoppers because vendors

label the LEB in some State agencies. No statistically significant relationships were observed between LEB and redemption rates for eggs, juice, legumes, or whole grains.

Mean Food Category Redemption Rate		Estimate	95 Percent Confidence Interval	Sample Sizeª
Milk and milk alternatives				
Cow's milk	67.7	31.0**	(13.0, 49.1)	964,441
Cheese	73.1	8.8*	(0.2, 17.4)	808,877
Eggs	78.0	3.9	(-4.1, 11.9)	966,462
Juice	70.9	-8.4	(-22.5, 5.8)	959,950
Legumes ^b	57.5	-10.3	(-30.3, 9.7)	933,060
Whole grains ^b	57.2	-2.3	(-7.7, 3.2)	820,625

Table 9.3. Estimated Relationship Between Redemption Rate and Least Expensive Brand Restriction

Notes

Estimates are OLS regression coefficients showing the association between the LEB restriction and the mean redemption rate. Standard errors are clustered at the State agency level.

^a Sample sizes include only households prescribed the food category.

^b For the legume category, the table presents the relationship between LEB restrictions on dry beans and legume redemption.

^c For the whole grains category, the table presents the relationship between LEB restrictions on whole-grain bread products, tortillas, and brown rice and whole grains redemption.

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight analysis of WIC EBT data as of March 2018 for all State agencies except Texas, which submitted data as of June 2018

b. Store brand only restrictions

While controlling for other factors, residence in a State agency with SBO restrictions for cheese or juice was associated with redemption rates that were 5.5 percentage points (p < 0.01) lower for cheese and 17.1 percentage points (p < 0.05) lower for juice compared with those for a State agency without the restrictions (see table 9.4).

Redemption Rate	Estimate	95 Percent Confidence Interval	Sample Sizeª	
73.1	-5.5**	(-9.2, -1.9)	808,877	
70.9	-17.1*	(-29.3, -4.9)	959,950	
	Redemption Rate 73.1 70.9	Redemption Rate Estimate 73.1 -5.5** 70.9 -17.1*	Redemption Rate Estimate 95 Percent Confidence Interval 73.1 -5.5** (-9.2, -1.9) 70.9 -17.1* (-29.3, -4.9)	

Notes

Estimates are OLS regression coefficients showing the association between the SBO restriction and the mean redemption rate. Standard errors are clustered at the State agency level. Foods with SBO restrictions used by fewer than 2 or more than 10 of the 12 EBT State agencies were excluded from the analysis.

^a Sample sizes include only households prescribed the food category.

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

Source: Insight analysis of WIC EBT data as of March 2018 for all State agencies except Texas, which submitted data as of June 2018

c. Manufacturer rebates

No statistically significant relationships were observed between redemption rates and manufacturer rebates for infant foods (see table 9.5).

Table 9.5. Estimated Relationship Between Redemption Rate and Manufacturer Rebates

Food Category	Mean Redemption Rate	Estimate	95 Percent Confidence Interval	Sample Sizeª
Infant cereal	53.0	-7.1	(-29.5, 15.4)	249,349
Infant fruits and vegetables	57.0	3.9	(-4.5, 12.3)	257,140
Infant food meat	33.4	-8.9	(-21.3, 3.5)	20,872

Notes

Estimates are OLS regression coefficients showing the association between the manufacturer rebate and the mean redemption rate. Standard errors are clustered at the State agency level. The estimates were not statistically significant at the 5-percent level. ^a Sample sizes include only households prescribed the food category.

Source: Insight analysis of WIC EBT data as of March 2018 for all State agencies except Texas, which submitted data as of June 2018

d. Container size restrictions

Container size restrictions for yogurt were associated with a 24.3-percentage-point decrease in the redemption rate (p < 0.05; see table 9.6). No other statistically significant relationships were observed between container size restrictions for cow's milk, cheese, juice, and breakfast cereal and redemption rates for these foods.

Table 9.6. Estimated Relationship Between Redemption Rate and Container Size Restriction

Food Category	Mean Redemption Rate	Estimate	95 Percent Confidence Interval	Sample Sizeª
Milk and milk alternatives				
Cow's milk (restricted quarts)	67.7	14.9	(-9.1, 38.9)	964,441
Yogurt (only quarts)	60.8	-24.3*	(-47.4, -1.2)	405,076
Cheese (16 ounces or larger)	73.1	5.5	(-17.1, 28.2)	808,877
Juice (no 48-ounce containers) ^b	70.9	-4.8	(-16.1, 6.5)	959,950

Notes

Estimates are OLS regression coefficients showing the association between the container size restriction and the mean redemption rate. Standard errors are clustered at the State agency level.

^a Sample sizes include only households prescribed the food category.

^b Typically, 48-ounce containers are prescribed to women so they may receive their full nutritional benefit. For study purposes, State agencies identified as having a restriction on 48-ounce juice containers, only allow frozen concentrate containers that reconstitute to 48 ounces.

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight analysis of WIC EBT data as of March 2018 for all State agencies except Texas, which submitted data as of June 2018

e. Form or type restrictions

After controlling for demographic factors and other cheese restrictions, residence in a State agency that restricted shredded cheese was associated with a lower cheese redemption rate (12.1-percentage-points; p < 0.01; see table 9.7). Form or type restrictions for eggs (large only) were also associated with a lower redemption rate (by 5.3-percentage-points; p < 0.001). No other statistically significant relationships were observed between the examined form or type restrictions and redemption rates.

Food Category	Mean Redemption Rate	Estimate	95 Percent Confidence Interval	Sample Sizeª
Milk and milk alternatives				
Cow's milk (no evaporated)	67.7	-1.1	(-21.0, 18.8)	964,441
Cow's milk (no UHT)	67.7	13.9	(-1.7, 29.5)	964,441
Yogurt (no Greek) ^b	60.8	-24.0	(-49.9, 2.0)	405,076
Cheese (no shredded)	73.1	-12.1**	(-20.2, -4.1)	808,877
Cheese (no string)	73.1	-1.9	(-5.6, 1.7)	808,877
Cheese (no Monterey Jack)	73.1	13.9	(-7.1, 34.8)	808,877
Eggs (large only)	78.0	-5.3***	(-7.5, -3.1)	966,462
Infant fruits and vegetables (no organic)	57.0	-4.2	(-27.5, 19.2)	257,140

Table 9.7. Estimated Relationship Between Redemption Rate and Form or Type Restriction

Notes

Estimates are OLS regression coefficients showing the association between the form or type restriction and the mean redemption rate. The form or type restriction of interest is listed in parentheses next to the WIC food. Standard errors are clustered at the State agency level.

^a Sample sizes include only households prescribed the food category.

^b Although the main regression models did not show a statistically significant association between restrictions on Greek yogurt and redemption, an alternate specification that included household income and other program participation as additional controls did result in a statistically significant negative estimate that was large in magnitude. Though the current model was not statistically significant at the 95 percent confidence level, the *p*-value was 0.06, suggesting there is still evidence of a large negative association between redemption and restrictions on Greek yogurt. The study team did not include income and program participation in the main regression models because large amounts of data were missing for certain State agencies.

* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Insight analysis of WIC EBT data as of March 2018 for all State agencies except Texas, which submitted data as of June 2018

C. Limitations

Although six food-specific restrictions were significantly associated with redemption, it is important to note these regressions did not indicate a causal link between food-specific restrictions and redemption of WIC foods. Though the study team was able to control for other relevant food-specific restrictions and household demographics, there were several other factors that could have affected redemption rates the team was unable to include in the model. These variables could have included the degree to which State agencies tailored their participant food packages to allow for choice in the legume or whole grains categories,⁵³ or other participant experiences at the WIC local clinic or vendor that influenced the amount of food redeemed, such as how well staff at local clinics explained what foods participants were able to buy or the ease of finding the items at WIC vendors. The team was unable to control for the State agency given that the variables of interest—indicators for food-specific restrictions implemented in each State agency—did not vary within a State agency during the study period. Thus, the team was unable to control for overall State agency characteristics such as overall participant satisfaction with the WIC program. Only 1 month of EBT data was used to conduct this analysis because the team was provided with only 1 month of certification data that included the household characteristics. Using a longitudinal dataset would enable future researchers to better control for time-invariant household characteristics that may be related to redemption.

⁵³ Ohio and Florida issue legumes at the subcategory level. According to the data, it is unclear to what degree other State agencies issue legumes or whole grains at the subcategory level.

Chapter 10. Participant Health Outcomes

This chapter examines the relationship between WIC benefit redemption and participant health. An important caveat of this chapter is that the analysis did not directly assess the complex relationship between food-specific restrictions and health but instead assessed the relationship between WIC benefit redemption and participant health.

Key Findings

- Regression-adjusted results indicated no evidence of a relationship between WIC benefit redemption and infant birth weight for babies born to WIC-participating women, or the change in height-for-age percentile, probability of exiting anemia, or probability of exiting underweight status for participating children.
- There were improvements in the prevalence of anemia and underweight status among children in households that recertified their WIC benefits.
 - Sixty-eight percent of children who were anemic at a baseline WIC certification assessment were no longer anemic at their recertification hematological assessment.
 - A third of children who were underweight at a baseline WIC certification anthropometric measurement were not underweight at their recertification anthropometric measurement.

A. Background and Approach

One goal of the WIC program is to improve the health outcomes of participants. Food-specific restrictions may indirectly affect health outcomes through their direct effect on benefit redemption. It is possible that—

- Food-specific restrictions may cause individuals to reduce their consumption of prescribed foods.
- Reduced consumption of WIC foods may result in worse health outcomes.

In the previous chapter, the study team examined the first part of this theoretical framework and demonstrated certain food-specific restrictions were associated with higher rates of food redemption in some cases and lower rates in other cases. In this chapter, the study team examined the second part of the theoretical framework and tested the relationship between benefit redemption and four health outcomes: infant birth weight, child anemia, child weight, and child height. Because WIC food consumption was not observed, household redemption of WIC benefits was used as a proxy for individual consumption of WIC foods. The empirical approach included a WIC participant-level multiple regression analysis in which the primary explanatory variable was the household average monthly WIC benefits redemption rate. The models included additional participant- and household-level characteristics and State indicators to account for geographic differences in participant health. Measures of health outcomes were obtained from anthropometric and hematological measurements from WIC certification records. All 12 EBT WIC State agencies provided certification data from 2 points in time: March 1, 2018, and July 1, 2018.⁵⁴ For the birth weight outcome, the study team assessed the relationship between households' redemption rate of WIC benefits in the months prior to an infant's

⁵⁴ Texas supplied files with caseload data for all households enrolled during April and September 2018.

birth and the infant's birth weight. For the analyses of child weight, height, and anemia status, the study team examined data for children who were enrolled on March 1, 2018, and July 1, 2018, and who had a second hematological or anthropometric measurement between the two dates.⁵⁵ These two measurements were used to assess the change in health status over time.^{56, 57, 58}

To estimate the change in height-for-age the study team calculated the difference between the first observed measurement to the second observed measurement. Height-for-age percentiles were calculated based on Centers for Disease Control (CDC) sex-specific age curves using the child's height and age in months at the time of each height measurement (CDC, 2016). The analysis of child height was limited to those who were at least 2 years old at the time of the first measurement.

The team estimated the probability of "exiting" anemia status—the probability a child who was initially observed as anemic would have a second blood test indicating they were no longer anemic. Blood tests measuring hemoglobin concentration or hematocrit levels were used to evaluate anemia status based on CDC guidelines (CDC, 1998). The analysis sample included only children who were anemic in the March/April caseload data and had a second observed hematological measurement. Infants were excluded from this analysis because CDC does not provide similar standards for infants.

The study team estimated the probability of exiting underweight status—the probability a child who was initially observed as underweight would have a second weight measurement indicating they were no longer underweight. Following the CDC guidelines, the team identified children as underweight if their weight-for-age was below the fifth percentile (CDC, 2018). Only children older than 2 who were considered underweight in the March/April caseload data and had another weight measurement were included in this analysis.

The health outcome measures were then linked to household WIC EBT issuance and redemption data. The analysis used WIC redemption rates from the months between the first and second anthropometric or hematological measurements. For example, the team linked redemption data from March and April for a child who had a second hematological measurement in May. Table 10.1 presents the months of redemption data used based on the month when the second anthropometric or hematological measurement was taken.^{59, 60} The percentage of food redeemed was calculated by taking the mean of

⁵⁵ For Texas, the data on children were examined between April 1 and September 30, 2018.

⁵⁶ For the analysis of child anemia, height, and weight, the analytic sample included children in Texas with a measurement in the April caseload file and a second measurement taken before October. For consistency, the sample was restricted to children in Texas whose first measurement was taken before April 1, 2018.

⁵⁷ WIC regulations require height, weight, and blood measures be generally taken at, or around, certification or recertification. These measurements may be taken at different times and not necessarily on the certification date (see 7 § C.F.R. 246).

⁵⁸ The methodology in this chapter follows and extends that of Kirlin et al. (2003)

⁵⁹ Children with 60 or fewer days between measurements were also excluded. Only infants whose mothers were certified as of March 1, 2018, (or at any time during April for Texas) were included in the analysis.

