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2005 WIC Vendor Management Study

Final Report

United States Department of Agriculture
Food and Nutrition Service

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Health Systems Research, Inc.

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EXECUTIVE SUMMARY

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) serves low-income pregnant, breastfeeding, or postpartum women, and infants and children up to age 5 who are at nutritional risk. In almost all States, the program provides eligible recipients with vouchers that can be used at authorized stores – referred to as vendors. The 46,000 authorized vendors are mostly grocery stores and pharmacies that have signed agreements to follow program rules.

In 1998, the Food and Nutrition Service (FNS), which administers the program, studied a nationally representative sample of WIC vendors to determine the extent to which they charge accurate prices to WIC shoppers and how vendors adhere to program rules.[1] After the 1998 study, FNS issued regulations to correct vendor practices.[2] This report replicates the 1998 study to monitor if the regulations were effective, and to measure the frequency with which vendors adhere to program rules and the degree to which they charge accurate prices to WIC recipients. It also provides data on payment error as required by the Improper Payments Information Act (IPIA).[3]

Key Findings

- ***The frequency and dollar impact of overcharging and undercharging reached historically low rates in 2005.***
- ***Of the $3.56 billion spent by WIC on food benefits in 2005, overcharging accounted for $6.1 million and undercharging for $15.4 million – the first time undercharging exceeded overcharging.***
- ***This results in an IPIA erroneous payment estimate of $21.5 million[4], or six-tenths of one percent of the 2005 food benefit portion of the WIC Program.***

[1] U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition and Evaluation, WIC Vendor Management Study, 1998 Final Report, by Loren Bell et al. Project Officers: Patricia McKinney, Boyd Kowal. Alexandria, VA: 2001.

[2] U.S. Department of Agriculture, Food and Nutrition Service, Supplemental Food Programs Division, "Regulatory Changes that Impacted WIC Vendor Management Between 1998 and 2004." Alexandria, VA: 2002.

[3] Improper Payments Information Act of 2002, P. L. 107-300.

[4] The IPIA requires that the absolute value of overpayment and underpayment be summed.

- ***The new, lower rates of vendor mischarging appear to reflect improvements in program management as a result of the significant revision of the Federal Regulations for WIC Program Vendor Management between 1998 and 2004.***

BACKGROUND

To administer the program, the Food and Nutrition Service (FNS) of USDA provides grants to States to fund supplemental foods, nutrition education, and health care and social service referrals to low-income pregnant, breastfeeding, or postpartum women, and infants and children up to age 5 who are at nutritional risk. States and 34 Indian Tribal Organizations (ITOs) provide services to clients at clinics located in health departments, hospitals, mobile vans, community centers, schools, public housing sites, migrant health centers and camps, and Indian Health Service facilities. At these clinics, clients receive vouchers for nutritious foods that they can use at approximately 46,000 authorized food retailers and pharmacies (referred to as vendors). States are responsible for authorizing and monitoring vendors.

The 2005 WIC Vendor Management Study is the third in a series of studies exploring State vendor characteristics and management practices.[5] Partly in response to findings in the 1998 vendor management report, between 1998 and 2004, Federal regulatory changes were instituted that impacted WIC vendor management. The regulations were specifically intended to reduce vendor overcharging and other violations. The 1998 WIC Vendor Management Study, which was conducted before the regulatory changes, may be seen as a pre-test while the 2005 Study may be seen as a post-test of the regulatory changes. As such, the objective of the 2005 study was to investigate the extent to which vendor violations - including administrative violations, overcharging, undercharging, and improper payments - were reduced following the regulatory changes.

METHODOLOGY

A nationally representative sample of 1,600 WIC-approved vendors was identified. Undercover shoppers who fit the profile of WIC recipients conducted about 4,800 compliance buys at these vendors. There were three types of compliance buys. In the first, known as a "safe buy," the undercover shopper followed program rules; they attempted to purchase all items prescribed for them on the WIC voucher with no substitutions. In the second buy type, referred to as "partial buys," the undercover shopper attempted to purchase some but not all of the items prescribed on

[5] Previous reports presented findings from 1991 (WIC Vendor Issues Study, 1991 Final Report) and 1998 (WIC Vendor Management Study, 1998 Final Report).

the WIC voucher. For the third buy type ("substitution buy"), the shopper attempted to substitute an unapproved food for one (or more) of the prescribed food items.[6]

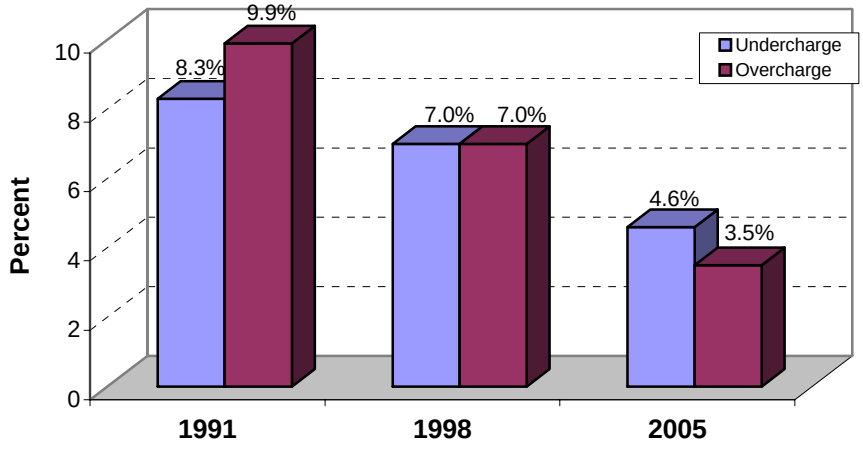
From the compliance buy data, the rates and amounts of overcharge, undercharge, and total improper payment were calculated. Compliance buys also provided data on whether the store and the transaction were in accord with program rules (e.g. sufficient food stock on hand, not charging cash in addition to the WIC voucher). In addition to compliance buys, information was collected from sample States to assess State vendor management practices across the nation. The results of the 2005 study were compared with those of the 1991 and 1998 studies.

FINDINGS

Overcharge and Undercharge

An overcharge (or undercharge) occurs when a vendor charges a WIC client a different price than a non-WIC consumer would pay. Overcharge and undercharge frequency rates for safe buys have dropped progressively since 1991 (Figure ES-1). For the first time, the rate of undercharge exceeded overcharge in 2005.

Figure ES-1: CHANGES IN OVERCHARGE AND UNDERCHARGE RATES IN 1991, 1998 AND 2005



Source: 2005 WIC Vendor Management Study

[6] Substitution buys were further broken down into minor substitutions (substituting an item of the same category as a WIC food – e.g. cereal or juice – but not on the WIC approved list; WIC-only store minor substitution is defined as allowing the purchase of more of one WIC food than authorized in place of another – e.g. cereal in place of milk) and major substitutions (substitution of an item that does not fall within one of the WIC food categories – e.g. soda instead of juice).

The prices that vendors charge WIC customers are substantially accurate:

- Overcharge rates in 2005 were about one-third the 1991 level and half of the 1998 level. The 1991, 1998 and 2005 overcharges were respectively 9.9%, 7.0% and 3.5% of safe buys.
- Undercharge rates were slightly more than half of the 1991 level and about two-thirds of the 1998 level. The 1991, 1998, and 2005 undercharge rates were respectively 8.3%, 7.0% and 4.6% of safe buys.
- The average dollar amount of overcharge dropped from $0.19 per buy in 1998 to $0.06 per buy in 2005.
- The average undercharge amount dropped from $0.08 per buy in 1998 to $0.04 per buy in 2005.
- The differences between the average undercharge and overcharge amounts have narrowed from $0.11 in 1998 to $0.02 in 2005.
- The national dollar estimate of overcharge in 2005 was $6.1 million; the estimate of undercharge was $15.4 million (Table ES-1). This results in a net undercharge to the program of $9.3 million.

Table ES1: National Annual Overcharge and Undercharge Estimates, 2005

	Overcharge (in millions)	**Undercharge** (in millions)	**Difference** (in millions)	**Total Improper Payment (Absolute Sum)** (in millions)
Amount	$6.06	- $15.41	- $9.34	$21.5

Source: 2005 WIC Vendor Management Study

Overcharges are not distributed evenly across all vendors:

- Small vendors are 8 times more likely to overcharge than large vendors.
- Vendors that do not provide a receipt are 11 times more likely to over charge than vendors that provide one.

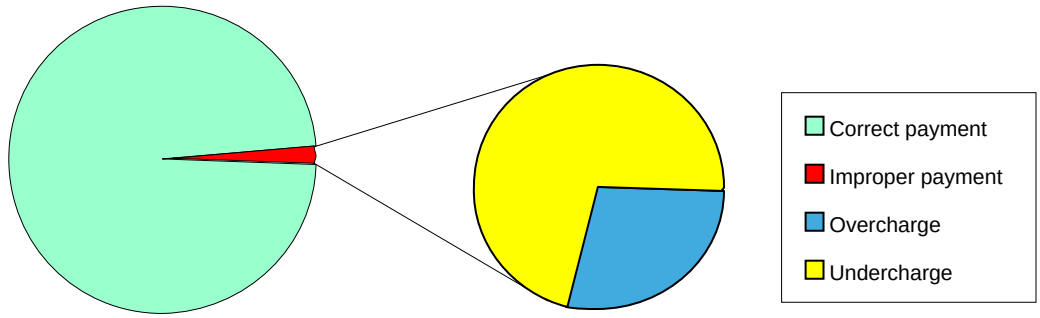
Improper Payments

In accordance with the Improper Payments Information Act of 2002 (Public Law 107-300), and OMB guidelines of May 2003, improper payments were calculated as the absolute sum of overcharges[7] and undercharges.

[7] Overcharges include credits. In some cases, when a food item is out of stock, a vendor issues a credit voucher to the client for a food item on the WIC voucher (for which the program is eventually billed) which the client is expected to present at the next visit and claim the item. Since there is no way of knowing whether the client would actually return to the store to claim the food, credits are treated as overcharge.

- The total improper payment amount in 2005 was $21.5 million (absolute sum of undercharge and overcharge).
- Improper payments represented 0.6 percent (or six-tenths of one percent) of total food redemptions of $3.56 billion (Figure ES-2).

FIGURE ES-2: WIC IMPROPER PAYMENTS IN 2005 WERE LESS THAN ONE PERCENT OF OUTLAYS; UNDERCHARGES EXCEEDED OVERCHARGES



Source: 2005 WIC Vendor Management Study

Administrative Violations

Administrative violations occur when vendors fail to follow proper procedures or State requirements when conducting a WIC transaction. They may not result in an improper payment but could be associated with substitution as in the 1991 and 1998 studies (see Figure ES-3).

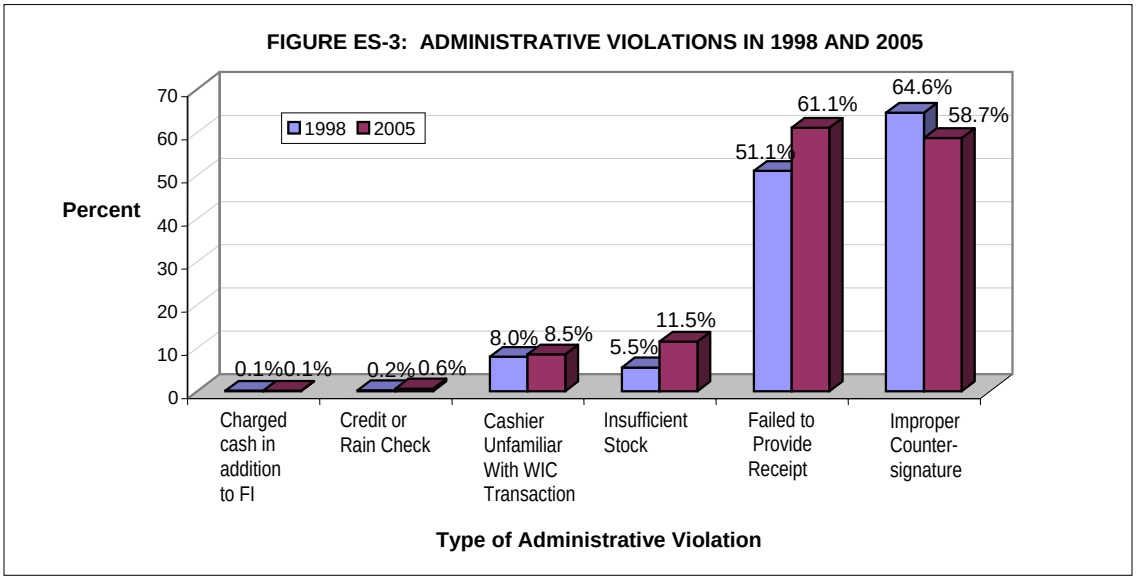
- In 2005, failure to provide a receipt (61% of the time) and improper countersignature (59%) were the most pervasive administrative violations. Failure to provide a receipt increased while improper countersignature declined since 1998.

Participant-Initiated Substitutions

WIC foods are provided in specific packages to ensure that participants receive appropriate types and quantities of nutritional foods. It is important to track substitution because changing an approved food to an unapproved food can undermine the nutritional purpose of the WIC Program. Substitutions were classified into two major groups:

- **Minor substitution –** substituting an item that is of the same category as a WIC food (e.g., cereal, juice) but not on the WIC-approved list. (WIC-only store minor substitution was defined as allowing the purchase of more of one WIC food than authorized in place of another, e.g., cereal in place of milk.)

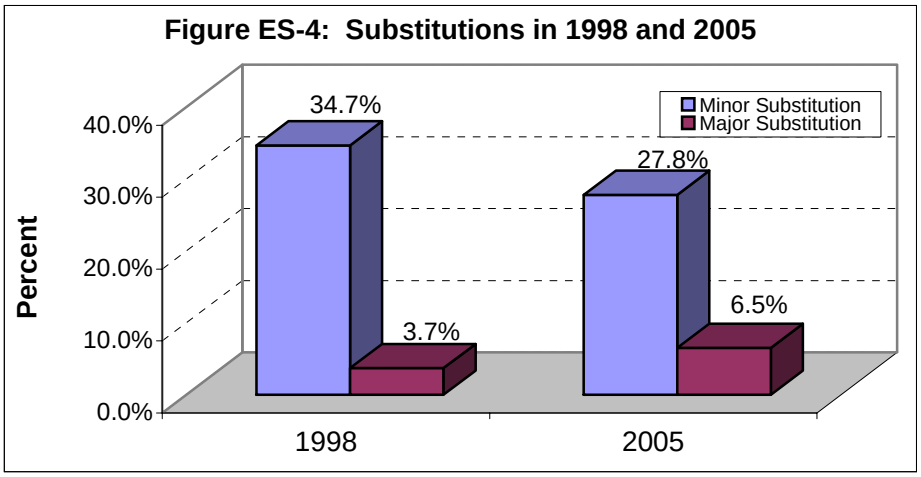
- **Major substitution –** substitution of an item that does not fall within one of the WIC food categories, e.g., soda instead of juice.



Source: 2005 WIC Vendor Management Study

In 2005, data were collected on participant-initiated substitutions.

- The rate of allowance of minor substitution dropped since 1998 (from 34.7% to 27.8%), while the allowance of major substitutions increased (from 3.7% to 6.5%) (Figure ES-4).
- Minor substitutions were most likely to be allowed in pharmacies, while major substitutions were most likely to be allowed at small grocers that do not scan food items.