⁶⁰ Several additional inclusion and exclusion rules were applied: (1) For State agencies whose participants were uniquely identified by household ID and birthdate, all children in the household born on the same day were excluded from the analyses of anemia, height, and weight. (2) Any infants or children from households with more than 10 WIC participants were excluded. (3) Infants and children in households with missing issuance data between March (April for Texas) and the month prior to the second measurement month were excluded. (4) For the analysis of infant birthweight, infants who were weighed more than 14 days after birth or whose mother was missing height data were excluded. (5) Children with fewer than 61 days between the first and second measurement were excluded. (6) Only children who were at least 1 year old for both measurements were included for the analysis of anemia, while only children who were at least 2 years old for both measurements were included for the analysis of anemia, while only children who were at least 2 years old for both measurements were included in March/April—were excluded. The percentage of WIC potentially analysis-eligible participants included in each analysis is presented in appendix table J.3.

the monthly redemption rates for the months observed prior to the month when the second measurement or birth weight measurement was taken.⁶¹

State Agencies	Month of Infant Weight Measurement or Second Measurement Child Outcome								
state Agencies	April	May	June	July	August	September			
Months of Issuance/Redemption Data									
CO, FL, MA, MI, NV, OH,	November-	November-	November-			N/A			
VA, WI, WV, WY	March	April	May	N/A	N/A	IN/A			
KV	January–	lanuary_April	lanuary-May	N/A	Ν/Δ	N/A			
K1	March	January-April	January–Iviay						
ТХ	N/A	N/A	May	May–June	May–July	May–August			

Table 10.1. Months of EBT Data Used in Analysis by Month of Outcome Measurement Date

Notes

Texas was unable to submit data within the requested timeframe because of a transition in its management information system. Kentucky did not submit EBT data prior to January.

N/A (not applicable) implies all participants with measurements taken in these months were excluded from the analysis.

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

Regressions of individual health outcomes adjusted for differences between individuals and State agency.⁶² See appendix J for details on the regression model specifications.

Among the health outcomes examined, anemia is unique in that it is primarily a function of iron intake rather than total diet quality. Among WIC food packages for children, WIC foods such as iron-fortified breakfast cereal and tofu contain iron. In assessing the likelihood of "exiting" anemia, the regressions included two measures of redemption: redemption of breakfast cereal and redemption of WIC foods other than breakfast cereal.⁶³ Because tofu also includes iron, the models also included an indicator for whether the household was issued tofu in any of the months prior to the month of the second hematological measurement.⁶⁴

B. Findings

Overall, there was substantial variation in participant health outcomes across State agencies. The mean birth weight was 118.7 ounces (7.4 pounds; standard deviation 53.1 ounces [3.3 pounds]) for the 49,578

⁶¹ The study team determined the redemption rates for each food category by calculating the percentage of issued units redeemed. This category rate was top coded at 100. An overall monthly redemption rate was calculated by taking the mean of the category specific redemption rates.

⁶² All models adjusted for the household's income level, the number of WIC participants in the household, and the number of people in the economic unit as of March. The birth weight model adjusted for several characteristics as of March, which included the mother's age and age squared, height, Medicaid participation, Temporary Assistance for Needy Families (TANF) participation, Supplemental Nutrition Assistance Program (SNAP) participation, migrant status, race/ethnicity, and the month of the first observed certification. It also adjusted for the number of days between the measurement of weight and birth (and that value squared) and sex of the infant. The child height, weight, and anemia status models adjusted for several characteristics of the child as of March, which included age in months and age in months squared, Medicaid participation, TANF participation, SNAP participation, migrant status, race/ethnicity, sex, and number of days between measurements.
⁶³ Although the study team expected redemptions of iron-fortified WIC cereal to be the only WIC benefit directly affecting anemia, the team also adjusted the anemia models by the redemption rate of noncereal to minimize bias because of unobserved factors associated with overall redemption of WIC benefits and participant health.

⁶⁴ Tofu consumption may also reduce anemia because of its iron content. However, not all State agencies authorized tofu. Fewer than 1 percent of children in the anemia analysis sample were prescribed tofu during any of the observed months. Therefore, the tofu redemption rate was not considered in this analysis.

infants included in the analysis (see table 10.2). Mean birth weight by State agency ranged from 114.7 ounces (7.2 pounds) in Kentucky to 122.9 ounces (7.7 pounds) in Nevada.

The study team observed two height and weight measurements for 142,440 children. On average, height-for-age increased 1.5 percentiles from the first to second measurements. This change corresponds to an additional 0.2 cm growth over a 12-month period for a boy that was 3 years old and of median height at the initial measurement. Across State agencies, this outcome ranged from the 0.3rd percentile in Nevada to the 3.3rd percentile in Virginia.

State Agency	Birth	Weight (Ound	ces)ª	Change in I	Change in Height-for-Age Percentile				
State Agency	N	Mean	SD	N	Mean	SD			
СО	1,126	117.2	19.5	8,514	0.5	11.5			
FL	9,879	115.2	21.7	47,757	1.1	11.8			
КҮ	2,528	114.7	19.9	9,306	1.2	13.9			
MA	2,264	118.0	19.0	4,377	2.6	15.6			
MI	4,650	118.5	29.3	7,599	3.0	12.2			
NV	700	122.9	17.5	6,113	0.3	12.8			
ОН	4,252	118.2	40.4	19,275	0.9	10.7			
ТХ	19,686	121.2	77.6	29,394	2.3	13.3			
VA	1,639	120.9	32.7	2,663	3.3	16.5			
WV	842	114.9	18.1	2,585	0.4	12.3			
WI	1,909	118.2	18.7	3,871	2.2	13.1			
WY	103	118.6	17.5	986	0.7	11.3			
Total	49,578	118.7	53.1	142,440	1.5	12.5			

Table 10.2. Birth Weight and Change in Height-for-Age Percentile of WIC Participants: UnadjustedOutcomes by State Agency

Notes

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

SD = standard deviation

^a Includes infants who were weighed within 2 weeks of birth born to women who participated in WIC while pregnant Source: Insight tabulations of WIC certification data

Of the 31,812 anemic children included in the analysis, approximately 68 percent exited anemia status by the time of their second hematological measurement (see table 10.3). The mean rate of exit from anemia across State agencies ranged from 56.8 percent in Michigan to 81.1 percent in Wyoming.

Of the 6,313 underweight children included in the analysis, approximately 33 percent exited underweight status by the time of their second weight measurement. The rate of exit from underweight status across State agencies ranged from 13.3 percent in Nevada to 42.9 percent in West Virginia.

Table 10.3. Number of WIC Participating Children Observed as Anemic or Underweight at Baseline and Percentage Who Exited That Status by the Time of Follow-Up Measurement: Unadjusted Outcomes by State Agency

State Agency	Exite	d Anemia Sta	tusª	Exited	Exited Underweight Status ^b				
State Agency	N	Percent	SD	N	Percent	SD			
СО	632	78.5	41.1	525	31.4	47.1			
FL	8,001	62.2	48.5	2,002	31.4	46.5			
КҮ	1,264	66.4	47.3	342	37.5	49.0			
MA	220	70.9	45.5	159	33.3	51.6			
MI	5,293	56.8	49.5	323	19.8	39.9			
NV	589	72.5	44.7	278	13.3	34.6			
ОН	2,706	71.5	45.2	866	35.7	48.1			
ТХ	9,531	77.2	41.9	1,333	37.1	48.4			
VA	1,532	66.6	47.2	127	17.1	37.9			
WV	231	61.9	48.7	114	42.9	53.5			
WI	1,760	67.8	46.7	179	18.2	38.9			
WY	53	81.1	39.5	65	33.3	57.7			
Total	31,812	67.9	46.7	6,313	33.2	47.1			

Notes

CO = Colorado; FL = Florida; KY = Kentucky; MA = Massachusetts; MI = Michigan; NV = Nevada; OH = Ohio; TX = Texas; VA = Virginia; WI = Wisconsin; WV = West Virginia; WY = Wyoming

SD = standard deviation

^a Includes only children 12 months or older and anemic at the time first hematological measurements; the percent column represents the proportion of these children who were not anemic (e.g., exited) by the time of their second hematological measurements ^b Includes only children aged 2 or older and underweight at the time of first anthropometric measurements. The percent column represents the portion of these children who were not underweight at the time of their second anthropometric measurement. Source: Insight tabulations of WIC certification data

The remainder of this section presents multivariate regression findings examining the relationship between participant health outcomes and redemption.