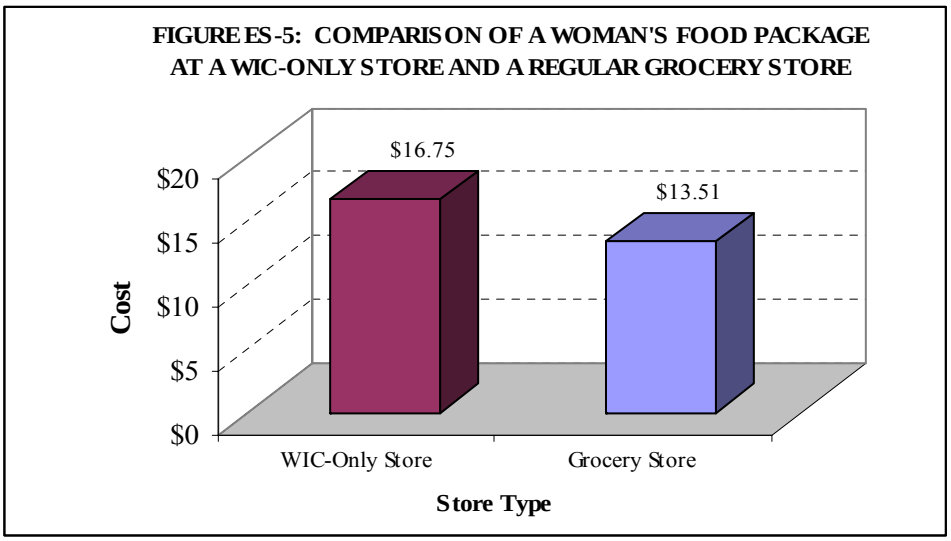


Source: 2005 WIC Vendor Management Study

WIC-Only Stores

WIC-only stores stock only WIC approved foods and only accept WIC vouchers for payment. It is commonly thought that these stores charge the government more for these foods than do traditional WIC vendors. Therefore, the cost of a WIC food package was compared at WIC-only and other stores using safe buys in the three States with the largest number of WIC-only stores (Texas, California, and Florida). The results showed that:

- The costs of both woman and child food packages were higher in WIC-only stores than in medium and large grocery stores. For example, the average cost of a woman's food package (safe buys) at a WIC-only store ($16.75) was 24 percent higher than at a grocery store ($13.51) - a marginal difference of $3.24. This difference was not statistically significant.[8]



Source: 2005 WIC Vendor Management Study.

- Most compliance buyers received gifts or incentives from WIC-only stores on the first visit just for being first-time customers.

8 The study found an apparent difference in the cost of a typical food package between WIC-only and regular grocery stores. The study was not designed to investigate reasons for this difference. However, possible reasons include variations in brand names carried by different store types and the selection behavior of compliance buyers. Compliance buyers were not given special instruction on the choice of food brands. But since store brand authorization varied among States, compliance buyers were encouraged to select name brands unless the State required a store brand. In States where the brand name is printed on the food instrument, the compliance buyer will choose the same brand in all store-types. Where the brand name is not printed on the food instrument, brands selected by compliance buyers would not be comparable between store-types. Therefore, some of the difference may attributable to this factor.

- The commonest gifts were raffle tickets (for weekly/monthly drawings for prizes, e.g., microwaves, bicycles, trips, etc.) and stamps or tickets for redeeming larger gifts at the next visit.
- WIC-only stores in California were more likely to offer gifts than in Texas and Florida.

CONCLUSION

A comparison of WIC Vendor studies before (1991 and 1998) and after (2005) the implementation of regulatory changes, shows a considerable improvement in the amount of vendor overcharging and undercharging.

- The frequency and dollar impact of overcharging and undercharging reached historically low rates in 2005.
- Of the $3.56 billion spent by WIC on food benefits in 2005, overcharging accounted for $6.1 million and undercharging for $15.4 million – the first time undercharging exceeded overcharging.
- This results in an Improper Payments Information Act (IPIA) erroneous payment estimate of $21.5 million ($6.1 million + $15.4 million), or six-tenths of one percent of the 2005 food benefit portion of the WIC Program.
- The new, lower rates of vendor mischarging appear to reflect improvements in program management as a result of the significant revision of the Federal Regulations for WIC Program Vendor Management, some of which became effective in 1999, and the rest in 2002.

CHAPTER 1: INTRODUCTION

In 2004, the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA) contracted with Health Systems Research, Inc. (HSR) and their partner, RTI International (RTI), to conduct a study to examine the management of the retail delivery systems of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). The WIC program provides vouchers to clients, which can be used to purchase specific foods at retail stores and pharmacies. This study was requested in the President's budget for FY 2003 and included in the final appropriation as a line item. The purpose of this study was to determine the extent to which retail grocers, also known as WIC vendors, followed program rules. Foremost among the rules examined were the requirements for the vendor to complete the WIC transaction at checkout in accordance with proper WIC program procedures, provide only authorized WIC foods to the participant, and charge the WIC program appropriately for food benefits provided.

The study was commissioned to develop estimates of vendor noncompliance and analyze associations between noncompliance and vendor and program characteristics through a variety of activities, including:

- Developing a national profile of State vendor management practices using information gathered from State vendor management plans;
- Estimating the prevalence and incidence of WIC vendor abuse by conducting compliance purchases in a nationally representative sample of WIC vendors;
- Analyzing compliance buy data by characteristics of vendors and State vendor management systems; and
- Comparing the results of the 2005 study to those of the 1991 and 1998 WIC Vendor Management Studies to examine changes in rates of program violations.

This report presents findings from the analysis of the compliance buy data and comparisons of the 2005 results with those of the 1991 and 1998 WIC Vendor Management studies. The results of the sub-study on the national profile of State vendor management practices are published in a separate, supplemental report.

A. Organization of the Report

This report is organized into nine chapters. Chapter I, the Introduction, provides background information on the WIC program retail delivery systems and the unique aspects of WIC-only stores. Chapter II discusses the methodology used to select a national sample of WIC vendors for the study and describes the data collection methodology. The third chapter describes the characteristics of the study population, and the fourth chapter presents findings related to vendor administrative violations. Chapter V presents issues related to vendor overcharges and undercharges, while the sixth chapter presents specific estimates of improper payments consistent with the Improper Payments Information Act (IPIA). Chapter VII addresses issues related to the substitution of foods not approved by the WIC program. Chapter VIII discusses findings related specifically to WIC-only stores. The final chapter, Chapter IX, presents the summary of findings, and the conclusions and recommendations.

B. Background on WIC Program Retail Delivery Systems

The WIC program was established in 1972 through an amendment to the Federal Child Nutrition Act of 1966. It is a Federal grant program established for the purpose of providing supplemental foods, nutrition education, and health care and social service referrals to low-income women who are pregnant, breastfeeding, or postpartum, as well as infants and children up to age 5. WIC is administered at the Federal level by FNS and at the State level by health departments in the 50 geographic States and the District of Columbia, 4 trust territories, and 33 Tribal "State agencies." The State WIC agencies, in turn, pass a portion of the program administration and nutrition education funds on to local WIC programs, which provide direct client services.

In FY 2004, the total Federal expenditure for food benefits in the WIC program was $3.56 billion, most of which passed through approximately 46,000 authorized retailers, called vendors. WIC program regulations require that each State agency develop a food delivery system to provide authorized food benefits to WIC participants. States use several methods to deliver food

benefits to participants, including retail purchase, home delivery, and direct distribution.[9] This study is focused on those States that employ a retail food delivery system through vendors that include grocery stores, pharmacies, or WIC-only stores (stores serving WIC participants only).

The majority of States deliver benefits to participants through a retail delivery system, issuing food instruments (FIs) to participants in the form of a check or voucher. Some States, like Wyoming, issue benefits through Electronic Benefits Transfer (EBT) using a card that works like a debit card. Each month, the WIC participant receives from the local WIC clinic a series of FIs that combine a variety of food categories to meet a food prescription. The participant takes the FI to an authorized store, selects foods from the prescribed categories, and pays for the foods by presenting the WIC FI to the cashier. Currently, a few States operate a "vendor-specific" retail system, in which participants are required to select a single authorized store at which they must purchase all of their WIC foods. Most States operate an "open" system, in which participants may use their FIs at any WIC-approved store. Both types of vendors are included in the 2005 study.[10] Of the 45 states that were eligible for participating in the 2005 study, only 6 states (13.3 percent) used a vendor-specific retail system.

State WIC agencies are responsible not only for establishing a food delivery system but also for authorizing retail grocers, providing program benefits, and monitoring that food benefit funds are properly spent on authorized WIC foods. Because of the large amounts of money that pass through WIC vendors, the WIC agencies are also required to ensure that retail grocers follow program rules and guidelines when redeeming FIs. It is also important that States make an effort to ensure the integrity of the nutritional purpose of the WIC program. Thus, it is critical that States develop effective vendor management programs. This often requires the development of sophisticated systems to prevent or detect fraud and abuse of the program; fraud may involve only the WIC vendor or both the WIC vendor and the WIC participant. Over the years, State agencies have developed a variety of methods for managing vendors. Techniques include strict vendor selection criteria, comprehensive vendor training, routine monitoring, high-risk vendor

[9] A number of States were excluded from the Study. WIC vendors in Alaska, Hawaii, and U.S. Territories were excluded because of the high costs associated with surveying those areas. Mississippi was excluded because it distributes WIC foods through State-run warehouses only; Vermont, because WIC foods are distributed through a home delivery system; and North Dakota, because it did not track vendor information needed for the sample and also allowed rain checks for milk purchases. Home delivery vendors in Ohio and direct distribution food delivery sites in Illinois were also excluded.

[10] The Child Nutrition and WIC Reauthorization Act of 2004 (P.L. 108-265), effective October 1, 2004 (at approximately the same time as the beginning of data collection), amended the Child Nutrition Act to require that State WIC agency food delivery systems be non-vendor-specific, allowing participants to use their FIs at any authorized vendor. Vendor-specific systems are currently being phased-out.

identification systems, and compliance investigations including compliance buys and inventory audits.

C. Background on WIC-only Stores

Historically, retail grocery stores have been the most efficient and cost-effective means of providing program benefits. Competition between grocers, access to bulk purchasing of foods, and grocer-authorizing and monitoring procedures have served to keep prices down and program abuse limited (U.S. Department of Agriculture, Food and Nutrition Service, 2001b). For the past decade, the WIC program has successfully leveraged market and regulatory forces to contain program food costs. Thus, while food prices in general have increased 28 percent over the past 10 years, the cost of WIC foods has risen only 18 percent (Neuberger and Greenstein, 2004).

Since the last WIC vendor management study was conducted in 1998, there has been a major change in the WIC program food delivery system, the emergence of retail grocers that serve only WIC clients. This change has altered the dynamics of food costs for many State WIC agencies. WIC-only stores are designed to exclusively serve WIC clients, carry only WIC foods, and accept no payment other than WIC checks or vouchers.[11] They are typically set up in small warehouses or mini-malls located near WIC clinics. They often offer participants special incentives, such as free baby goods, extra food, financial rewards, or drawings for larger gifts (e.g., bicycles, televisions), for shopping there.

WIC-only stores are very popular with WIC participants. The owners contend that their popularity stems from a number of special advantages that they offer to customers, including the following (Neuberger and Greenstein, 2004):

- **Customer convenience.** They are often located close to WIC clinics, offering the advantage for participants of one-stop shopping and reducing the distance customers must travel to obtain their food.

- **Ease of making food choices.** Because they carry only WIC-approved foods, customers can avoid being confused by the numerous types and brands of foods in a regular grocery store, some of which are authorized and others are not. WIC-only store officials also argue that their setup prevents participants from receiving unauthorized foods, which prevents fraud and abuse.

[11] Some WIC-only stores may accept cash for small incidental items, such as a soda or candy bar.

- **Extra customer service and support.** WIC-only stores officials claim they have friendlier staff; provide extra services, such as helping participants take their food to their cars; and provide incentives (noted above) as a bonus.

- **Avoiding customer embarrassment or stigma.** WIC participants may be embarrassed about being on the program or feel that regular store staff members treat them differently from other customers. These risks are reduced if they can shop at a store where all the shoppers are WIC clients.

There is, however, one major disadvantage with WIC-only stores. They charge higher prices to the States for WIC foods than do other authorized stores. For example, a study of WIC-only store prices in California found that the prices for food items to fill a typical woman's or child's food package were 13 to 16 percent higher than in the WIC-only stores located in competitive markets (Neuberger and Greenstein, 2004). This difference can largely be attributed to two factors: (1) they do not have to compete with other grocery stores for non-WIC customers, and (2) they often lack access to bulk wholesale purchasing. As a result, it appears that they often set their WIC food prices significantly higher than those of chain stores or even smaller independent markets. Even comparing them with small "mom and pop" stores, which often charge higher prices, WIC-only stores were still found to be more expensive. For example, the cost of milk is 6 percent more and the cost of peanut butter is about 7 percent more in WIC-only stores than in small markets with two or fewer cash registers (Neuberger and Greenstein, 2004).

The prices States pay for WIC foods have a significant impact on program costs, because the WIC program is not an entitlement. Thus, the number of clients who can be served by a given State is based on the amount of food money available to a State and the cost of the WIC foods purchased. If the cost of WIC foods rises, it reduces the number of WIC clients who can receive services. For example, California officials estimate that the high cost of food from WIC-only stores translates into 50,000 fewer participants served by the program (California WIC Association, 2005).

To address what State and Federal officials perceive to be problems with WIC-only stores, Congress passed two significant provisions related to State authorization, management, and monitoring of WIC-only stores. First, Congress established a moratorium on the authorization of new WIC-only stores until better controls could be put into place. In re-authorizing the WIC program in FY 2004, Congress included a provision requiring States to establish pricing peer group systems except in limited situations. WIC-only stores can be placed in their own peer group or in a group with other vendors. In either case, their prices cannot be considered when

establishing competitive pricing policies or reimbursements to stores. State agencies must ensure that reimbursements paid to "above-50-percent vendors"[12] do not result in higher food costs than if participants transacted their food instruments with regular vendors. In addition, WIC-only stores will be prohibited from providing incentives they currently offer. Second, the new Federal rules refer to "above-50-percent vendors" as those stores from which 50 percent or greater food sales come from WIC transactions, which include WIC-only stores.[13] In discussions with State WIC Vendor Managers during the data collection phase of this study, it was discovered that States were just beginning to develop methods of implementing these rules.

Because little is known with regard to the national impact of WIC-only stores, they were included in the 2005 study as an over sampled group of vendors. For most of the findings, the WIC-only stores are compared to grocers and pharmacies, both in terms of vendor classification and size variables. However, since they have some unique aspects that warrant examination, a separate section discussing WIC-only store findings is also included.

D. Regulatory Changes that Impacted WIC between 1998 and 2004

FNS issued two regulations between 1998 and 2004 that were specifically intended to reduce the incidence of vendor violations.

- *The WIC/Food Stamp Program Vendor Disqualification Final Rule,* published in March 1999, mandated uniform sanctions across State WIC agencies for the most serious WIC Program vendor violations in order to curb vendor-related fraud and abuse. States were required to implement the provisions by October 1, 1999.

- *The WIC Food Delivery Systems Final Rule,* published in December 2000, established mandatory vendor selection criteria, training and monitoring requirements, and criteria for identifying high-risk vendors. State agencies were required to implement the provisions by October 1, 2002.

The 2005 study can be viewed as a post-test of the regulatory changes implemented in 1999 and 2002 (See Appendix).

[12] Above 50-percent vendors are WIC-authorized vendors that derive more than 50 percent of their annual food sales revenue from WIC food instruments.

[13] Since this rule was not in place at the time of data collection, the study team relied on States to provide the proper classification of stores as "WIC-only." The stores classified as WIC-only in this study were stores where 95 to 100 percent of all sales were WIC transactions. Data were not available to re-classify other vendors that might have met the new definition.

CHAPTER 2: STUDY METHODOLOGY

A. Overview of Methodology

This chapter describes the methods and procedures used to identify a nationally representative sample of WIC-approved vendors, conduct the data collection, process the data, develop an electronic data file, establish statistical weights for each sampled vendor, and conduct the data analysis. It also presents a comparison between the characteristics of the study populations and samples of the 2005 WIC Vendor Management Study and those of the 1991 and 1998 studies.

B. Developing the Sample Plan

The 2005 study employed a nationally representative probability sample of WIC vendors. A two-stage clustered design was developed to facilitate the over-sampling of WIC-only stores. The following subsections describe the basic steps involved in developing and implementing the sampling plan. The detailed sampling plan is provided in Appendix H.