1. Infant Birth Weight

There was a positive but not statistically significant relationship between WIC food redemption and infant birth weight (see table 10.4). A 1-percentage-point increase in average redemption of WIC foods in the months before an infant's birth was associated with an increase in infant birth weight of 0.014 ounces, relative to a mean birthweight of 119 ounces (7.4 pounds).

Measure	Mean (Ounces)	Estimate	95 Percent Confidence Interval	Sample Size
Average percent redeemed	118.7	0.014	(-0.009, 0.036)	49,578

Table 10.4. Estimated Relationship Between EBT Redemption and Infant Birth Weight

Notes

Percentage of food redeemed was calculated by taking the mean of monthly redemption rates for months observed prior to the month when birth weight measurement was taken. Estimate is an OLS regression coefficient, showing the association with a 1-percentage-point increase in WIC benefit redemption. The mean is the average infant birth weight in ounces. The model adjusted for the set of model-specific covariates and an indicator for State agency. Standard errors were clustered at the State agency. The estimate was not statistically significant at the 5-percent level.

Source: Insight analysis of WIC EBT and certification data

2. Change in Height-for-Age Percentile

Height-for-age percentiles were calculated based on CDC sex-specific age curves using the child's height and age in months at the time of each height measurement (CDC, 2016).⁶⁵ The analysis of height was limited to children who were at least 2 years old at the time of the first measurement. The study team found no association between child height-for-age and a 1-percentage-point increase in redemption of WIC foods (see table 10.5).

Table 10.5. Estimated Relationship Between EBT Redemption and Change in Height-for-Age Percentile

Measure	Mean (Change in Height-for-Age Percentile)	Estimate	95 Percent Confidence Interval	Sample Size
Average percent redeemed	1.5	0.002	(-0.002, 0.005)	142,440
•• ·				

Notes

Percentage of food redeemed was calculated by taking the mean of monthly redemption rates for months observed prior to the month when the second height measurement was taken. Estimate is an OLS regression coefficients, showing the association with a 1-percentage-point increase in WIC benefit redemption. The mean is the average change in height-for-age percentile among children 2 years or older in the sample with at least two anthropometric measurements. The model adjusted for the set of model-specific covariates and an indicator for State agency. Standard errors were clustered at the State agency. The estimate was not statistically significant at the 5-percent level.

Source: Insight analysis of WIC EBT and certification data

3. Anemia

Blood tests measuring hemoglobin concentration or hematocrit levels were used to evaluate the anemia status of children (but not infants) based on CDC guidelines (CDC, 1998).⁶⁶ In the analysis for anemia, there were two measures of interest: (1) average percentage of WIC food redeemed; and (2) percentage of breakfast cereal redeemed. There was no association between the probability of "exiting anemia" and a 1-percentage-point increase in redemption of either redemption measure (see table 10.6).⁶⁷

Redemption of WIC foods could possibly prevent the onset of anemia. As a secondary analysis, the study team estimated the probability of "entering" anemia status as a function of the redemption of breakfast cereal and other foods. Only children who were not anemic at the first measurement and had a second hematological measurement during the study period were included. The results do not indicate the

⁶⁵ CDC, 2016

⁶⁶ CDC, 1998

⁶⁷ While in the main specification, this model was estimated using OLS; logistic regressions were estimated as a sensitivity analysis. The results were substantively similar (see appendix table J.1).

redemption of breakfast cereal was associated with a decrease in the probability of becoming anemic (see appendix table J.2). A 1-percentage-point increase in the redemption of non-breakfast cereal food was associated with a 0.035-percentage-point decrease in the probability of becoming anemic. However, the consumption of WIC foods other than breakfast cereal is unlikely to improve anemia because these foods do not offer participants any additional iron. Instead, it is likely that redemption of WIC foods is correlated with unobserved factors and do not indicate a causal relationship between redemption of non-cereal WIC foods and anemia.

Mean 95 Percent Sample Measure Estimate (Percent) **Confidence Interval** Size Average percent redeemed 0.018 (-0.018, 0.054) (excluding breakfast cereal) 67.9 31,812 Average breakfast cereal -0.003 (-0.031, 0.025)percent redeemed

Table 10.6. Estimated Relationship Between EBT Redemption and Probability of Exiting Anemia Status

Notes

Percentage of food redeemed was calculated by taking the mean of monthly redemption rates for months observed prior to the month when the second blood test was taken. Entries are OLS regression coefficients showing the association with a 1-percentage-point increase in overall WIC benefit redemption or just cereal redemption. Estimates and confidence intervals were multiplied by 100, such that estimates represent the relationship between a percentage-point change in the probability. The mean is the percent of children in the sample who exited anemia status. The model adjusted for set of model-specific covariates and an indicator for State agency. Total percent redeemed excludes cereal from its calculation. Standard errors were clustered at the State agency. The estimates were not significant at the 5-percent level.

Source: Insight analysis of WIC EBT and certification data

4. Underweight

Following the CDC guidelines, children were identified as underweight if their weight-for-age was below the fifth percentile (CDC, 2018). Only children older than 2 who were considered underweight in the March caseload data and had another weight measurement in the July data were included in this analysis. The relationship between overall WIC benefit redemption and the probability of exiting underweight status was not statistically significant (see table 10.7). When estimated as logistic regressions, there was a statistically significant positive relationship between WIC benefit redemption and the probability of exiting underweight status (see appendix table J.1). This result is consistent with positive point estimate in the main analysis.

The consumption of WIC foods could prevent children from becoming underweight. As a sensitivity analysis, the study team modeled the probability of entering underweight status as a function of the percentage of WIC food redeemed (see appendix table J.2). Only children who were not underweight as of their first weight measurement were included in this analysis. The dependent variable was an indicator of whether these children were underweight at the time of their second weight measurement. The results imply a 1-percentage-point increase in the percentage redeemed is associated with a 0.006-percentage-point decrease in the probability of becoming underweight.

Table 10.7. Estimated Relationship Between EBT Redemption and Probability of Exiting UnderweightStatus

Measure	Mean	Estimate	95 Percent Confidence Interval	Sample Size
Average percent redeemed	33.2	0.08	(-0.04, 0.19)	6,313

Notes

Percentage of food redeemed was calculated by taking the mean of monthly redemption rates for months observed prior to the month when the second weight measurement was taken. Entries are OLS regression coefficients, showing the association with a 1-percentage-point increase in redemption. Estimates and confidence intervals were multiplied by 100, such that estimates represent the relationship between a percentage point change in probability. The mean is the percentage of children aged 2 and older in the sample who exited underweight status.