1. Defining the Survey Population

The study population was comprised of all vendors operating in States with retail food delivery systems. Excluded from the study were States with direct distribution delivery systems (Mississippi and a few in Chicago, Illinois), and home delivery systems (Vermont and some parts of Ohio). Military commissaries and pharmacies (which only provided WIC participants with special order infant formula or WIC-eligible medical foods) were also excluded. Vendors in Alaska, Hawaii, North Dakota, and the U.S. Territories, as well as vendors authorized solely by Indian Tribal Organizations,[14] were also excluded from the study population. Exclusion criteria were based on several factors, including the relative high cost of collecting data from areas outside the 48 contiguous States, the difficulty in gaining access to military bases, the fact that the data collection approach was not appropriate or applicable to home and direct distribution delivery systems, and the fact that vendors in these areas provide food benefits to only 4.5% of the WIC program participants

[13] Some Indian Tribal Organizations (ITOs) share vendors with the State in Oklahoma, Arizona, and North Carolina.

and represent 5.1% of the food costs.[15] Forty-five States and the District of Columbia were represented in the survey population.

As mentioned previously, WIC Vendor Studies were also conducted in 1991 and 1998. Since this report will compare results of the 2005 study with the prior studies, it is also necessary to compare the study populations and sampling techniques of these studies. Some similarities and differences exist in the way the three studies' populations were chosen. For example, all three studies used a nationally representative sample including only States with retail delivery systems and excluding Mississippi, Vermont, Indian Tribal Organizations, and military commissaries, as well as Alaska, Hawaii, and U.S. Territories. The 1998 and 2005 studies also excluded pharmacies providing only special infant formula, as well as North Dakota and parts of Ohio and Illinois. Each study differed in what population was chosen for over sampling to test a specific hypothesis. In 1991, "other than large chain stores" were over sampled; in 1998, vendors in vendor-specific States were over-sampled; and in 2005, WIC-only stores were over sampled. The designs of the 1998 and 2005 studies were practically identical. Further similarities and differences in the characteristics of the three study samples are detailed in Table II-1.

2. Constructing the Sampling Frame for the 2005 Study

To build the frame from which a national sample of vendors would be selected, current lists of authorized retail vendors were requested from each of the 45 States and the District of Columbia. Information regarding each vendor, including name and address, vendor type (pharmacy, WIC-only, or grocery), and WIC monetary redemption amounts was obtained and used to select the sample. States were asked to review the lists and identify home food delivery contractors, State-run vendors, military commissaries, and pharmacies that only provide special order infant formula for exclusion from the sampling frame. Also excluded were vendors with zero redemption dollars (less than 1 percent of the listed vendors) and vendors with a pending WIC administrative action. Vendors with pending administrative actions were excluded by WIC State Agencies prior to HSR receiving the lists.

The vendor lists were standardized to adjust for formatting differences across States. Edit checks included verifying missing or zero redemption dollars, missing vendor classifications, missing address information, and duplicate vendor listings.

[15] Data were obtained from the 2005 table of WIC Food Costs and WIC Participation accessed on the web pages: http://www.fns.usda.gov/pd/wicfood$.htm and http://www.fns.usda.gov/pd/wifypart.htm.

Table II-1. Similarities and Differences in Characteristics of the 1991, 1998, and 2005 Samples

	1991	1998	2005
Study Population	Included vendors from 46 of the 48 contiguous States, plus Washington, DC, all of which have retail food delivery systems. Also included pharmacies and drug stores (2.2% of the sample).	Included vendors operating in States with retail food delivery systems plus Washington, DC.	Included. Same as 1998.
	Excluded Mississippi, Vermont, Indian Tribal Organizations, and military commissaries.	Excluded Mississippi, Vermont, North Dakota, parts of Ohio and Illinois, military commissaries, pharmacies, Alaska, Hawaii, U.S. Territories, and Indian Tribal Organizations.	Excluded reasons: ▪ Mississippi and North Dakota operate non-standard food distribution systems, as do a few Illinois food centers and Ohio home delivery sites. ▪ Alaska, Hawaii, and U.S. Territories excluded for prohibitive study logistics and costs. ▪ Military commissaries and Indian Tribal Organizations excluded for access reasons Pharmacies that stock only special order infant formula excluded for cost reasons (all other pharmacies were included).
Sampling Frame	Vendors were selected using a two-stage probability selection: primary sampling units (PSUs) and then vendors within PSUs. PSUs were defined as WIC vendors contained in a group of one or more contiguous counties in the same State. Each PSU had at least 80 vendors. The United States was divided into 60 strata. One PSU per stratum was selected. About 20 vendors were selected from each PSU.	Used a Geographic Information System (GIS) computer program to form 366 PSUs in contiguous counties. Selected 100 PSUs using probability non-replacement sampling with probabilities proportional to the size of the PSU. Most PSUs had at least 70 vendors. Selected about 18 vendors each from the 100 PSUs.	Used a GIS computer program to form 365 PSUs in contiguous counties. Most PSUs had at least 80 vendors. Selected 100 PSUs using probability non-replacement sampling with probabilities proportional to the size of the PSU. Selected about 16 vendors and 4 reserve vendors from each of the 100 PSUs.
	Over sampled "other than large" chain stores relative to large chain stores in order to test the hypothesis that small to medium-sized "independent" vendors abuse the program at higher incidence than major chain stores. The overall sampling rates for these groups were set so that they did not vary by more than 3:1.	Over sampled PSUs at the rate of 2:1 from vendor-specific FI States versus States that operate an open FI system.	Over sampled WIC-only vendors. The over sampling rate varied by strata, but overall WIC-only stores were sampled at a rate that was over eight times larger than the rate in which non-WIC only stores were sampled.
	Vendors had participated in the Program for at least 12 months.	Length of program participation varied and could not be ascertained from the data files that were submitted to FNS.	Length of program participation varied and could not be ascertained.

Table II-1 (continued)

	1991	1998	2005
Sample Size	Nationally representative sample. Total 1,205 (unweighted) vendors weighted up to 34,033 vendors. 58% were from a metropolitan area.	Nationally representative sample. Total 1,600 (unweighted) vendors weighted up to 36,754 vendors. 72% were from a metropolitan area.	Nationally representative sample. Total 1,600 (unweighted) vendors, with at least one completed compliance buy, weighted up to 39,347 vendors.
Vendor Size Definition	Small = 1 to 5 cash registers (accounted for 75% of the sample). Large = 6 or more cash registers (accounted for 25% of the sample).	Small = 2 or less cash registers. Medium = 3 to 7 cash registers. Large = 8 or more cash registers. Redefined for an FNS special report as Small = 1 to 5 cash registers (51% of the sample) and Large = 6 or more cash registers (49% of the sample).	Small = 2 or fewer cash registers. Medium = 3 to 7 cash registers. Large = 8 or more cash registers. WIC-only was included as separate category.
Compliance Buy Methodology	Three safe buys (Buys 1, 2, and 3) were conducted at all vendors. The sample was then divided into 3 groups of 400 vendors each. The 1st group received two additional safe buys for a total of 5 safe buys. The 2nd group did not receive any more compliance buys. The 3rd group received a major substitution buy wherein the buyer attempted to purchase a non-WIC food item. During all safe buys, the buyer attempted to purchase all items listed on the WIC FI in the exact quantity specified.	Three buys (Buys 1, 2, and either 3A or 3B) were conducted at each vendor. Buy 1 = safe buy (buyer attempted to purchase all food listed on FI in quantities and types specified). Buy 2 = partial buy (buyer attempted to purchase some but not all of the items listed on the FI). Buy 3A = minor substitution (buyer attempted to substitute an unauthorized food item within an approved food category). Buy 3B = major substitution (buyer attempted to substitute an unauthorized item clearly outside an approved food category).	Same as 1998.
Presentation of findings	Percentages are based on occurrence of at least one of three safe buys, not an average of the three safe buys. Also presented data on a major substitution buy.	Only one safe buy – the first buy. Data for a partial buy and minor and major substitution buys were also presented. Re-analyzed for an FNS special report and compared the first safe buy in 1991 to the first buy in 1998 (safe buy).	same as 1998

Additionally, reported redemption dollars covering more than 1 month were converted to 1-month equivalent amounts. In a few cases, the same vendor was listed in adjacent States. In those instances, the vendor was assigned to the State and county in which it was physically located. The redemption amount for any vendor listed in adjacent States was the sum of the individual redemption amounts. States were asked to clarify discrepant or missing information on their lists, and their answers were used to update the file of the sampling frame. The final sampling frame contained a total of 41,974 WIC vendors.

3. Constructing Primary Sampling Units (PSUs)

To construct the primary sampling units, it was necessary to identify the county in which each vendor was located. Since most State lists did not identify counties, vendor county location was determined by geocoding information on vendor mailing address and zip code.

PSUs were defined as either individual counties or as groups of geographically contiguous counties within a single State. The number of WIC retail vendors was determined for each county and used to ensure that each PSU in the sampling frame contained the target number of at least 80 vendors. The District of Columbia and each county within the 45 States were included in one, and only one, PSU. Counties with fewer than 80 WIC retail vendors were combined with geographically adjacent counties to form PSUs that met or exceeded the minimum requirement of 80 vendors.

A computer program (ArcView 3.2a, a product of Environmental Systems Research Institute, ESRI) using Geographic Information System (GIS) technique was used to derive the PSUs. The program allowed grouping adjacent counties into PSUs within a State until each PSU contained at least the minimum number of required vendors. The number of WIC vendors in each county could then be displayed on a State-level county outline map. In an attempt to form PSUs that would allow time- and cost-efficient field visits, State-level county maps were overlain with major highway routes and other physical features. A highway atlas was used to identify major mountain ranges, lakes, and other features.

In a few cases, it was impossible to meet all PSU construction objectives. For example, the vendor list from Washington, DC, contained only 25 vendors. To meet the target of at least 80 vendors in a PSU, Washington was combined with an adjacent Maryland county to form a PSU with 109 total vendors. Delaware's list identified 76 vendors and thus formed a single PSU. The final sampling frame contained 365 PSUs.

4. Selecting the Sample

A nationally representative sample of 1,610 WIC retail vendors, designed to over sample WIC-only stores, was initially selected for the study. One hundred PSUs were first selected from the 365 available PSUs (see PSU selection details below). These 100 sampled PSUs were spread across 41 States and the District of Columbia, as depicted in Figure II-1. Within each of the 100 PSUs, an average of 16 vendors was selected for inclusion in the study. Because there were likely to be vendors included in the sample that were no longer in business or no longer authorized as vendors, a backup sample of 403 vendors (roughly four per PSU) was also identified and held in reserve.

As a final step to ensure the integrity of the sample, State agencies were asked to verify the WIC eligibility status of each vendor (including reserve vendors) selected in their State. Vendors that were no longer in business or no longer authorized to accept WIC vouchers were deemed ineligible for inclusion in the study and replaced by eligible reserve vendors. Similarly, during the data collection period, if a vendor was found to be ineligible, it was replaced with an eligible reserve vendor. In summary:

- 2,013 vendors were selected,
- 403 of the 2,013 were identified as reserve vendors,
- 1,610 vendors comprised the study sample at the inception of the study, and
- 158 sample vendors were determined to be ineligible (e.g., out of business, no longer WIC-approved) and were replaced from the reserve vendor pool.

Stratification of States in the Sample

PSUs were stratified to reduce sampling variability and to ensure adequate sample sizes for key analysis and comparisons. PSU stratification was based on two criteria:

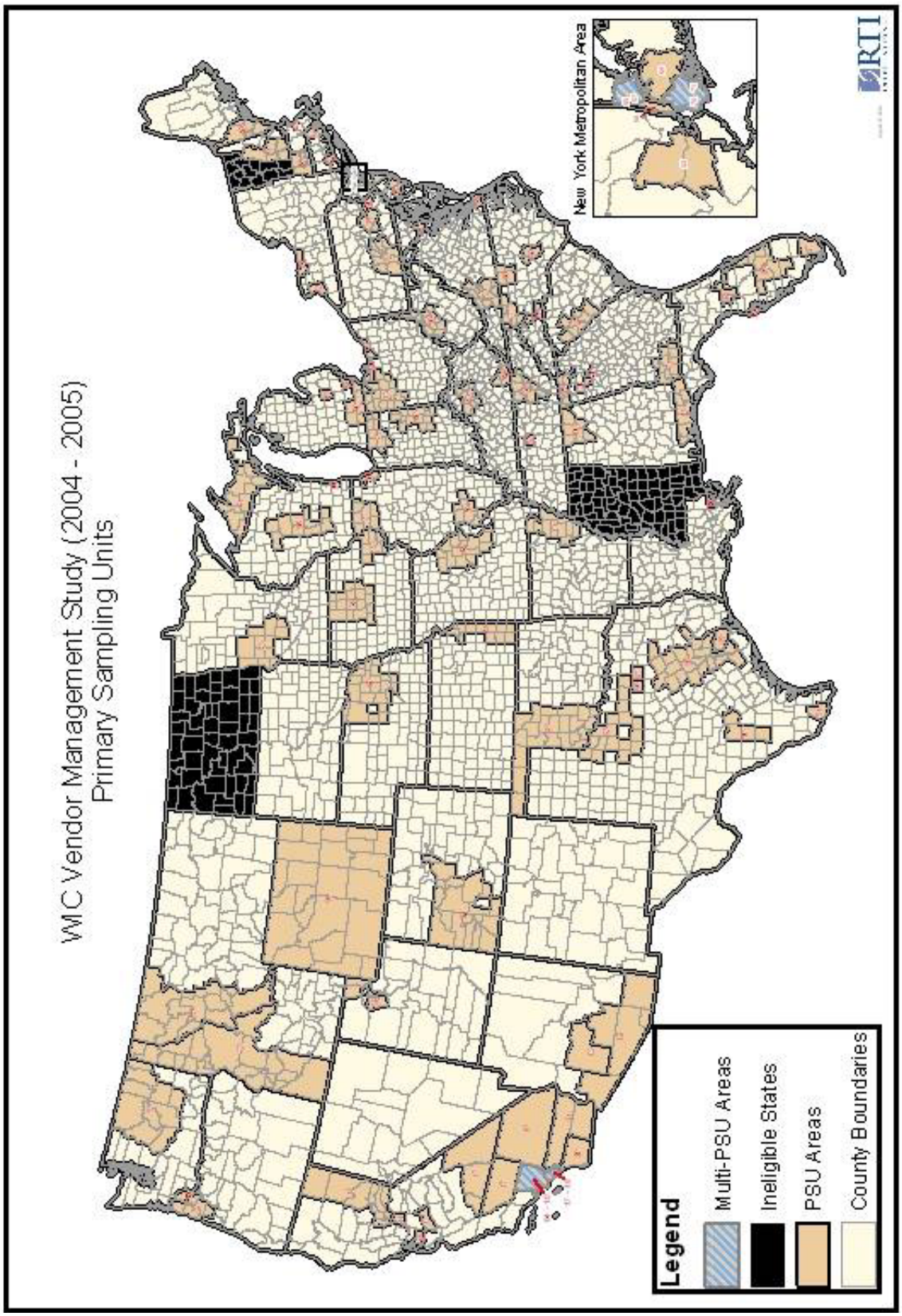
- WIC-only vendors versus all other vendors, and
- State vendor-to-participant ratio (low, medium and high) based on data extracted from the Integrity Profile Report for FY 2001.

To facilitate the over-sampling of WIC-only vendors, three strata were formed:

- **Stratum 1.** States with few or no WIC-only vendors. This stratum contained all vendors from 41 States and the District of Columbia.
- **Stratum 2.** Los Angeles County, CA. This county was placed in its own stratum because it contained an extremely large proportion (38 percent) of all WIC-only vendors.
- **Stratum 3.** All vendors in California (except Los Angeles County), Florida, and Texas.

Selecting PSUs within Strata

The 100 PSUs were allocated in two steps. They were first allocated across the three strata to meet the requirement for over sampling WIC-only vendors. This step created the desired proportion of WIC-only and non-WIC-only vendors in each stratum. The sampling plan (Appendix H) provides details on the desired numbers of WIC-only and non-WIC-only vendors by stratum, and PSU allocations. Final allocations assigned 70 PSUs to Stratum 1, 7 to Stratum 2, and 23 to Stratum 3.


WIC Vendor Management Study (2004 - 2005)
Primary Sampling Units
New York Metropolitan Area
RTI
Legend
Multi-PSU Areas
Ineligible States
PSU Areas
County Boundaries

The second step in allocating Stratum 1 PSUs involved the creation of substrata into States with low, medium, and high vendor-to-participant ratios. This allocation was proportional to the number of vendors in each substratum. Substratum 1 contained States with low vendor-to-participant ratios (54–101), and substrata 2 and 3 contained medium (101–156) and high (165–511) ratios, respectively.

The selection of PSUs differed for each stratum. In Stratum 1, within each substratum, PSUs were sorted by State prior to sampling. This sorting created an implicit geographic stratification that aided in ensuring a wide geographic range for the 70 selected PSUs. After sorting, a probability minimum replacement selection procedure developed by Chromy (1979) was used to select PSUs for each substratum. The PSUs were selected proportional to a size measure, which was the number of eligible vendors for each PSU. Chromy's method allows multiple hits for PSUs whose expected sample size exceeds unity. Consequently, in Stratum 1 two large PSUs in New York were selected twice.

Seven Stratum 1 PSUs encompassed extraordinarily large geographic areas. To facilitate reasonable data collection logistics and costs, each of these PSUs was divided into four sub-PSUs of roughly equal size and one sub-PSU was selected at random.

As indicated earlier, Stratum 2 was composed of Los Angeles County and included seven PSUs. The 23 PSUs allocated to Stratum 3 were selected proportional to a composite size measure (S_i) using Chromy's method, where:

$$S_i = f_{WIC\text{-}only} * (\text{number of WIC-only stores in } PSU_i) + f_{non\text{-}WIC\text{-}only} * (\text{\# of non-WIC-only stores in } PSU_i)$$

Where $f_{WIC\text{-}only}$ = number of WIC-only vendors to select divided by the total number of WIC-only vendors in Stratum 3

$f_{non\text{-}WIC\text{-}only}$ = number of non-WIC-only vendors to select divided by the total number of non-WIC-only vendors in Stratum 3

The sub-stratification of Strata 2 and 3 (into high, medium and low) followed a natural pattern. Stratum 2 (Los Angeles County) all had high vendor-to-participant ratios while Stratum 3 consisted of vendors in States with either a high vendor-to-participant ratio (CA minus Los Angeles County, and TX) or a medium ratio (FL).

Selecting the Sample Vendors within PSUs

The final sampling stage involved selecting vendors within the 100 PSUs. In addition to sampling a sufficient number of WIC-only vendors, it was necessary to select vendors ranging from high volume to low volume redemption amounts. To accomplish this,

vendors within each PSU were sorted by monthly WIC redemption amount and systematically sampled with equal probability and without replacement. In Stratum 1, 20 vendors (16 primary, 4 reserve) within each PSU were selected. Stratum 2 vendors were divided into two groups: WIC-only and non-WIC-only. For Stratum 3, the composite size measure formulas used to select the PSUs also provided initial sample sizes for both types of vendors (WIC-only and non-WIC-only) to select within each PSU. After sorting each group by redemption amount, a systematic sample from each group was selected. A systematic sample was drawn to ensure vendors with varying redemption dollar amounts were selected. Table II-2 summarizes the final sampling results by stratum and analysis domains. A total of 1,610 primary vendors were selected, including 1,367 non-WIC-only and 243 WIC-only vendors.

Table II-2. Vendor Selection by Stratum and Analysis Domain

	Stratum 1 (All States except CA, FL, TX)	**Stratum 2** Los Angeles County, CA	**Stratum 3** FL, TX, and CA (except Los Angeles County)
WIC-ONLY VS. NON-WIC-ONLY			
WIC-only vendors	4	90	149
Non-WIC-only vendors	1,116	32	219
VENDOR-TO-PARTICIPANT RATIOS			
Low	432	-	-
Medium	432	-	80
High	256	122	288
TOTAL SAMPLE OF VENDORS	**1,120**	**122**	**368**

Source: 2005 WIC Vendor Management Study.

C. Data Collection Instrument

The principal data collection instrument used in this Study was the Compliance Buy Form (CBF). Using the 1998 instrument as a starting point, the 2005 CBF underwent several iterations of revisions before it was finalized. The CBF contained four parts: identifying information, description of compliance buy, WIC purchase information, and certification.

While the data elements to be captured remained similar to 1998, the 2005 CBF was enhanced to facilitate its use by the data collectors. Enhancements included:

- Preprinted vendor name and address
- Preprinted voucher number(s)
- Preprinted food packages and dollar values of vouchers
- More space to record notes and anecdotal information
- Landscape orientation in purchase information selection
- Streamlined procedures for recording purchase information
- Color-coded forms to distinguish buy type (e.g., pink for safe buy)
- Separate form for recording and certifying donated items to charitable organizations.

An example of the 2005 CBF is presented in Appendix I.

D. Selecting and Training Data Collectors

Selecting and training the national field staff of data collectors for the 2005 study posed several unique challenges. These challenges are described below.

1. Selecting the Data Collectors

To perform the required in-person compliance purchases successfully, it was essential that the "compliance buyers," the title assigned to data collectors, reflect the physical characteristics of persons who receive WIC benefits. This meant, for example, that all buyers had to be females of childbearing age. In addition, in order to avoid suspicion among vendors, it was also necessary for compliance buyers to belong to one of the predominant racial or ethnic groups of regular customers who shop at those vendors. A total of 99 Compliance Buyers, including Whites, African-Americans, Hispanics, Asian-Americans, and Native Americans, and five field supervisors were selected to perform the field data collection requirements.

2. Training the Data Collectors

During July through September 2004, training manuals and other materials necessary to ensure the application of standardized data collection procedures were developed. Among the documents prepared were the following:

- Compliance Buyer Manual
- Field Supervisor Manual
- Compliance Buyer Pre-training Study Package
- Pre-training Self-test

- Training Agenda
- Post-training Exit Exam
- Post-training Homework.

All field supervisors and compliance buyers were required to attend and complete a 3-day training program in Raleigh, NC. Training was administered by RTI and HSR staff members, and the FNS Contracting Officer's Representative attended and participated. The training agenda is included as Appendix J.

The training was designed to engage the field staff and maximize comprehension and retention of the principles and procedures required for data collection. Various training formats were employed, ranging from lecture, question and answer, home study, small group discussion, and role play. One noteworthy component occurred on the final training day when trainees were required to complete a "practice buy" at an authorized WIC vendor in the Raleigh area. Using rental cars that were provided and real WIC vouchers furnished by the North Carolina WIC program, trainees located and traveled to the specified vendor and conducted the compliance purchase. They completed the data collection form, and reported back to the field supervisor and central office staff. The completed forms were reviewed and immediate feedback provided so that the buyers obtained maximum benefit from the learning situation. After the practice buys, the compliance buyers gathered in groups with the field supervisor to debrief and further solidify their confidence to successfully execute their assignments.

The training also educated the buyers about WIC-only vendors, specifically what they are, how their numbers have increased since 1998, and why the 2005 study included an over sampling of them. Prior to the training session, HSR and RTI central staff discreetly observed transactions at dozens of WIC-only vendors. This experience allowed the trainers to relate the idiosyncrasies and special features of WIC-only vendors (described above) and ensured that the trainees were fully prepared to perform their assignments at WIC-only vendors.

Following the successful completion of all training requirements, the trainees were certified as compliance buyers and declared ready to launch their field assignments.

E. Conducting Compliance Buys

This section provides a brief description of the preparations for data collection, execution of the compliance buys, quality control measures applied, and a summary of the field results.

1. Preparations for Compliance Buys

Prior to beginning data collection, HSR, RTI, and the WIC State agencies undertook a substantial amount of collaborative effort. Each State agency was contacted to determine the appropriate food package (woman, infant, or child) to be included on a series of three vouchers for each sampled vendor. The WIC State agency was also informed of compliance buyer names to be imprinted on the vouchers. WIC State agencies produced the vouchers in the quantities required. One State (Wyoming) issued EBT cards. Another (California) issued three or more vouchers to be used for each scheduled compliance buy, since that is the standard procedure for that State.

Voucher serial numbers were entered into a database and designated for use at a specific vendor and for the specific purchase for which it was to be used by the Compliance Buyer; e.g., Compliance Buyer 555555 will use voucher #12345678 at vendor #8888 for Buy #1 (safe buy). Three CBFs were printed for each vendor. To simplify the buyer's role, each form was preprinted with the following identifying information:

- Compliance buyer name
- Vendor name, address, and zip code
- Four-digit vendor number (the first two identified the PSU number; the last two the vendor number within the PSU)
- Voucher serial number
- Voucher food items, quantities, and sizes: (e.g., "juice, two 46-ounce containers")
- Buy type (safe, partial, minor substitution, or major substitution buy)
- Food package (woman, infant, or child)

Compliance Buyers were also provided with other WIC materials that enabled them to complete their purchases without arousing suspicion among the vendor staff. States issued valid WIC identification cards for buyers and provided lists of WIC-approved foods.

The ability to collect shelf prices was a critical component of the compliance purchase. Therefore, several measures were taken to ensure accurate and complete collection of this information. First, compliance buyers were provided with shopping lists they could use to record shelf prices as they shopped. The shopping lists were especially effective in larger grocery stores. Compliance buyers were encouraged to conduct their buys at times of the day when vendors were busiest so that they could write down information without arousing suspicion. Buyers were also encouraged to memorize shelf prices. This was an effective method in smaller stores and WIC-only stores where use of the shopping list was not

feasible, and worked especially well when food packages contained only a few items. For the vast majority (95 percent) of the compliance buys, these measures enabled the compliance buyers to successfully capture the shelf prices of the food purchased. Alternate methods for obtaining prices were employed for the 5 percent of cases where the compliance buyer was not able to use the shopping list or memorize prices. In most of these situations, the buyer enlisted a friend or family member to visit the store and purchase the same item with cash, and observe the shelf price and obtain a receipt. A second alternate method involved the compliance buyer or field supervisor calling the store to inquire about the price of the item. And in a few instances, compliance buyers resorted to their own resourcefulness to collect prices, such as using a cell phone to enter prices while pretending to send text messages, or calling their home phones and leaving voice messages.

2. Data Collection

Each of the three scheduled compliance buys at a sampled vendor required the buyer to follow a different protocol. The three "buy types" were defined as follows:

Buy 1	Safe Buy: Buyer purchases all foods listed on the voucher in the quantities and types listed.
Buy 2	Partial Buy: Buyer attempts to purchase some but not all of the items listed on the voucher.
Buy 3A*	Minor Substitution: Buyer attempts to purchase an unapproved item within an approved food category.
Buy 3B*	Major Substitution: Buyer attempts to purchase an unapproved item clearly outside any approved food category.

*The third buy was either a "Buy 3A" or "Buy 3B" as pre-designated on the CBF.

WIC vouchers were valid for use during a specified 30-day period. Compliance buyers were required to complete all three purchases within the eligibility period printed on the vouchers. To avoid arousing suspicion among the vendor staff, buyers were required to allow 5 or more days between purchases at each vendor.

The chronology for completing a compliance buy is shown in Table II-3. The primary tasks involved with each purchase entailed selecting correct foods for the type of buy; observing certain vendor characteristics; obtaining the shelf price of each item; presenting the voucher at the checkout counter; and observing administrative violations (if any) of WIC protocol. Immediately after the compliance buy and away from vendor premises,

buyers completed the CBF, on which they recorded all pertinent details of the buy. All purchased items were donated to charitable organizations.

Table II-3. Compliance Buy Chronology: Instructions and Guidelines for Compliance Buyers

I. Before the Compliance Buy	
▪ Assemble all materials for the vendor, including the WIC ID, FI, CBF, donation form, shopping list, ice, and cooler. ▪ Make sure you are familiar with the brands on the WIC-approved food list. ▪ Consult a map to determine the location of a vendor (do not call a vendor for directions). ▪ Dress appropriately (i.e., casual clothing; avoid wearing a lot of expensive jewelry).	▪ Drive to the vendor's address and verify that it is the correct vendor (several other chain stores of the same name may be in the area). ▪ Enter the parking lot, but do not park near the entrance. ▪ Review the Pre-buy Checklist!!
II. During the Compliance Buy	
▪ Leave the CBF, the Compliance Buy Manual, and other materials in the car, hidden from view of passersby. ▪ Enter the vendor. ▪ Note the number of cash registers in the store. ▪ Select items on the WIC FI. ▪ Follow the specific instructions for a safe buy, partial buy, or minor or major substitution buy. ▪ Use a shopping list (if appropriate) and record the prices. ▪ If the shopping list is inappropriate, memorize prices. ▪ Enter the checkout line and present your WIC ID and FI.	▪ Observe whether the store has scanning equipment and whether it is used on WIC items. ▪ Memorize the amount the clerk enters on the FI, if visible. ▪ Memorize the total amount rung up on the cash register and whether or not sales tax was charged on the WIC purchase. ▪ Accept a receipt if offered. Do not request one. ▪ Exit the vendor with your purchases, and drive to an area just beyond vendor premises. ▪ Immediately record memorized information on the CBF. ▪ Complete the other CBF items and attach the receipt.
III. After the Compliance Buy	
▪ Store perishable items in a cooler. ▪ Conceal purchased items in your trunk. ▪ If the shopping list was not used and prices could not be memorized, implement alternate strategies for obtaining shelf prices.	▪ Donate all items to a charitable organization, and obtain the signature of a representative. ▪ Review the CBF for accuracy, completeness, and legibility. ▪ Deliver or mail the CBF and donation form to your field supervisor.

Source: 2005 WIC Vendor Management Study.

After each buy, compliance buyers completed the CBF and donation receipt form. Twice weekly, they sent all completed forms to their field supervisor, who reviewed them for accuracy and completeness and sent them to RTI. At RTI, they were also reviewed for

accuracy and completeness and forwarded to RTI's Data Entry Unit where they were keyed into a database.

Compliance buys were conducted at all types of vendors, including large and small chain grocery stores, WIC-only stores, general stores, mom-and-pop stores, convenience stores, and pharmacies. Data collection was completed during the 6-month period from October 2004 through March 2005, with three exceptions: vouchers received from Arkansas, South Carolina, and Texas required the substitution compliance buys to be performed during April. Forty-nine of the PSUs were completed in late 2004, and 51 early 2005.

3. Quality Control

Quality control measures were applied throughout the data collection period, starting with practice buys and certification requirements at training. At the outset of data collection, project staff members made field visits, some announced and some not, to ensure that all procedures were being properly applied and to debrief all buyers if any adjustments were in order. Extra attention was accorded to buyers at WIC-only vendors. Project staff members also met with the field supervisors to discuss progress and review completed forms.

Field supervisors conducted various quality assurance activities, including verification of closed or inactive vendors and confirmation of a percentage of each buyer's completed cases to verify that the vendors were in operation. Field supervisors reviewed the CBFs before forwarding them to the central office, where they were also reviewed. Finally, data entry was performed with 100 percent verification; that is, each form was independently keyed by two staff members. If they entered identical data, the system accepted the form as complete. If there was any difference between them, the system required successful resolution of the problem before the form was accepted into the data file.

Voucher redemption data were received electronically from some States, while other States sent the processed vouchers which were then converted to an electronic file. Eventually, all files were merged to create a combined redemption file which contained the serial number and amount of each voucher, along with the date of redemption and the State-assigned WIC vendor number. Voucher redemption data were then merged on to the raw data file, and a computer program checked for errors and inconsistencies and calculated cost variables from the data on each form (e.g., the product of the quantity and shelf price for each food item purchased, the sum of the cost of all items listed in the purchase table). These calculations were compared to the redemption data for each buy. Any remaining inconsistencies were resolved by reviewing the hardcopy CBF and correcting the data file.