The model adjusted for set of model-specific covariates and an indicator for State agency. Standard errors are clustered at the State agency. The estimate was not statistically significant at the 5-percent level.

Source: Insight analysis of WIC EBT and certification data

C. Limitations

This analysis has several important limitations. First, redemption and health outcomes were determined simultaneously. This introduced several sources of bias. For instance, participants who are motivated to improve their health may both redeem WIC foods at a high rate and engage in other behaviors that improve health. This would bias estimates of the relationship between redemption and health outcomes upward. On the other hand, participants who are in greater need may redeem WIC benefits at a higher rate but have worse health outcomes. For example, participants who have more difficulty buying foods outside of the WIC program may redeem WIC foods at high rates and may also have worse health outcomes because of unobserved factors. This would have biased estimates of the relationship between redemption and health outcomes downward, perhaps resulting in negative estimates. Although all the models adjusted for some factors related to this issue, such as household income level and SNAP participation, it is likely there were additional unobserved factors for which the model did not adjust.

Second, the data did not include information about the amounts of WIC foods participants consumed. Instead, this analysis used WIC benefit household redemption rates as a proxy measure of WIC benefit consumption. While this proxy measure was the best available, it was likely an imprecise measure of benefit consumption. The study team was not able to differentiate redemption rates of person-specific food packages using household-level benefit redemption when households included multiple WIC participants, nor was the study team able to determine who within a household was consuming any or how much of the redeemed food packages. At best, the difference between household redemption rates and participant consumption was random, in which case the regression estimates were attenuated towards zero. At worst, the differences between benefit redemption and participant consumption of WIC foods were correlated with other unobserved factors that were also associated with time-varying factors also associated with the health outcomes the study team examined. If the latter is the case, then the estimates of the relationship between benefit redemption and health are biased. The study team minimized this potential bias by adjusting for available observed WIC participant characteristics related to this relationship.

Third, this analysis examined changes in health outcomes over several months. However, changes in diet-related changes in health often manifest only after longer periods of time. The relatively short duration of this study period may not have been long enough to observe any meaningful changes in health among participants.

Fourth, the empirical approach was susceptible to selection bias because the analysis included only children who recertified. The overall direction of bias was indeterminate. Selection could have resulted in underestimates of the relationship between redemption and health if participants who did not recertify experienced disproportionately greater improvements in health compared with participants who did recertify. Alternately, selection could have resulted in overestimates if participants who did not recertify experienced disproportionately smaller improvements in health compared with participants who did not recertify experienced disproportionately smaller improvements in health compared with participants who did not recertify.

Fifth, because this analysis used a single cross-section of data from each State agency, there was no observed within-State variation on State agency factors that could have differentiated the effects of cost containment from other factors that could affect participant's health. This analysis could not distinguish between the effects of food-specific restrictions and other State agency practices on health.

Chapter 11. Conclusions and Recommendations

This study provided a national picture of voluntary food cost-containment practices and examined both the cost savings and participant outcomes impacted by each of six common practices: least expensive brand (LEB) restrictions, store brand only (SBO) restrictions, manufacturer rebates, container size restrictions, form or type restrictions, and the restriction of alternative foods. This chapter summarizes and synthesizes information from chapters 3–10 to draw conclusions and make recommendations to address objective 3. Study limitations were described in previous chapters but are also described here as they relate to recommendations and future research.

A. Summary and Conclusions

Average standardized food package cost estimates (excluding the cost of fruits and vegetables and infant formula) varied across State agencies, ranging from \$36.97 to \$48.08 per participant per month. Average estimated actual food package costs were much lower, ranging from \$14.92 to \$26.93, most likely because of the less-than-full redemptions observed across all food categories. The greatest contributors to average food package costs in the 12 EBT State agencies were cow's milk, breakfast cereal, juice, and cheese.

29 Food-Specific Restrictions Examined Through the Study

- 8 LEB restrictions
- 2 SBO restrictions
- 3 manufacturer rebates
- 4 container size restrictions
- 8 form or type restrictions
- 4 food alternative restrictions

Both nationally and among the study sample, State agencies

imposed a wide variety of food-specific restrictions to reduce their total food costs. This study examined 29 food-specific restrictions across the 6 practices. Of these 29 food-specific restrictions, 17 (more than half) yielded estimated actual cost savings greater than \$0.01 per participant month: 3 LEB, 2 SBO, 3s manufacturer rebate, 3 container size, 4 form or type, and 2 food alternative restrictions. Because State agencies voluntarily implement statewide food-specific restrictions to reduce food costs, it is reasonable to conclude these 16 restrictions are supported for that purpose by the evidence examined through this study.

Although the goal of voluntary restrictions is to reduce food costs, State agencies must ensure the restrictions do not adversely impact participants. The study examined associations between food-specific restrictions and a subset of participant outcomes: household satisfaction with WIC foods, self-reported consumption of WIC foods, and food redemptions as determined from EBT data. Overall, 7 of the 25 restrictions for which these outcomes could be assessed—2 LEB, 2 SBO, 1 container size, and 2 form or type—were associated with adverse participant outcomes (i.e., lower satisfaction, lower likelihood of reporting full consumption, and lower redemption rates). It was not possible to examine participant outcomes relative to the four food alternative restrictions (yogurt, tofu, oats, and whole-wheat pasta) because only households residing in State agencies that authorized and prescribed these items could be surveyed about their related satisfaction and consumption.

Findings from the food-cost savings and some outcomes analyses (self-reported satisfaction and consumption and EBT redemptions) were used to classify the 25 food-specific restrictions into 1 of 4 categories: (1) cost savings, no adverse participant outcomes; (2) cost savings, adverse participant outcomes; (3) no cost savings, no adverse participant outcomes; and (4) no cost savings, adverse participant outcomes (see figure 11.1). Summary results for restrictions associated with estimated cost savings are also presented in table 11.1.





Notes

Participant outcomes used to classify restrictions included satisfaction with and consumption of WIC foods as reported by households in the Survey of WIC Participants and EBT redemption rates. Restrictions were identified as resulting in cost savings if estimated actual cost savings were statistically significant (p < 0.05, p < 0.01, or p < 0.001) and greater than \$0.01 per participant month. Restrictions on alternatives are excluded from the figure because participant outcomes were not examined.

^a Whole-wheat/whole-grain bread/rolls/buns

Food	Restriction	Estimated Average Food Category Cost per Participant Month	Estimated Average Cost Savings per Participant Month	Adverse Participant Outcomes, if Applicable	Percent of 70 Study State Agencies with Restriction		
No Adverse Participant Outcomes							
Cheese	16-ounce containers only	\$1.96	0.37***	N/A	58.6		
Juice	No 48-ounce containers	\$2.70	0.28***	N/A	67.1		
Infant fruits and vegetables	Manufacturer rebate (post-rebate)	\$1.91	0.27***	N/A	8.6		
Juice	LEB restriction	\$2.70	0.25***	N/A	10.0		
Infant fruits and vegetables	No organics	\$1.91	0.16***	N/A	71.4		
Cheese	LEB restriction	\$1.96	0.15***	N/A	27.1		
Yogurt	No Greek	\$0.74	0.15***	N/A	51.4		
Infant cereal	Manufacturer rebate (post-rebate)	\$0.44	0.14***	N/A	11.4		
Cow's milk	No evaporated	\$5.17	0.10***	N/A	22.9		
Infant food meat	Manufacturer rebate (post- rebate)	\$0.11	0.02***	N/A	8.6		
		Some Adverse Parti	cipant Outcomes				
Cheese	SBO restriction	\$1.96	0.61***	Lower redemption rates	20.0		
Juice	SBO restriction	\$2.70	0.39***	Lower redemption rate and lower likelihood of fully consuming purchased juice	8.6		
Yogurt	Quarts only	\$0.74	0.09***	Lower redemption rate and lower likelihood of fully consuming purchased yogurt	71.4		
Whole-grain bread products	LEB restriction	\$1.60	0.08***	Lower likelihood of fully consuming purchased bread	4.3		
Eggs	Large eggs only	\$1.09	0.06***	Lower redemption rate	35.7		

Table 11.1. Food-Specific Restrictions Associated with Cost Savings

Notes

Food-specific restrictions are ordered by presence of an association with adverse participant outcomes and magnitude of estimated average cost savings. The estimated average food category costs per participant month and estimated average food cost savings per participant month columns reflect average food category costs and savings across the EBT State agencies based on their actual caseloads and redemption rates. Adverse participant outcomes considered for this analysis were self-reported satisfaction with and consumption of WIC foods and EBT redemptions

"Per participant month" = per participant per month

^a Whole-wheat/whole-grain bread/buns/rolls

* p < 0.05, ** p < 0.01, *** p < 0.001

Sources: Insight analysis of Survey of WIC Participants; Insight tabulations of WIC EBT data

B. Recommendations on Restrictions

To address study objective 3, this section outlines recommendations related to the potential broad implementation or elimination of some food-specific restrictions based on an assessment of key outcomes and information gleaned from interviews with State agencies. Although already described in prior chapters, there are several important study limitations to bear in mind when considering these recommendations:

- First, the cost savings estimates could not account for unobserved factors such as the cumulative effects of policies or State agency responses to price fluctuations and therefore could be biased. Post-rebate cost savings were estimated only for State agencies that held rebate contracts for foods other than infant formula during the study period; estimates based on this limited universe are likely not representative.
- Second, significant regression findings indicated only that there was an association between restrictions and outcomes, not that there was a causal relationship. Likewise, though the regression analysis found no relationship, it is still possible one existed.
- Third, only 12 State agencies were examined in the analysis of outcomes, and findings could differ if more or different State agencies were included in the analytic sample. Although encompassing all FNS Regions and a variety of WIC households, the selected State agencies were not representative of the national WIC population.

The recommendations outlined in this section do not take into consideration findings from the former participant, modified diet, or health outcomes analyses because of data and methodological limitations. For example, because there was not enough variation in policies across the three State agencies included in the former household analysis, the study team was unable to examine the relationship between most food-specific restrictions and satisfaction among formerly participating households. Although associations could have varied by type of modified diet, there was not enough statistical power to examine each separately; instead, all households with any type of modified diet were grouped together for analysis purposes. Data limitations (e.g., the absence of any exogenous policy variation, redemptions as a proxy for consumption, and cross-sectional data examined for only a 3-month period) also substantially hampered the efficacy of the health outcomes analysis.

Instead, the recommendations rely heavily upon findings from the estimated cost-savings analyses; selfreported satisfaction with and consumption of WIC foods, and EBT redemptions; and important contextual information provided through State agency interviews. Using this information, the study team identified restrictions that may be appropriate for broad implementation and restrictions that should potentially be reconsidered. Many of the 29 food-specific restrictions examined through the study did not fit into either of the two recommendation categories (i.e., potentially appropriate for broad implementation and restrictions that should potentially be reconsidered). For example, because participant outcomes could not be examined for the four food alternative restrictions, it was not appropriate to make recommendations about their implementation even when statistically significant average cost savings were estimated. Eight food-specific restrictions examined through the study were neither associated with estimated average cost savings per participant month across State agencies nor adverse participant outcomes: LEB restrictions for milk, eggs, dry beans, and brown rice; container size restrictions for cow's milk; form or type restrictions for cow's milk (no UHT); and form or type restrictions for cheese (no Monterey Jack and no string; see figure 11.1). These findings suggest maintaining these restrictions, if already in place, would not be ill advised, especially if there were administrative reasons for implementing them, and maintaining them would cause no additional burden or administrative cost to the State agencies. However, if not already in place, it would not be advisable to adopt these restrictions for cost-containment purposes as there would be no apparent benefit to the State agency. The remainder of this section discusses two key recommendations related to food-specific restrictions and their ongoing or future use.

1. Disseminate information about food-specific restrictions that reduced food costs and were not associated with adverse participant outcomes

Among the restrictions examined through this study, 10 were associated with average food-cost savings of more than \$0.01 per participant month across the 12 EBT State agencies and not associated with adverse participant outcomes. These restrictions were LEB restrictions for cheese and juice; manufacturer rebates for infant fruits and vegetables, infant cereal, and infant food meats; container size restrictions for cheese and juice; and form or type restrictions for milk (no evaporated), infant fruits and vegetables (no organics), and yogurt (no Greek; see figure 11.1 and table 11.1). Four of these food-specific restrictions may be most appropriate for broad implementation if deemed necessary to meet program goals:

- Cheese container size (16 ounce only)
- ▶ Juice container size (no 48 ounce)⁶⁸
- Yogurt form or type (no Greek)
- Infant fruits and vegetables form or type (no organic)

In general, interview findings suggest State agencies encountered few barriers to implementing container size and form or type restrictions. Though State agencies noted some challenges with container size restrictions and primarily discussed the challenges associated with restricting quarts of milk, no other container size restriction challenge was commonly reported.

State agencies also reported very few challenges implementing form or type restrictions. One concern associated with form or type restrictions was participant satisfaction. Some State agencies chose to allow Greek yogurt or organics in an effort to increase participant satisfaction and promote consumption of WIC foods. However, study results did not detect significant associations between restrictions on Greek yogurt or organic infant fruits and vegetables and participant purchases and consumption (see table 11.1).

These restrictions were also already widely used across the 70 study State agencies, unlike some of the other restrictions examined through this study, which may further indicate few barriers to implementation. For example, 71 percent of State agencies restricted organic infant fruits and vegetables, 67 percent restricted 48-ounce containers of liquid juice, 59 percent restricted cheese to 16-ounce container sizes, and 51 percent did not allow Greek yogurt.