4. Data Collection Results

Throughout the field data collection period, weekly reports were provided to FNS that summarized production totals and the status of field operations. The reports were presented in two formats: by State and by PSU. Each showed the number of eligible vendors available for compliance buys and the number of safe (Buy 1), partial (Buy 2), minor substitution (Buy 3A), and major substitution (Buy 3B) compliance purchases conducted.

The final data collection report, reflecting total number of eligible vendors and completed compliance purchases by State, is presented in Appendix K. The production statistics demonstrate the overall success of the field data collection effort, including the following highlights:

- Data collection was completed in all 41 States included in the sample and the District of Columbia.
- Data collection was completed in all 100 PSUs included in the sample.
- A total of 1,603 eligible vendors were available for all three scheduled compliance purchases.
- All three scheduled buys were completed at 1,564 of the 1,603 eligible vendors.
- The study response rate, for vendors where all three buys were completed, was 97.6 percent.
- All three compliance buys were completed at 224 of the 233 WIC-only vendors.
- The WIC-only response rate for all three buys was 96.1 percent.

As indicated earlier, an extraordinary degree of collaboration and cooperation among WIC State agencies, HSR, and RTI was required to facilitate startup logistics and completion of the data collection effort. State agencies provided current vendor lists, food lists, buyer credentials, vouchers, and redeemed amounts for vouchers. HSR and RTI maintained the inventory, security, and current status of almost 7,000 vouchers from 41 State agencies and the District of Columbia; preprinted three CBFs for each sampled vendor; supplied the field staff with the forms and materials needed to execute the compliance buys; and converted the data on the completed forms to an electronic database. The buyers performed their assignments according to established protocols and within the specified 30-day period; returned the completed forms to their supervisors who in turn sent them to RTI; and donated all purchased foods (valued at approximately $100,000) to charitable organizations.

F. Sampling Weights for Vendors

Weights were constructed and used for analyzing the data. These weights reflect the probabilities for selecting PSUs and vendors adjusted for non-response. Weights were necessary because of the unequal selection probabilities and differential non-response of vendors. Because the sampling process was different for each stratum, the initial sampling weights for the selected vendors were calculated differently by stratum.

In Strata 1 and 3, initial sampling weights were based on the inverses of the PSU selection probabilities and the conditional vendor selection probabilities. In addition, weights for the seven geographically large PSUs that were sampled were appropriately adjusted.

In Stratum 2, there was no first-stage PSU selection. Therefore, the initial sampling weights were the inverses of the vendor selection probabilities. If complete study data were obtained for all of the sampled vendors, these unadjusted weights would have been appropriate for analyzing the survey results. This was not the case, however, as some vendors were found to be ineligible for the survey and it was not possible to complete all of the proposed data collection activities for others.

The initial sampling weights were based on the 1,610 initially sampled vendors plus the 403 vendors in the reserve sample. The first adjustment made to the initial sampling weights was to adjust for the actual number of vendors included in the sample. As sampled vendors were identified as ineligible, reserve vendors were included in the study sample. Some vendors became ineligible after the first or second buy was completed (i.e. the vendor closed). When this occurred, a reserve vendor was activated, thus reserve vendors could enter the sample at any point during data collection. At the end of data collection, 1,768 vendors were either originally selected for inclusion in the study sample, or added during the data collection period.

The second adjustment accounted for non-response and vendor ineligibility. Non-response and vendor eligibility changed as the three scheduled compliance buys at sampled vendors were completed, resulting in four different analysis weights: safe, partial, substitution, and "all three buys." A fifth analysis weight was created for comparisons between major and minor substitutions.

Table II-4 reflects vendor eligibility, response rates, number of vendors with completed buy, and the weighted number of vendors with a complete buy by type of buy. The number of vendors eligible and the number of vendors with completed buys differ across each buy type, and thus the response rates were different for each buy. For the safe buy 1,620 vendors were eligible and a compliance buy was completed at 1,594. For the partial buy 1,612 vendors were eligible and a

compliance buy was completed at 1,588. For the substitution buy 1,604 vendors were eligible and a compliance buy was completed at 1,572. A total of 1,603 vendors were eligible for all three compliance buys and a compliance buy was completed at 1,564 vendors for a response rate of (1,564/1,603)*100 = 97.6 percent. Similarly, there were 1,600 vendors with at least one completed buy out of a possible 1,620 for a response rate of 98.7%.

Table II-4. Vendor Eligibility and Response Rate by Type of Buy[16]

Buys	Vendors Eligible for Buy	Response Rate	Vendors with Completed Buy	Weighted Number of Vendors
Buy 1 (safe buy)	1,620	98.4%	1,594	38,853
Buy 2 (partial buy)	1,612	98.5%	1,588	38,853
Buy 3A or 3B (substitution)	1,604	98.0%	1,572	38,687
All 3 buys	1,603	97.6%	1,564	38,687
At least one buy	1,620	98.7%	1,600	38,995

Source: 2005 WIC Vendor Management Study.

G. Creating the Analysis File

Creation of the final analysis file involved several steps. The file contained the cumulative results of the sampling, data collection, data management, and weighting activities performed. The initial sample of vendors formed the basis of the file. Throughout data collection, information on the sampled vendors, WIC vouchers, and actual compliance buys was tracked. When data collection was complete, the CBFs were keyed. Data elements from all these sources were merged to create the draft analysis file.

The file was thoroughly checked for potential data inconsistencies. All questionable results were verified by reviewing various sources of information including the original data collection forms, the data collection electronic control system, and the original sample frame. The final analysis file was formed by merging the WIC voucher redemption amounts received from the States to

[16] In the 2005 WIC Vendor Management Study every vendor was expected to have a safe, partial buy, and substitution buy. However, there were 10 vendors with only a safe buy and 26 vendors with only two buys (some combination of safe, partial, and substitution).

the draft analysis file. Analysis weights were then created and the analysis variables were identified. In creating analysis variables, non-response codes (don't know, not applicable, etc.) were set to missing values to comply with the software requirements. Appropriate labels and formats were added to all variables for clarity.

H. Presentation of Data and Results

Data in this report are presented in three ways. First, highlights of key findings are described in the text and, in some instances, in small tables. Second, where appropriate, graphic representations are provided. Finally, because extensive data analysis was conducted involving a comprehensive set of variables, a large number of tables are presented in the Appendices. The tables are amply referenced in the text, but many independently provide detailed information on the methodological approach, the analysis, as well as the primary and supplemental findings.

Most tables contain information from the 2005 WIC Vendor Management Study alone. However, where possible and useful, the report also presents comparable data from the 1991 and 1998 studies. Because the 1998 and the current studies are similar, there are instances where comparisons are made for these 2 years only.

CHAPTER 3: CHARACTERISTICS OF THE STUDY POPULATION

This chapter describes the characteristics of the vendors and States selected for the study. Multiple sources of data were used to gather information. Vendor locations were determined during the development of the sampling plan through zip code data. Data on vendor management practices (vendor-to-participant ratios, whether the vendor operated in a State using a vendor-specific or open system, and whether the State allows partial buys) were obtained from State plans, vendor managers, and The Integrity Profile (TIP) report. Much of the vendor data were collected in the field by the data collector during the compliance buy. Table III-1 displays the major variable categories and the data sources for each.

In this chapter, only data from the 2005 study are compared with results of the 1998 study. Data for the 1991 study were not available.

Table III-1. Variables and Data Sources on Vendor and State-Level Characteristics

Variable	Source
Vendor Type Geographic Distribution of Vendors	State Vendor Lists
Number of Cash Registers (Vendor Size) Use of Scanning Equipment	Field Data Collection
Volume of Business	State Vendor Lists, TIP Reports, and STARS Data
Vendor-to-participant Ratio	TIP Reports
Vendor-specific vs. Open Systems Partial Buys	State Plans and State Vendor Managers

Source: 2005 WIC Vendor Management Study.

A. Types of Vendors

Out of 1,600 vendors who completed at least one compliance buy in the 2005 study, 1,309 were classified as grocery stores, 61 as pharmacies, and 230 as WIC-only stores, or 93.6 percent, 4.3

percent, and 2.2 percent, respectively. Pharmacies are included in the study because most States permit them to provide infant formula to participants. For purposes of analysis and weighting, pharmacies were treated the same way as any other WIC vendor. As mentioned previously, WIC-only stores were over sampled to ensure a sufficient number of cases for sub-analysis.

In the 1998 study, 97.8 percent of vendors were classified as "grocery stores," while 2.2 percent were classified as pharmacies. WIC-only stores were not included as a separate vendor type in the 1998 study because they were not recognized as such and were not as common at that time.

B. Geographic Distribution of Vendors

In the 1998 study, the geographic location of vendors was described in terms of metropolitan and non-metropolitan classifications. In the 2005 study, in order to more accurately describe the geographic location, the approach used in the 1998 study was replaced with a four-level rural-urban commuting area (RUCA) code categorization. This includes the following breakdowns:

- Urban
- Large rural city/town
- Small rural town
- Isolated small rural town.

RUCA codes are based on the size of the city or town and the commuting pattern in the area. Urban-focused areas include metropolitan areas and surrounding towns from which commuters flow to an urban area. Large rural areas include large towns ("micropolitan" areas) with populations of 10,000 to 49,999 and their surrounding areas. Small rural areas include small towns with populations of 2,500 to 9,999 and their surrounding areas, and isolated rural areas include rural areas where commuters flow to a tract outside an urban area or urban cluster (U.S. Department of Agriculture, Economic Research Service, 2006).

While this does not allow comparison with the 1998 results on the geographic location of vendors, it does allow for a more accurate picture of geographic location. Of the vendors selected for the 2005 study, 73.5 percent were located in an urban area, 10.5 percent in a large rural city/town, 8.2 percent were located in a small rural town, and 7.6 percent were located in an isolated small rural town.

C. Vendor Size

The number of cash registers in a store was used as a proxy to estimate the physical size of a vendor. The number of registers ranged from 0 to 41, with a mean of 7. Vendors were

categorized by number of registers into four groups: those with zero to two (small), three to seven (medium), eight or more (large) and WIC-only stores, which were kept as a separate category. Excluding WIC-only stores, the proportion of vendors in each category ranged from just over one-quarter to nearly two-fifths. Thus, 27.5 percent had zero to two, 31.3 percent had three to seven, and 39.2 percent had eight or more. WIC-only stores accounted for 2.2 percent.

In the 1998 study, the same three size categories of small, medium, and large vendors were used, and approximately one-third of vendors fell into each: 31.2 percent constituted small, 35.3 percent medium, and 33.4 percent were large-sized vendors. Again, WIC-only stores did not exist at the time of the 1998 study.

D. Volume of Business (2005)

Monthly vendor redemption amount was used as an additional proxy for measuring the relative size of a vendor. Vendor monthly redemptions were grouped as such: $0–1,649, $1,650–4,499, $4,500–11,199, $11,200-24,679, and $24680 or more. These groups were originally created as quartiles (using weighted numbers) from the full sample. Because the group with the highest monthly redemptions covered such a large range of monthly redemptions (range = $405,542; $11,200 to $416,742) and due to a desire to be able to separately examine the largest WIC vendors, this group was split into two groups. The resultant distribution of vendors into the aforementioned groups was as follows: 24.6 percent, 24.6 percent, 25.4 percent, 16.2 percent, and 9.1 percent, respectively. Monthly vendor redemptions ranged from $0 to $416,742, with an average monthly redemption of $9,581. Monthly vendor redemptions were not included as a variable in the 1998 study.

E. Use of Scanning Equipment

The 1998 study examined how and the extent to which the use of scanning equipment by vendors, when conducting a WIC transaction, was related to program compliance. The results indicated that most (69 percent) of the vendors had scanning equipment and used it for every transaction, and 27 percent did not have scanning equipment; an additional four percent of the vendors had scanning equipment but did not use it. The 1998 study also found that WIC vendors that did not have scanning equipment allowed significantly more minor and major substitutions than those using scanning equipment. Given that a relationship between the use of scanning equipment and a vendor's propensity to accept substitutions was identified in the 1998 study, the use of scanning equipment was once again included as a variable in the 2005 study. The percentage of vendors that had scanning equipment and did not use it dropped from 4 percent in

1998 to less than 1 percent in the 2005 study. The percentage of vendors without scanning equipment remained essentially the same (26.1 percent), while the percentage of vendors that had scanning equipment and used it increased from 69 to 73.5 percent.

F. Vendor Management Practices

Vendor-to-participant Ratio

One of the factors that some States consider when authorizing vendors is the overall ratio of vendors to participants in the State, based on the expectation that the higher the ratio, the fewer the vendors to manage and the easier it is to manage vendor practices. Also, some State agencies use vendor-to-participant ratios to help control food costs; if more stores apply for WIC authorization than permitted by the ratio, the stores with the lowest prices are authorized. To examine whether this ratio has an impact on vendor practices, this variable was included in the 1998 study. For that study, ratios were divided into four categories (depicted in Table III-2), each with approximately 25 percent of the study population. In the 1998 study, no significant differences were found in administrative error, under- and overcharge, or substitutions related to the vendor-to-participant ratio. Nonetheless, this variable was still considered important for State vendor management and included in the analysis of the 2005 study. Table III-2 indicates, there has been a change in the vendor-to-participant ratios since 1998, with increases in the smaller proportions and decreases in the higher ratios – suggesting that States have not reduced the number of vendors to participants since the last study.

Table III-2. Comparison of the Distribution of Vendors Included in the Study by State Vendor-to-Participant Ratio: 1998 and 2005[17]

Study Period	1: <112	1: 112–157	1: 158–192	1: >192
1998	25%	27%	24%	24%
Current (2005)	33%	33%	12%	22%
Percent Difference Between 1998 & 2005	Up 8%	Up 6%	Down 12%	Down 2%

Source: 2005 WIC Vendor Management Study.

[17] 1991 data regarding vendor-to-participant ratio was not available. 1998 vendor-to-participant ratios were calculated by dividing the number of vendors in the state by October caseload data. 2005 vendor-to-participant ratios were obtained directly from The Integrity Profile report (2001).

Vendor-specific vs. Open Systems

One of the key variables examined in the 1998 study was the relationship between the type of food delivery system (i.e., vendor-specific or open) selected by the State and the extent to which it might contribute to vendor violations. Unlike the 1998 study, vendors in vendor-specific States in the 2005 study were not over sampled as it was not necessary. As a result, vendors in vendor-specific States represented 17.7 percent of the sample in 2005, compared to 20.5 percent in the 1998 study.[18]

Table III-3. Type of Food Delivery System Used by States in the Sample.

States Using a Vendor-Specific System	States Using an Open Retail System
CA, CO, DC, ID, PA, WA,	AL, AR, AZ, CT, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MT, NC, NE, NH, NJ, NY, OH, OK, OR, RI, SC, TN, TX, UT, VA, WI, WV WY

Source: 2005 WIC Vendor Management Study.

Partial Buys

In order to discern whether vendors have in fact violated or upheld program rules by either allowing or refusing to allow a partial buy, it was necessary to collect information from State vendor managers regarding whether or not it is State policy to allow WIC participants to purchase only some of the foods on their WIC FI. State policies fell into three categories:

- Partial buys not allowed
- Partial buys allowed except for infant formula
- Partial buys allowed for all items.

In the 2005 study, 20.8 percent of vendors were located in States that do not allow partial buys; 5.8 percent were in States that allow partial buys except for the purchase of infant formula; and 73.4 percent were located in States allowing partial buys for all items. Additional information on vendor characteristics can be found in Appendix A.

[18] The Child Nutrition and WIC Reauthorization Act of 2004 (P.L. 108-265), effective October 1, 2004, amended the Child Nutrition Act to require that State WIC Agency food delivery systems be non-vendor specific, allowing participants to use their FIs at any authorized vendor. Vendor-specific systems are currently being phased out.