The remaining 6 of the 10 promising restrictions this study identified may not be suitable for broad implementation: cow's milk form or type restrictions (no evaporated milk); manufacturer rebates for infant fruits and vegetables, infant cereal, and infant food meat; and LEB restrictions for cheese and

⁶⁸ Typically, 48-ounce containers are prescribed to women so they may receive their full nutritional benefit. For study purposes, State agencies identified as having a restriction on 48-ounce juice containers only allow frozen concentrate containers that reconstitute to 48 ounces.

juice. While form or type restrictions are generally not challenging to implement, in State agencies that allowed evaporated milk, it accounted for less than 1 percent of milk ounces redeemed. Given the low redemption, which indicates lack of interest among participants, it is likely not worthwhile for State agencies that already allow evaporated milk to restrict it.

Interview findings suggest some State agencies face significant challenges implementing LEB restrictions and manufacturer rebates, unlike form and type restrictions. While some State agencies with LEB restrictions cited limited barriers, other State agencies said LEB restrictions were difficult to enforce in an EBT environment, could increase burden on vendors, and could make the participant shopping experience more difficult, thereby decreasing participant satisfaction with WIC. Barriers to implementing LEB in an EBT environment are particularly salient because almost all State agencies now provide benefits via EBT. In an EBT environment, State agencies with LEB restrictions must include a variety of brands on their APLs to accommodate situations when the LEB is out of stock or when smaller vendors are sometimes unable to stock cheaper brands. When a State agency implements an LEB restriction for the first time, participants may continue to attempt to buy the brands they are used to purchasing even though these brands are no longer consistent with the LEB policy. If the more expensive brand is included on the APL, the transaction will be approved. LEB items are rarely advertised on the State agency food list; therefore, even if the restriction has been in place for some time, participants may be unaware of it. Because of these limitations, the LEB restrictions for cheese and juice, although identified as effective based on the outcomes examined through this study, may not be appropriate for broad implementation.

The primary barrier State agencies reported to implementing manufacturer rebates was administrative burden. Manufacturer rebates on infant cereal, infant fruits and vegetables, and infant food meat were associated with average cost savings and not associated with adverse participant outcomes. However, rebates require State agencies to review bids, negotiate and contract with manufacturers, and set up systems for monitoring and tracking—therefore, rebates can be costly and burdensome to implement. Some State agencies shared during the interview that they perceived administrative costs associated with managing the rebate to be higher than any potential cost savings, thereby eliminating any benefit of the rebate. Manufacturer rebates for foods other than infant formula are also not a viable option for smaller State agencies. State agencies noted several other barriers to implementing manufacturer rebates, including a hesitancy to limit participant choice and feedback from vendors that would prefer to stock multiple—not just the rebate—brands. For these reasons, manufacturer rebates for foods other than infant formula, although identified as effective based on the outcomes examined through this study, may not be appropriate for broad implementation.

Importantly, the success of any food cost-containment practice likely depends on the circumstances within the State agency. Factors such as the retail environment, access to food distributors, geography, or participant demographics would be important to consider when making decisions about restrictions. For example, State agencies with many small or rural vendors that have difficulty stocking larger container sizes may be unable to implement a container size restriction for cheese, even though evidence from the study supports doing so. State agencies looking to implement new cost-containment practices or update current ones must first determine the feasibility of doing so within the State agency and the likelihood of success given their circumstances before making a change.

2. Reconsider any food-specific restrictions that did not reduce estimated food costs and/or were associated with adverse participant outcomes

Two food-specific restrictions did not yield any estimated cost savings and were associated with adverse participant outcomes:

- Tortilla brand (LEB)
- Cheese form or type (shredded)

These restrictions were unpopular with households, resulting in negative associations with full consumption or redemption of the given foods. Based on the outcomes examined through this study, it may not be advisable to implement or maintain such restrictions. Specifically, each of these food-specific restrictions was significantly associated with a decreased likelihood of full consumption of the WIC food. Households served by State agencies that restricted shredded cheese had, on average, significantly lower redemption rates compared with households in State agencies without the restriction. The association was relatively large in magnitude (a nearly 12-percent reduction in cheese redemptions), suggesting State agencies with this restriction that are looking to increase redemption rates of cheese but not increase food costs could consider removing the restriction. State agencies may also want to enhance their nutrition education around why the foods in the food package are important and how to shop for the WIC foods.

An additional five food-specific restrictions the study examined were associated with reduced estimated food costs and adverse participant outcomes. SBO restrictions for juice and allowing only quart-sized containers of yogurt were associated with lower redemption rates and, when purchased, a lower likelihood of full consumption; SBO restrictions for cheese and form or type restrictions for eggs (large eggs only) were associated with lower redemption rates; and LEB restrictions for whole-grain bread products were associated with a lower likelihood of full consumption. Given the associations between these restrictions and adverse participant outcomes and the modest estimated average cost savings (\$0.08 to \$0.09 per participant month) for two of the restrictions (yogurt container size and LEB for whole-grain bread products), FNS may want to caution State agencies against such restrictions. At a minimum, State agencies should carefully consider how these restrictions might adversely affect their WIC population.

C. Recommendations for Future Research

Several common food-specific restrictions could not be examined through the study because of a lack of variation across the 12 EBT State agencies, including SBO restrictions for milk and eggs, container size restrictions for cereal, and many organic restrictions. To be examined in the participant outcomes analysis, food-specific restrictions needed to be present in at least 2 but no more than 10 of the 12 EBT State agencies. If a food-specific restriction was present in only one State agency, it would be impossible to know whether observed associations were indicative of a relationship between the restriction and the outcome or a relationship between some unmeasured or unknown factor in the restrictive State

agency. Although it may be reasonable to extrapolate the findings from this study to other similar restrictions, FNS could—

Conduct additional small-scale studies to directly evaluate the effectiveness of common food-specific restrictions that could not be examined through this study. These studies could be much more focused than the current study and rely solely upon EBT data. With EBT data from a purposive sample of State agencies, FNS could examine and compare estimated cost savings and redemption rates among State agencies with and without a specific restriction using the same methodology employed for this study. Although participant survey data were also used to identify promising practices, an assessment of redemption rates might be most telling and could be examined with existing administrative data.

Findings from this study did not provide a clear picture of how participants would respond to the implementation of a new restriction or the discontinuation of a current restriction—only what could expect to be observed in the presence of a different condition. For example, although the Survey of WIC Participants was able to measure household satisfaction with brands of WIC foods in State agencies both with and without brand restrictions, because none of the 12 EBT State agencies changed their brand restriction policies during the study timeframe, and the survey was administered at only a single point in time (not pre/post), the study team could not measure change in satisfaction. Households in State agencies that have implemented LEB restrictions for some foods for many years may exhibit a high rate of participant satisfaction because participants are comfortable with the policy. However, if the same policies were newly implemented in a different State agency, and households were no longer able to purchase their preferred items, then the State agency might encounter higher levels of participant dissatisfaction than were measured in this study. Ideally, FNS should—

Evaluate the impact of food-specific restrictions by tracking and monitoring certain outcomes over time (i.e., before and after a restriction is implemented or eliminated) or encourage State agencies to do so. Again, EBT data could be used to support this type of evaluation or monitoring. Simply tracking the food-category costs per participant month (i.e., total monthly food-category costs divided by total monthly caseload) and overall redemption rates for the food category (i.e., the total number of units redeemed within the food category divided by the total number of units issued) for a period before and after a change were implemented would provide valuable insight into the effects of the restriction. State agencies frequently use participant surveys to identify food-specific restrictions least likely to affect participant outcomes (i.e., satisfaction, redemption, and consumption) and to understand the effects of restrictions once implemented. Findings from this study demonstrate responses to such surveys may be subject to social desirability bias, meaning respondents may indicate high levels of satisfaction with a food or food brands, for example, but subsequently be less likely to fully redeem their benefits. Although it is important to understand the perspectives, needs, and preferences of WIC participants, close monitoring of redemption rates might also serve an important role in understanding the effects of a new policy or restriction.