CHAPTER 4: FINDINGS ON WIC VENDOR ADMINISTRATIVE ERRORS

All States have rules to which WIC vendors must adhere for WIC transactions. However, the WIC program gives States flexibility in establishing rules, so that there are some significant differences among States in rules and approaches. Despite this variation, there are consistencies across States regarding the quantity of WIC foods that are available to participants and how WIC transactions are conducted.

For this study, violations of program rules have been defined as administrative violations. An administrative violation may not have any impact on whether or not a vendor actually commits a violation that results in an improper payment. However, the purpose of the rules is to increase the likelihood that vendors will conduct proper transactions and that the payments to vendors will be accurate. It is important to note that in both of the prior studies of WIC vendor management, some of these administrative violations have been significantly associated with more serious violations, such as overcharge and substitution of unauthorized foods.

This chapter presents findings related to six administrative violations:

- **Not following proper FI countersignature procedures.** Virtually all States require that a vendor enter the price on a WIC FI before it is signed by the WIC participant. This procedure was put into effect to place some responsibility to the participant for ensuring an accurate recording of the price. In addition, WIC program managers felt that it was less likely that a store would overcharge if it had to give the FI back to the participant to sign with the amount already entered. In the 1998 study, WIC vendors that did not follow proper countersignature procedures were almost five times more likely to overcharge than those that did follow proper procedures.
- **Failing to provide a receipt.** Some States specifically require that a receipt be provided to each WIC participant. Other States require that WIC participants be treated the same way as any other customer. Thus, if receipts are provided to non-WIC shoppers, they

must also be given to every WIC customer. The failure to provide a receipt has been strongly associated with overcharging. In the 1998 study, vendors that did not provide a receipt were over 10 times more likely to overcharge than those providing a receipt.

- **Not meeting food stocking requirements.** States require that stores that are authorized to accept WIC FIs carry a minimum amount of WIC foods. The purpose of this requirement is to ensure that if a WIC client goes to a vendor to shop, the food that he or she needs to fill a food prescription will be immediately available. Although the level of stocking requirements varies across States, buyers for the 2005 study were expected to be able to complete their WIC food purchases as prescribed on their FI. The 1998 study did not find a significant correlation between insufficient stock and overcharges or substitutions. Nonetheless, it was deemed important to continue to examine this factor in the current study.

- **Not ensuring that cashiers are familiar with WIC transactions.** WIC vendors are responsible for ensuring that cashiers are properly trained in how to conduct a WIC transaction. However, with the high rate of turnover in cashier positions, it is likely that a cashier will be expected to conduct a WIC transaction without having the proper training. In the 2005 study, buyers were asked to identify cashiers that did not seem to be familiar with conducting a WIC transaction. In the 1998 study, lack of cashier familiarity with how to properly conduct a WIC transaction was associated with vendors allowing major substitutions.

- **Providing credit or a rain check.** The WIC program is not supposed to be charged for foods that are not provided to the participant at the time of the WIC transaction. Some stores that do not have sufficient stock may provide the participant with a credit slip or a rain check for foods not available. However, there is no guarantee that the participant will ever return to receive the foods. As a result, in the 1998 study and the 2005 study, the provision of a rain check or credit slip was classified as an overcharge to the program. It is important to note that in the prior study, very few vendors provided credit. Thus, the decision was made for the 2005 study to examine whether there had been any change over time in regard to this violation.

- **Requiring the participant to pay cash in addition to the WIC FI.** All States prohibit vendors from requiring that participants pay any extra cash for WIC foods. As was true for credit, very few stores in the 1998 study required the payment of extra cash. For the sake of completeness and consistency, this factor was included in the study to see if this violation remained insignificant.

A. Overall Findings

In this section, comparisons are made between the 1998 and 2005 rates of administrative violations. Comparisons were not made with the 1991 study due to significant methodological differences. The percentage of vendors committing administrative violations in 2005 has increased since the 1998 study. Data in Table IV-1 reflect the rates of administrative violations across all buys, with a vendor being counted only once, even if they committed the violation on multiple buys.

Table IV-1. Comparison of Rates of Administrative Violations for the 1998 and 2005 WIC Vendor Management Studies: Across All Buys

Administrative Violation	Percent of Vendors Committing Violation, 1998 Study	Percent of Vendors Committing Violation, 2005 Study
Improper Countersignature Procedures	64.6%	58.7%
Failed to Provide Receipt*	51.1%	61.1%
Insufficient Stock**	5.5%	11.5%
Cashier Unfamiliar with Conducting a WIC Transaction	---	20.9%
Provided Credit or Rain check	0.5%	0.6%
Charged Cash in Addition to WIC FI	0.1%	0.1%

* These findings are statistically significantly different at the <0.05 level (t-test).
** These findings are statistically significantly different at the <0.001 level (t-test).

Source: 2005 WIC Vendor Management Study.

As can be seen in Table IV-1, there has been an increase in the percentages of WIC vendors failing to provide a receipt and not maintaining sufficient stock of WIC foods. The frequency of improper countersignature procedures decreased from nearly 65 percent in 1998 to approximately 59 percent in 2005. Vendors providing credit and charging cash continue to make up a very small percentage. Table B-1 in Appendix B displays additional information related to all administrative violations across all buys.

Most vendors committed at least one administrative error. When the total number of violations was examined across all buys, only 13 percent of vendors never committed a violation. Out of 18 possible opportunities to violate[19] 14 percent of vendors had one administrative violation, 12

[19] Insufficient stock, not providing a receipt, cashier unfamiliarity, providing a raincheck, charging cash in addition to WIC voucher, and improper countersignature procedures over three buys.

percent had two violations, and a little more than 23 percent committed three violations. Approximately 38 percent of all vendors committed four or more administrative violations over the three buys. Table B-3 in Appendix B displays the percentage of vendors that committed multiple violations.

Finally, as noted earlier, simply because a vendor commits an administrative violation does not mean that they are involved in overcharge and undercharge. The extent to which vendors committed one of the administrative violations with or without committing overcharge, undercharge, or substitution violations was examined, and the results are shown on Table IV-2.

Table IV-2. Percentage of Vendors That Committed One of the Three Major Administrative Violations with or without Committing Overcharge, Undercharge, or Substitution Violations, by Type of Administrative Violation

Type of Administrative Violation	Percent of Vendors Overcharging, Undercharging, or Allowing a Substitution and Committing an Administrative Violation (n=1564)	Percent of Vendors Not Overcharging, Undercharging, or Allowing a Substitution and Committing Administrative Violation (n=1564)
Not Following Proper Countersignature Procedures	61.8%	58.1%
Not Providing a Receipt	93.0%	54.1%
Cashier Unfamiliar with a WIC Transaction	21.3%	20.8%
Insufficient Stock of WIC Foods	15.2%	10.7%

Source: 2005 WIC Vendor Management Study.

A majority of vendors that did not overcharge, undercharge, or allowed a substitution still failed to provide a receipt (54 percent) and follow proper countersignature procedures (58 percent). However, vendors that did overcharge, undercharge, or allow a substitution were even more likely to commit the same violations, 93 and 62 percent.

B. Findings Related to Improper Countersignature Procedures

As noted earlier, 59 percent of all vendors had the WIC participant sign the FI prior to the cashier entering the price, or failed to have the participant sign the FI altogether. The study examined many factors to identify the characteristics of vendors that did not follow proper countersignature procedures. The first was the rate of countersignatures for grocers, pharmacies,

and WIC-only stores. Almost 82 percent of WIC-only stores, 70 percent of pharmacies, and 58 percent of grocery stores required the participant to sign the FI prior to entering the price. There was a statistically significant difference between grocery stores and pharmacies, with pharmacies less likely to follow proper countersignature procedures.

One feature of the 2005 study that was not examined in prior studies was the use of electronic check-writing technology by vendors to process both personal checks and FIs. Electronic check-writing technology allows a vendor to place the FI into the register and print the store name and dollar amount directly on the FI. When this factor was examined, it was found that stores using electronic check-writing technology were more likely to have the participant sign the FI first and then process the check. Of the 13 percent of vendors that used electronic check-writing technology, almost 70 percent had the compliance buyer sign the FI first and then processed the instrument using the check-writing technology. This contrasts with 56 percent of vendors that did not have check-writing technology but required the buyer to sign the instrument first.

Another statistically significant factor relative to improper countersignature was vendor-to-participant ratio. The potential effect of this ratio in the 2005 study was that States have been encouraged to reduce the number of vendors they have to manage, which increases the ratio. The effects of changes in the State vendor-to-participant ratio were examined to see if they had any impact on rates of administrative errors. To address this issue, States were divided into quartiles by vendor-to-participant ratio in the 1998 study; the corresponding ranges of vendor-to-participant ratios were used in the 2005 study to re-examine the rates of improper countersignature procedures. The findings indicated that vendors located in States with the lowest vendor-to-participant ratio (hence with fewer total vendors available to participants) were significantly less likely to follow proper countersignature procedures. Table IV-3 displays the results by vendor-to-participant ratio group.

C. Failure to Provide a Receipt

The most significant factor identified in the 1998 study associated with overcharge was the failure to provide a receipt. The percentage of WIC vendors that did not provide a receipt (61 percent) was higher in the 2005 study than in the 1998 study (51 percent). It is important to note that in some States, provision of a receipt is not required. In addition, WIC participants may not be likely to ask for a receipt. Thus, for the 2005 study, compliance buyers were told not to ask for a receipt but to accept one if offered. This allowed a more accurate measure of the extent to which receipts were offered to participants without a request.

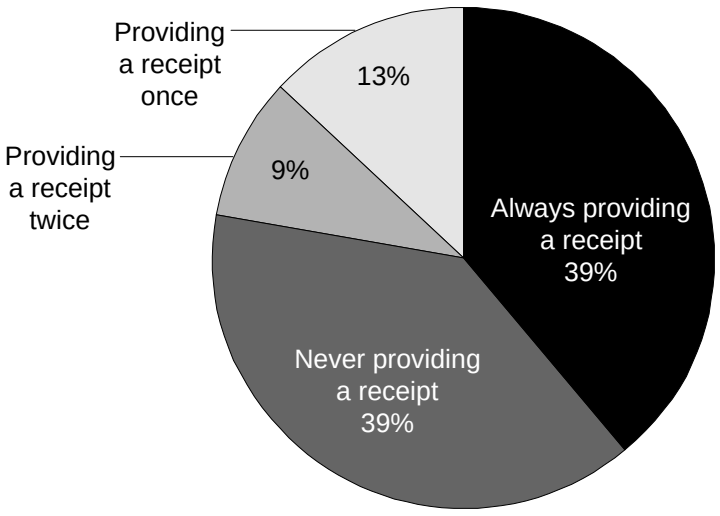
Table IV-3. Percentage of Vendors Not Following Proper Countersignature Procedures, by Vendor-to-participant Ratios

Vendor-to-Participant Ratio (comparable to 1998)	Weighted Number of Vendors Not Following Proper Countersignature Procedures	Percentage of Vendors Not Following Proper Countersignature Procedures	Standard Error Percent
1:<112	5808	46.1	5.1
1: 112–1:157	6606	51.1	5.0
1:158–192	3036	63.3	8.2
1:192+	7275	87.0	4.0

Source: 2005 WIC Vendor Management Study.

In order to examine the characteristics of vendors that did not provide a receipt, a number of factors were considered. The first was the frequency with which stores did not provide a receipt. The intent was to see if it was consistent or happened only infrequently. The findings indicated that over the three buys, nearly 39 percent of all stores consistently provided a receipt to WIC customers. A little more than 39 percent never provided a receipt. Approximately 13 percent of stores provided a receipt two out of three times, and nearly 9 percent provided a receipt one out of three buys (see Figure IV-1).

Figure IV-1. Provision of Receipt by Vendors Across All Three Buys



Source: 2005 WIC Vendor Management Study.

Additional information on States' policy on receipt provision was collected after the 2005 study was already completed. Based on the results of a retrospective analysis, vendors in States that required a receipt were more likely to provide the compliance buyer with a receipt than vendors in States that did not require receipt provision, 73.4 percent and 29.3 percent, respectively (see Table IV-4). When types of vendors were compared, it was found that WIC-only stores and grocery stores were less likely to provide a receipt than a pharmacy. Only 19.1 percent of WIC-only stores and 38.8 percent of grocery stores provided receipts, compared to more than half of all the pharmacies (50.3 percent).

Table IV-4. Percentage of Vendors Providing a Receipt, by State Policy on Providing a Receipt.

	State Requires Vendor to Provide a Receipt			
	YES		NO	
	%	Weighted n	%	Weighted n
Vendor Provided Receipt	41.0	6093	59.0	8778
Vendor Did Not Provide a Receipt	9.5	2209	90.6	21175

Source: 2005 WIC Vendor Management Study.

Vendor size as a predictor of receipt provision was also examined. Small vendors—those with zero to two cash registers—along with WIC-only stores, were less likely to provide a receipt than medium-sized (three to seven registers) or large (eight or more registers) vendors. Ninety-four percent of all small stores and 81 percent of WIC-only stores did not provide a receipt. Table B-3 in Appendix B shows details on the percentages of stores not providing a receipt.

An additional factor related to size is the total dollar volume of WIC checks processed by a vendor. In the 2005 study vendors were grouped into five groups according to their vendor volume, and the receipt provision was examined. Low-volume vendors, those with less than $1,650 a month in WIC business, were less likely to provide a receipt than other groups with higher volumes of WIC sales.

Yet another factor that was significant in predicting receipt provision was the use of scanning equipment. As might be expected, vendors that scanned WIC foods were more likely to provide a receipt than those that did not. Of the vendors that did not scan, 94 percent did not provide a receipt. In comparison, 50 percent of vendors that did scan foods did not provide a receipt. This

is consistent with the findings related to size, as WIC-only and small stores are less likely to scan food than larger and non-WIC-only vendors.

Finally, one other factor was found to be statistically significantly related to the provision of receipts. This factor was the differences between States with vendor-specific food delivery systems and those with open systems. Stores in vendor-specific States were significantly more likely to provide a receipt than those in open-system States (see Table IV-5).

Table IV-5. Percentage of Vendors Providing a Receipt, by Food Delivery System.

	Vendor Provided a Receipt			
	YES		NO	
	%	Weighted n	%	Weighted n
Vendor-specific system	44.3	3005	55.7	3780
Open system	64.7	20644	35.3	11258

Source: 2005 WIC Vendor Management Study.

D. Vendor Food Stocking Requirements

The final administrative violation that was examined was the extent to which vendors had sufficient stock of WIC foods available to fill the food package. This administrative violation was examined for three reasons. First, participant convenience is an important issue in the WIC community and has been of concern for many years. Participants often face difficulties in transportation, child care, and shopping. When they do shop, it is important for them to be able to purchase all of their foods without having to return again later or travel to another store.

Second, the issue of customer convenience is one that has fueled the rise of WIC-only stores. WIC-only stores claim to be more convenient to participants, and that they are in a better position to fill a participant's food prescription than other vendors.

The final reason for examining the availability of WIC foods was that insufficient stock may lead to the issuance of credit, rain checks, or substitutions of approved foods, which are all considered as violations within the WIC Program.

Vendors were first examined by type to assess the degree to which particular vendors have insufficient WIC food stock. The results indicated that as expected, WIC-only stores were rarely out of stock, with 95 percent having sufficient stock to fill a complete food package. Similarly, grocery stores were nearly as likely (91 percent) as WIC-only stores to have sufficient stock.

The largest problems appeared with pharmacies, where only 36 percent had sufficient stock to fill the WIC food prescription.

Lack of stock was found particularly to affect infant food packages. The results indicate that nearly 3 percent of the vendors could not completely fill a woman's food package, almost 3 percent could not fill a child's food package, and nearly 12 percent could not fill the infant's package. Infant formula was the single commodity least likely to be available.

As was true with provision of a receipt, vendor size was significantly related to insufficient stock. In fact, the frequency of the occurrence of insufficient stock decreases with increasing vendor size. Small, medium, and large vendors, and WIC-only stores had insufficient stock 18, 14, 5 and 5 percent of the time, respectively.