The aforementioned approaches might also be useful for evaluating restrictions on food alternatives. Although the study did examine four food alternative restrictions, the evidence was inconclusive because the methodology employed in this study was not optimized for estimating cost savings from these restrictions. The estimates for these restrictions incorporated the prices and purchases of many other subcategories within the major food category and thus created the potential for substantial bias. For example, although restrictions on tofu and yogurt as alternatives for cow's milk were associated with significant average cost savings per participant month, these cost savings estimates were calculated using price and purchase data from across the cow's milk category, which were influenced by a variety of factors, including other food-specific and food alternative restrictions. Unlike other restrictions, which simply limit the options within a food category or subcategory, food alternative restrictions eliminate the entire food category. Therefore, it was not possible to survey participants about their satisfaction with brands or their redemption or consumption of these foods in State agencies that did not allow the alternative foods. The aforementioned approaches, particularly the longitudinal tracking of food-category costs and redemption rates, may be useful for better evaluating food alternative restrictions.

Future research on the relationship between WIC food restrictions and health outcomes could address several of the limitations of the analysis of participant health outcomes. WIC food restrictions could affect health either through the effects on program participation or dietary intake. This study was only able to examine the relationship of food restrictions on health by observing the indirect relationship of health with benefit redemption. However, because program participation (or program exit) and the amount of WIC benefits redeemed (or consumed) is likely also associated with additional, unobservable factors related to health outcomes, this approach is subject to a likely "omitted variable bias." To address this limitation, FNS should—

Conduct a study that compares participant outcomes in periods before and after a food restriction was implemented, and compare participant outcomes in State agencies where restrictions did versus did not change. As part of the study, it would be important to document and consider what prompted implementation of a food-specific restriction in the first place. This study could also collect dietary recall data from a sample of participants in selected State agencies to examine the relationship between WIC benefit redemption and food consumption, and the effect of the change in food restrictions on food consumption. This approach would also benefit from conducting follow-up surveys with participants who unenroll from WIC during the study period to observe their dietary consumption and health outcomes. This would provide useful information on the potential unintended consequences of WIC food restrictions on the dietary intake and health of participants who may unenroll from WIC in response to food restrictions.

References

- CDC (Centers for Disease Control and Prevention). (1998). Recommendations to prevent and control iron deficiency in the United States. *Morbidity and Mortality Weekly Report (47).*
- CDC. (2016). Growth chart training: A SAS program for the 2000 CDC growth charts (ages 0 to <20 years) [Instructions and data files]. <u>https://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm</u>
- CDC. (2018). About child & teen BMI. https://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html
- Davis, D. E., & Leibtag, E. S. (2005). Interstate variation in WIC food package costs: The role of food prices, caseload competition, and cost-containment practices (Research Report No. 41). https://www.ers.usda.gov/webdocs/publications/46843/28944_fanrr41.pdf?v=0
- Gray, K., Trippe, C., Tadler, C., Perry, C., Johnson, P., & Betson, D. (2019). *National- and State-level* estimates of WIC eligibility and WIC program reach in 2017. <u>https://www.fns.usda.gov/wic/national-</u> and-state-level-estimates-wic-eligibility-and-wic-program-reach-2017

Healthy, Hunger-Free Kids Act, 42 U.S.C. § 1751 (2010).

- Kirlin, J. A., Cole, N., & Logan, C. (2003). Assessment of WIC cost-containment practices: Final report (Report No. E-FAN-03-005). https://www.ers.usda.gov/webdocs/publications/43251/30911_efan03005_002.pdf?v=0
- Special Supplemental Nutrition Program for Women, Infants and Children (WIC), 7 C.F.R. § 246.12 (2010).
- Special Supplemental Nutrition Program for Women, Infants and Children (WIC), 7 C.F.R. § 246.10 (2014).
- Thorn, B., Huret, N., Bellows, D., Ayo, E., Meyers, R., & Wilcox-Cook, E. (2015). *WIC food packages policy options: Study II.* U.S. Department of Agriculture, Food and Nutrition Service, Office of Policy Support.
- U.S. Census Bureau. (n.d.). U.S. Census Bureau's 2010 Urban Area to ZIP Code Tabulation Area (ZCTA) relationship file [Datasets]. <u>https://www.census.gov/geographies/reference-files/2010/geo/relationship-files.html#par_list</u>
- USDA FNS (U.S. Department of Agriculture, Food and Nutrition Service). (n.d.a). *FNS regional offices*. https://www.fns.usda.gov/fns-regional-offices
- USDA FNS. (n.d.b). WIC program grant levels by fiscal year. https://www.fns.usda.gov/wic/wic-programgrant-levels-fy
- USDA FNS. (2016). WIC food packages: Regulatory requirements for WIC-eligible foods. http://www.fns.usda.gov/wic/wic-food-packages-maximum-monthly-allowances

- USDA FNS. (2018). Special Supplemental Nutrition Program for Women, Infants and Children (WIC): Food package policy and guidance. https://fns-prod.azureedge.net/sites/default/files/wic/WIC-Food-Package-Policy-Guidance-2018.pdf
- USDA FNS. (2019). *Monthly data: State-level participation by category and program costs* [Excel file]. https://www.fns.usda.gov/pd/wic-program
- USDA FNS. (2020a). *WIC program: Food cost data as of February 14, 2020* [Table]. <u>https://fns-prod.azureedge.net/sites/default/files/resource-files/24wicfood\$-2.pdf</u>
- USDA FNS. (2020b). *WIC program: Total participation data as of February 14, 2020* [Table]. <u>https://fns-prod.azureedge.net/sites/default/files/resource-files/26wifypart-2.pdf</u>
- USDA FNS. (2020c). *WIC program participation and costs: Data as of January 03, 2020* [Table]. <u>https://fns-prod.azureedge.net/sites/default/files/resource-files/wisummary-1.pdf</u>
- USDA FNS. (2020d). WIC State agency EBT detail status report [Table]. <u>https://fns-</u> prod.azureedge.net/sites/default/files/resource-files/February2020WICEBTDetailStatusReportR1.pdf
- USDA OIG (Office of Inspector General). (2014). *State agencies' food costs for the Food and Nutrition Service's Special Supplemental Nutrition Program for Women, Infants, and Children* (Audit Report No. 27004-0001-22). Author.