Finally, the type of food delivery system was also significantly related to vendor stock insufficiency (Table IV-6). Stores in vendor-specific States were more likely to have enough stock to fill the WIC food packages: only about 5 percent of all vendors in vendor-specific States did not have enough WIC foods to fill the prescription at the time of the compliance buy, while nearly 13 percent of stores in open-system States had insufficient stock. It makes some sense that stores in vendor-specific States would not likely be out-of-stock, as the participant was required to do all their shopping at that one store.

Table IV-6. Percentage of Vendors with Insufficient Stock, by Food Delivery System.

	Vendor had Insufficient Stock			
	YES		NO	
	%	Weighted n	%	Weighted n
Vendor-specific system	5.3	357	94.8	6429
Open system	12.8	4092	87.2	27810

Source: 2005 WIC Vendor Management Study.

E. Cashier Familiarity with a WIC Transaction

Cashier familiarity with WIC transactions was examined in both the 1998 and 2005 studies. While it was not possible to measure actual cashier experience, in both studies situations were identified that could lead to the conclusion that a cashier might not be familiar with WIC transactions. These situations, which are not mutually exclusive, include the following:

- The cashier indicated to the data collector that he/she was a new employee or wore a special badge indicating that he/she was in training.
- The cashier indicated that he/she had never completed a WIC transaction.
- The cashier required assistance from a coworker to complete the WIC transaction.
- The cashier indicated in some other way that he/she was not familiar with the WIC transaction (e.g., asked buyer what to do or made comments that indicated a lack of familiarity).

Once again, findings from the 2005 study on cashier familiarity with WIC transactions were similar to those of the 1998 study. In 2005, 8 percent of vendors had cashiers who were unfamiliar with WIC checkout procedures, compared to 8 percent in 1998. Of the cashiers who were unfamiliar with WIC transactions, the majority (65 percent) in the 2005 study received assistance from a coworker. An additional 8 percent indicated they were new employees, 7 percent indicated they had never completed a WIC transaction, and 55 percent expressed unfamiliarity in some other way.

F. Conclusion

Some administrative violations increased between the 1998 and 2005 studies. One potential explanation for this, which may warrant further examination, is the increase in the number of WIC-only stores. These stores may have had an impact on the increase in the percentage of stores not providing a receipt or following proper countersignature procedures. WIC-only stores almost universally do not provide a receipt and almost always have the participant sign the FI prior to the cashier entering the price. Yet, they are also rarely out of stock and thus could have offset, to a certain extent, the increase in the percentage of stores that had insufficient stock.

Stores in vendor-specific States were more likely to have enough stock to fill the WIC food packages. This is perhaps because these stores are aware that participants have been assigned to buy food from them, and thus, make a greater effort to maintain stock. States that have changed from vendor-specific to open systems might want to re-examine stocking requirements to avoid an increase in cases where vendors cannot fill the WIC food package. However, as was noted earlier, the presence of administrative errors does not necessarily translate into overcharge, undercharge or substitution. The next two chapters examine the associations of the administrative violations discussed here to overcharge, undercharge, and substitutions.

CHAPTER 5: FINDINGS ON OVERCHARGE AND UNDERCHARGE

This chapter presents findings on vendor overcharge and undercharge. Both the 1991 and 1998 studies found that vendors both overcharged and undercharged the program for WIC foods. For the purposes of the 2005 study, overcharge was defined as payment to a vendor that exceeded the price that a non-WIC shopper would have paid for the same foods. Undercharge was defined as payment to a WIC vendor that was less than the amount a non-WIC customer would have paid for the same foods.

To determine the amount that should have been charged, information was recorded from a number of sources. First, the compliance buyer would record shelf prices, if they were posted. Second, if the compliance buyer was provided with a receipt, the total amount of the purchase was recorded from it. If no receipt was provided, the compliance buyer was instructed to record the amount of the total rung into the cash register. Finally, if none of these methods was available to calculate the appropriate price the buyer returned to the vendor with another person and purchased the same foods with cash.

There were several challenges to determining cases of overcharge and undercharge. Many small stores do not post shelf prices or use cash registers, and often do not enter the price on the FI until the transaction is complete and the buyer has left. In addition, because some overcharges are intentional, the cashier intentionally will try to hide the overcharge from the buyer. Finally, because some stores have limited quantities of WIC-approved foods, it is sometimes not possible to go back and purchase the exact same items with cash to verify the cost of the purchase.

WIC-only stores present a unique problem in determining overcharge and undercharge. Like non-WIC-only vendors, they also often do not have prices posted, use cash registers, or enter the price on the FI until the buyer has left the store. But unlike other vendors, WIC-only stores do not accept cash for WIC foods, so it was not possible to do a comparison cash purchase.

In order to determine accurately the rate of overcharge and undercharge, the best total price for the purchase was recorded. This was determined by examining all of the pricing information

included on the compliance buy form and determining which of the data best reflected the true price. The process was done electronically, and those records that indicated an overcharge or undercharge were examined individually to verify accuracy. However, due to the limitations described above, some records did not have a best price for comparison. One thousand five hundred and sixty four vendors had all three buys completed at their store and contributed 4,692 buys that were used for further analysis. Three thousand nine hundred and fifty six buys were ultimately analyzed and 736 buys were excluded, as either the purchase or shelf price of the items obtained during the compliance buy could not be verified to determine whether an overcharge or undercharge had occurred. This exclusion did not impact significantly the rates discussed in this report.

For the safe buy, for which the national estimates were derived, a total of 1564 buys were conducted. Of those buys, 1330 were included in the analysis for national estimates, and 234 were excluded because not enough information was available to determine if an overcharge or undercharge had occurred.

Table V-1. Buy Type by Verification Method of Cost of Items Purchased

Buy Type	Statistics		Multiplied Shelf Price*Quantity on CBF[@]	CB[#] Viewed Receipt Total	CB Viewed Price Entered on Food Instrument	CB Viewed Cash Register Total	Total Buys[$]
Safe	Sample size		32	443	722	133	1330
	Weighted	N	851.34	12035	18337	2060.6	33284
		%	2.56	36.16	55.09	6.19	
Partial	Sample size		28	469	695	135	1327
	Weighted	N	683.13	12617	18093	1754.9	33149
		%	2.06	38.06	54.58	5.29	
Minor	Sample size		12	307	486	105	910
	Weighted	N	283.04	8329.5	12122	1308.4	22043
		%	1.28	37.79	54.99	5.94	
Major	Sample size		9	156	197	27	389
	Weighted	N	237.99	4355.7	5522.8	763	10880
		%	2.19	40.04	50.76	7.01	

[@] Compliance Buy Form
[#] CB means Compliance Buyer
[$] Missing cases were 736 unweighted observations and 15,669 weighted observations for which either the cost of items purchased or amount charged was unavailable.

Source: 2005 WIC Vendor Management Study.

One issue that was not examined in prior studies was overcharge and undercharge figures that might be due to transpositional errors by the cashier while entering the price on the FI. In the 2005 study, transpositional errors were investigated for all over- and undercharges. Only 1.9 percent of over- and undercharges, or seven unweighted transpositions, were identified in the analysis. Using SAS, the following method was used to conduct the transpositional analysis:

1. For dollar values less than or equal to $99.99, recorded in the form of $AB.XY:
    - If AB was the amount charged to the compliance buyer, and BA the amount redeemed by the State or vice versa, this was considered a transposition.
    - Similarly, if XY was the amount charged to the compliance buyer, and YX the amount redeemed by the State or vice versa, this was also considered a transposition.
2. For dollar values less than or equal to $999.99, recorded in the form of $ABC.XY:
    - If AB or BC was the amount charged to the compliance buyer, and BA or CB the amount redeemed by the State or vice versa, this was considered a transposition.
    - Similarly, if XY was the amount charged to the compliance buyer, and YX the amount redeemed by the State or vice versa, this was also considered a transposition.

Transpositions across the decimal place were not examined. For example, in the case of dollar amounts less than $99.99 in the form of $AB.XY, if the numerical values for B and X were transposed, the analysis would not have detected this error. In addition, errors in transcription, such as entering 8 for 3 or 9 for 4, were not explored.

The remainder of this chapter is organized into two major sections. The first section discusses national rates of occurrence of overcharge and undercharge across all buys, and national estimates of the total dollar values of overcharge and undercharge are calculated. The second section discusses the variables and models that predict overcharge and undercharge.

Within each section, the findings of the 2005 study are presented and compared, where appropriate, with those of the 1991 and 1998 studies. Data for comparison among the three studies came from this analysis and the analysis conducted by FNS comparing the 1991 and 1998 results (Singh et al, 2003). The comparisons are necessarily limited by the different

methodologies used in the 1991 and 1998 studies. The 1998 and 2005 studies used similar methodologies and were comparable.

Finally, in examining national estimates of the total dollar values of overcharge and undercharge, only data from the safe buy were included because data were not available to predict the rates of partial and substitution buys that occur naturally. For example, in the 2005 study, all of the second buys were partial buys, which meant that one-third of all buys fell into that category. Due to the lack of any verifiable information on the rate of partial buys occurring naturally, there is no way to base the total dollar value national estimates on partial buy rates of occurrence. Additional tables on the analysis of overcharge and undercharge are presented in Appendices C and G.

A. Overall Findings on Overcharge and Undercharge

The overall findings related to overcharge and undercharge in 2005 were somewhat surprising. The study had hypothesized that the rates of overcharge and undercharge probably had gone down from the rates reported in the prior studies, because of new regulations and better WIC program vendor management practices. However, this hypothesis was somewhat tempered because the rates of administrative violations had increased since 1998. Complicating matters, it was anticipated that the presence of WIC-only stores would impact overcharge and undercharge rates, although it was unclear just how much effect they would have. Following is a summary of the findings with elaborations.

- Rates for both overcharge and undercharge have reduced progressively since the 1991 study. The rate of overcharge for safe buys declined from 9.9 percent in 1991, to 7.0 percent in 1998, and down to 3.5 percent in 2005. In addition, the rate for undercharge has been reduced from 7.0 percent in 1998 to 4.6 percent in 2005. However, for the first time, the rate of undercharge exceeds the rate of overcharge.

- The distributions of overcharge and undercharge across vendors show some significant differences from each other. It was expected that undercharges would be somewhat even in distribution across all buy types, vendor types, and vendor categories. This, in fact, was the case, however, the distribution of overcharges was not even. Small vendors with a low volume of business were most likely to commit this violation while vendors least likely to overcharge were of large or medium size (p-value: <.0001).

- The overall frequency of overcharge and undercharge across all buys has also changed. In the 1998 study, 81.9 percent of vendors never overcharged, while in the 2005 study,

89.4 percent never overcharged. Interestingly, in 1998, 1.5 percent of vendors overcharged on all three buys, while in 2005, no vendor overcharged on all three buys. When the rates for undercharge of all three buys were compared between 1998 and 2005, they were close, at 0.57 and 0.3 percent, respectively.

- The average dollar amount of safe-buy overcharges dropped significantly, from $0.19 in 1998 to $0.06 in 2005. Undercharges dropped as well, from $0.08 in 1998 to $0.04 in 2005. The difference between undercharge and overcharge for 2005 was $0.02, compared to $0.11 in 1998.

- The national estimate of total dollar value of overcharge, undercharge, and their combined effect produced interesting results. The dollar value for both estimates, shown in Table V-8, dropped in 2005 from the 1998 study, but more interesting is the fact that for the first time, the estimated national total dollar value of undercharges exceeded overcharges.

- Provision of a receipt is the single most significant correlate of vendor overcharge. On the safe buy, no vendor that provided a receipt overcharged in the 2005 study. Across all buys, vendors that did not provide a receipt were more than 11 times (p-value: <.0001) more likely to overcharge than those that did.

- Small vendors (0-2 registers) are almost 8 times (p-value: <.0001)more likely to overcharge than large vendors (8+ registers) during a safe buy. In addition, vendors that do a lower volume of WIC business are almost five times (p-value: 0.026) more likely to overcharge on a safe buy than those doing higher volume of business.

1. Overall rates of overcharge and undercharge

The national rates of occurrence of overcharge and undercharge across all buys were very close; at 4.2 percent and 4.3 percent, respectively (Appendix C). For the safe buy, there was a greater difference, with 3.5 percent of vendors overcharging and 4.6 percent undercharging. Rates for these categories reflect reductions from the 1991 and 1998 studies. Table V-2 displays the differences across the three study years for the overcharge rates, and Table V-3 displays the same for the undercharge rates.

Table V-2. Comparison of Vendor Overcharge Rates Across the 3 Study Years, Safe Buy Only

Study Year	Percent of Vendors Overcharging
1991	9.9%
1998	7.0%
2005	3.5%

Source: 2005 WIC Vendor Management Study.

Table V-3. Comparison of Vendor Undercharge Rates Across the 3 Study Years, Safe Buy Only

Study Year	Percent of Vendor Undercharging
1991	8.3%
1998	7.0%
2005	4.6%

Source: 2005 WIC Vendor Management Study.

The rates of vendor overcharge for all other buy types dropped as well from the 1998 study. However, as was true in the 1998 study, the results for the partial and substitution buys seem to reflect a higher vendor proclivity to overcharge. The percentages of vendors that overcharged during the partial and major substitution buys are among the highest of all buys. In addition, the dollar values of the overcharge and overcharge/undercharge difference were greatest in the partial buy, with overcharge in excess. As stated above, for substitution buys, the percentage of vendors that overcharged during the major substitution buy was the highest, however it was almost equally offset by the undercharge rate. Because partial and minor substitution buys were not conducted in 1991, comparisons can be made only with data from the 1998 study. Table V-4 displays both the rate and the average dollar amount of the overcharge for the two study years across the different types of buys. Table V-5 displays the same information for undercharges.

When examining the difference between the average dollar amounts of overcharge and undercharge, the partial buy stands out as the most significant at $0.32, compared to $0.02 for the safe buy, $0.05 for the minor substitution buy, and $0.04 for the major substitution buy. While the study did not examine the reasons for this difference, it must be pointed out that there is more room between the actual price and the maximum value of the FI with a partial buy, and State officials do not have any way of knowing that all the foods were not purchased. Thus, there is greater opportunity for a vendor to overcharge on a partial buy and not be discovered by State fraud detection systems than a safe buy.

Table V-4. Differences in Rates and Dollar Amounts of Vendor Overcharge Across the Study Years, by All Buy Types

Buy Type	Percentage of Vendors Overcharging		Dollar Amount of Overcharge	
	Study Year		Study Year	
	1998	2005	1998	2005
Safe Buy ±, *	7.0%	3.5%	$0.19	$0.06
Partial Buy ±	9.5%	4.6%	$0.47	$0.36
Minor Substitution ±	9.7%	3.9%	$0.36	$0.17
Major Substitution ±, *	10.4%	6.2%	$0.41	$0.10

± Rate of overcharge is significantly different between 1998 and 2005
* Dollar amount overcharge is significantly different between 1998 and 2005

Table V-5. Differences in Rates and Dollar Amounts of Vendor Undercharge Across the Study Years, by All Buy Types

Buy Type	Percentage of Vendors Undercharging		Dollar Amount of Undercharge	
	Study Year		Study Year	
	1998	2005	1998	2005
Safe Buy ±, *	7.0%	4.6%	$0.08	$0.04
Partial Buy ±, *	5.5%	2.9%	$0.11	$0.04
Minor Substitution ±, *	7.8%	5.1%	$0.31	$0.12
Major Substitution	8.2%	6.0%	$0.13	$0.06

± Rate of undercharge is significantly different between 1998 and 2005
* Dollar amount undercharge is significantly different between 1998 and 2005

Source: 2005 WIC Vendor Management Study.

When vendor proclivities to overcharge and undercharge were examined, two major findings stood out. First, the rate of overcharge across all three buys shifted in that no vendors overcharged on all three buys. In addition the overcharge rates for those overcharging only once and those overcharging twice in 2005 were less than the rates in 1998. Table V-6 displays the rates of overcharge for the 1998 and 2005 studies.

The percentage of vendors that undercharged fell slightly between 1998 and 2005. However, the rate for vendors that never undercharged rose from 83.7 percent in 1998 to 89.6 percent in 2005. Table V-7 on the next page displays the comparison rates for the frequency of undercharge between both study years.

Table V-6. Percentage of Vendors Overcharging Over Multiple Buys in 1998 and 2005

Frequency of Overcharge	Study Year	
	1998	2005
Never Overcharged*	81.9%	89.4%
Overcharged Once*	12.4%	9.7%
Overcharged Twice*	4.2%	1.0%
Overcharged Three Times*	1.5%	–

* Rate of overcharge is significantly different between 1998 and 2005

Source: 2005 WIC Vendor Management Study.

Table V-7. Percentage of Vendors Undercharging Over Multiple Buys in 1998 and 2005

Frequency of Undercharge	Study Year	
	1998	2005
Never Undercharged*	83.7%	89.6%
Undercharged Once*	13.4%	9.3%
Undercharged Twice*	2.3%	1.0%
Undercharged Three Times	0.1%	0.3%

* Rate of undercharge is significantly different between 1998 and 2005

Source: 2005 WIC Vendor Management Study.

2. National dollar estimate of overcharge and undercharge

As noted earlier, the national estimate of the total dollar value of overcharge was less than the national estimate of the total dollar value of the undercharge, resulting in a net undercharge to the WIC program. Estimating the national annual overcharge and undercharge amounts required a series of steps designed to maximize the precision of the final estimates.

Step 1. The first step was to create a vendor-level variable that represented the best estimate of each responding vendor's annual redemption dollars. FNS provided the Integrity Profile (TIP) Report file with 2005 data on annualized redemption dollars[20] that was merged onto the WIC analysis file. This did not result in a perfect 1:1 merge; thus, for

[20] Annualized redemption amounts were calculated by multiplying monthly figures provided by states times 12.

the 50 vendors without updated information, the WIC vendor annualized redemption amounts provided by the States at the start of the study were used.

Step 2. Using the vendor-level annual redemption amounts obtained in Step 1, an estimate of the 2005 total WIC redemption dollars was obtained by summing the weighted vendor-level redemption amounts for all vendors. The total 2004 estimated annual redemptions were 4.48 billion. Appropriate sample weight, adjusted for non-response, was used in this calculation. It should be noted that this represents an estimate of the total annual dollars redeemed by WIC vendors across the states eligible to participate in the study.

Step 3. For each buy type the post-audit redeemed dollar amount for each WIC voucher was gathered for responding vendors.

Step 4. For each buy, an edited version of the "true" amount associated with each buy was created. It is referred to in the 2005 study as the receipt amount. If a receipt was given from the buy, the receipt value was considered the most accurate information and was therefore used as the receipt amount. If a receipt was not provided, the price the buyer observed on the cash register was used. If neither of the numbers was available, the price entered on the WIC voucher was used, as observed by the buyer at the time the purchase was made.

Step 5. Only buys with both the redeemed amount and the receipt amount were used. There are various reasons why both amounts would not be present. For example, the compliance buyer was not always able to obtain the receipt amount. Roughly 85 percent of all buys conducted are included in this analysis. Based on the results of a non-response analysis there is some potential for bias. However, if there is bias, the national overcharge and undercharge estimates are probably biased low (i.e. the dollar amount for the overcharge and undercharge estimate is probably understated). A detailed description of the non-response analysis that was conducted as well as any related results has been included in Appendix C.

As part of the quality control of this estimation process, each record on the resultant file where the cost of the buy (receipt amount) did not match the price redeemed from the State (redemption amount) was manually examined. Discrepancies were resolved where appropriate. This quality control check ensured that overcharges and undercharges for each buy conducted were accurately represented.

Step 6. National estimates of annual overcharges and undercharges to the WIC program are of interest to both policymakers and researchers. Thus, two charge-estimates for each

buy type were computed: an estimate of the annual WIC overcharge and an estimate of the annual WIC undercharge. To estimate the annual WIC overcharge, the ratio of the receipt value to the redeemed amount for each vendor was considered. If the ratio was less than 1, it implied an "overcharge" and the ratio was used in the overcharge estimation process. If the ratio was greater than or equal to 1, it was set equal to 1 for the purpose of the overcharge estimate and the "1" was also used in the estimation process[21]. For each vendor, this ratio was applied to the vendor's annual redemption dollars computed in Step 1, which in turn forms an estimate of the annual receipt amount for the vendor. The weighted[22] sum of these estimated receipt amounts across all responding vendors was then computed. This sum divided by the weighted redemption amount submitted to WIC from these same responding vendors represented the estimate of the ratio of annual WIC overcharges. The estimated annual overcharge ratio was applied to the total WIC redemption amount computed in Step 2 to compute an estimate of the total amount of WIC overcharging.

Step 7. To estimate the annual WIC undercharge, a methodology was used that virtually mirrored the one described in Step 6. First, the ratio of receipt value to redemption amount for each vendor was established. This time, if the ratio was greater than 1, it was used in the undercharge estimation process. Otherwise, the ratio was set equal to 1. WIC charge errors stemming from ratios less than 1 were accounted for in Step 6. As with the overcharge estimate, these vendor-level ratios were applied to the vendor's annual redemption dollars obtained in Step 1. This formed an estimate of receipt amount for the vendor. The weighted sum of these estimated receipt amounts divided by the weighted sum of the redemption amounts represented the estimate of the ratio of annual WIC undercharges. This ratio was applied to the total WIC redemption amount computed in Step 2 to derive an estimate of the total amount of WIC undercharging.

Table V-8 presents the resulting estimates of annual WIC overcharges and annual WIC undercharges, based only on safe buys conducted; thus, partial and substitution buys are not included in these estimates[23]. In 2005, the estimates indicate $6,064,488 in overcharges and $15,406,597 in undercharges, resulting in a net $9,342,109 undercharge. The 95 percent confidence interval for the difference estimate contains zero, thus statistically, the difference estimate is not significantly different from zero (p-value $\geq$ 0.05).

[21] The error in WIC charge stemming from respondents with a ratio greater than 1 was accounted for in the estimate of annual WIC undercharge.
[22] The same non-response adjusted weights used in Step 2 were used in Step 6.
[23] The frequency at which partial and substitution buys occur could not be estimated by our study, therefore we only used the safe buys in our estimate.

However, the 90 percent confidence interval for the difference estimate does not contain zero, therefore the result is statistically significant at the 90 percent confidence level ($0.05 \leq$ p-value ≤ 0.10).

Table V-8. National Annual Overcharge and Undercharge Estimates with 90 and 95 Percent Confidence Intervals, 2004

	Overcharge	Undercharge	Difference
Amount	$6.06 million	- $15.41 million	-$9.34 million
95% C.I.	($1.82 million; $10.3 million)	(-$25.26 million; -$5.55 million)	(-$20.10 million; $1.42 million)
90% C.I.	($2.52 million; $9.61 million)	(-$23.65 million; -$7.16 million)	(-$18.35 million; -$338,455)

Source: 2005 WIC Vendor Management Study.

Because this finding did not meet the original hypothesis, the reasons for the net undercharge were examined further. A careful review of the data revealed several factors that contribute to the net undercharge. Those factors include the following:

- WIC-only stores, which have a high volume of WIC business, undercharge more frequently than they overcharge. An undercharge in a WIC-only store was counted when a price list was available or the store used a cash register. The compliance buyer recorded the individual item prices from a price list or the total dollar amount rung up on the cash register and used that as the best price base number. When WIC-only store undercharges were calculated and the undercharge ratio was multiplied by the vendor's redemption volume (see Step 6 on page 49), they made a significantly larger contribution to the national estimate than did lower-volume stores.

- Most stores that overcharged had a low volume of WIC business and thus the volume multiplied by the overcharge ratio had less of an effect than higher-volume stores (see Step 6 on page 49). In addition, the rate of overcharge for the safe buy (which are representative of most transactions) was slightly lower than the rate across buys where the buyer attempted to violate program rules. Finally, there were more repeat offenders that undercharged than overcharged.

- A high percentage of stores overcharged on the partial buy, and the dollar amount of the overcharge was much higher. However, these data are not representative of WIC shopping behavior and were not used in calculating the national estimate.

Table V-9. Overcharges as a Percentage of Total WIC Redemptions Across the 3 Study Years, Adjusted to 2004 Dollars*

Redemption Years	Gross Overcharge in Nominal Dollars	Gross Overcharge in 2004 Dollars	Annual WIC Redemptions in 2004 Dollars	Percentage of Overcharge Relative to Total Redemptions
1991	$30.73 million	$42.62 million	$2.9 billion	1.5%
1998[24]	$40.00 million	$42.87 million	$4.48 billion	0.9%
2005	$6.06 million	$6.06 million	$4.47 billion	0.1%

*Dollars were adjusted for inflation. Dollar figures for sample vendors were obtained from 2004 TIP Report.

Source: 2005 WIC Vendor Management Study.

In order to compare this estimate with estimates from prior years, the findings from the FNS comparison study, which estimated overcharge loss for 1991 and 1998, were examined. To create an equal comparison, information from the Bureau of Labor Statistics Consumer Price Index was used to adjust the total dollar value of the figures presented for 1991 and 1998 to reflect their value in 2005. In addition, to have a fair comparison of program size, the total WIC redemption dollars for the same two periods were adjusted to reflect 2005 values. This way a comparison of the percentage of WIC redemptions across the three years could be displayed.

B. Characteristics of WIC Vendors that Overcharge and Undercharge

When examining factors that contribute to overcharge and undercharge, it is important to set the context by remembering that the problem of overcharging seems to be decreasing. In fact, it would appear that WIC program administrators have reached a point where their focus on preventing overcharge is working quite well in reducing overcharges but not undercharges. Given the fact that overcharge losses are now exceeded by undercharge gains, the net result for the program is that vendors are more likely to err in favor of the WIC program than in their own.

While WIC program administrators are likely to be concerned that an accurate transaction take place that is fair to both the State and the vendor, it is likely that resources at the State level are not devoted exclusively to preventing undercharging. It is more likely that FI edits, vendor training, vendor monitoring visits, and other compliance activities are more designed to protect the State WIC program than the vendor. It is in this context that the next section discusses the

[24] The 2001 FNS report analyzed 1991 and 1998 data.

factors that contribute to vendor overcharge, and the extent to which they may contribute to the prediction of vendor overcharge.

1. Factors Associated with Overcharge

A number of factors were examined to determine their association with vendor overcharge and undercharge. When the characteristics of vendors were examined along with activities occurring at checkout, four variables were found to be significant correlates of vendor overcharge. These include the following:

- **Provision of a receipt.** As was the case in the 1998 study, vendors not providing a receipt were most likely to overcharge. Across all buys, vendors that fail to provide a receipt were more than 10 times more likely to overcharge than those that do provide a receipt. The association of not providing a receipt with overcharge was so strong in the safe buy that no vendor overcharging on the safe buy provided a receipt.

- **Not scanning food items.** Vendors that did not scan food items were more than two times as likely to overcharge as those that did — 15.6 percent versus 7.9 percent respectively. This finding is similar to the findings of the 1998 study.

- **Vendor size.** Small vendors overcharged more than others. When small vendors are compared to medium-sized vendors, they were over two times as likely to overcharge (17.6 percent and 8.2 percent, respectively). When small vendors are compared to large vendors, they are almost three times as likely to overcharge (17.6 percent and 6.1 percent, respectively).

- **Vendor volume of WIC business.** As reported earlier in the vendor size analysis, vendors that fall into the lowest group of vendor volume were most likely to overcharge. When the lowest–volume vendors are compared to the highest volume, it was found that the lowest–volume vendors were over three-times as likely to overcharge (14.5 percent and 4.3 percent, respectively).

Two other factors are important to note. First, in the 1998 study, the failure to follow proper countersignature procedures was significant as a correlate of overcharge. It was not significant in the 2005 study. This may be because the practice is becoming so commonplace that even stores that never overcharge do not require the participant to sign the check prior to entry of the price. It also may reflect the growing importance of the WIC-only stores contribution to this variable, as they almost never have the participant sign after the amount is entered.

Second, the use of electronic check writing technology by vendors was examined and, while not found to be significant, it certainly needs comment. Of vendors that had electronic check-writing equipment, only 6.4 overcharged, compared to 10.5 percent of vendors without equipment. However, with regard to undercharging, 7.9 percent of all vendors who had equipment undercharged, while 10.2 percent of vendors without equipment did. Because this electronic technology has the potential to improve store transaction accuracy, it should be evaluated in any future vendor management study.

2. Vendor Proclivity to Overcharge

As with the 1998 study, an attempt was made to distinguish vendors that overcharged as a function of deliberate intent from those that overcharged due to random error. One approach was to determine the randomness of overcharge was to look at the vendors in the context of undercharging. It seems unlikely that a vendor would intentionally undercharge the WIC program. More likely, an error was made by the cashier transferring information from the cash register to the FI. Because these errors are random and a cashier would be as likely to make an overcharge error as an undercharge error, it seemed appropriate to consider differences between vendors that consistently overcharged, vendors that may have both overcharged and undercharged, and vendors that did not overcharge or undercharge. A little more than 8.7 percent of the WIC vendors overcharged at least once but never undercharged, while a little more than 8.9 percent of the WIC vendors undercharged at least once but never overcharged. In contrast, only 2.1 percent of all vendors appeared to undercharge as well as overcharge.

This finding also is somewhat curious. It would appear that vendors either consistently overcharge or consistently undercharge. Yet one would assume that if the errors were random, they would occur in both directions. When correlates of undercharge were examined, some of the same factors that contributed to overcharge seemed to correlate with undercharge, such as provision of a receipt, store size, and lack of scanning of WIC foods. However, it is interesting to note that grocery stores are more likely to undercharge than WIC-only stores or pharmacies.

Multivariate analysis was performed in addition to the univariate analysis discussed above. Only a very small amount of the variance was explained by the models derived from the multivariate analysis. Therefore, the results are not presented as a separate section of the report. More detailed information on these models is presented in Appendix C.

CHAPTER 6: FINDINGS ON IMPROPER PAYMENTS

In October of 2002, Congress passed Public Law 107-300, the Improper Payments Information Act of 2002. The purpose of the act was to identify improper payments made in publicly financed programs. The act requires USDA to identify and reduce erroneous payments in various programs, including the WIC program. One of the key features of this vendor management study is to estimate the total level of improper payments and report these estimates by type of program violation.

Improper payments are reported through a different method than other violations reported in the 2005 study. The Office of Management and Budget issued a directive in May 2003 that the estimates of annual erroneous payments must be a gross total of both underpayments and overpayments. This means that the absolute values of all types of improper payments, whether a debt or credit to the program, are added together to create the final estimate. For example, if an underpayment was $500 and an overpayment was $650, the total improper payment would be equal to $1150 ($500+$650).

In this section, two different types of improper payment estimates are provided. First, information on the total number of vendors involved in an improper payment activity is presented. For purposes of this study, an improper payment is made when a WIC vendor overcharges, undercharges, gives credit for foods not provided, or allows the participant to substitute unapproved foods. For each of these categories, the study provides estimates for individual types of violations and an overall estimate for all violations.

Second, national estimates of the total dollar values of selected improper payments by type of payment are presented. In computing dollar values, the study is able to present information on overcharge, undercharge, and provision of credit. For each of these violations, national estimates were derived to allow for the calculation of the total value of improper payments. It is not possible to calculate estimates for dollar loss due to substitutions, as there is no information available to estimate the percentage of WIC participants that initiate substitutions.

A. Estimates of the Percentage of WIC Vendors Involved in Improper Payment Activities

The first area of examination is the percentage of WIC vendors that are involved in an improper payment activity. Using the nationally representative sample of WIC vendors and examining improper payments for the safe buy, it was determined that 92.9 percent of all WIC vendors never committed an improper payment. Table VI-1 shows the percentage of vendors that did commit an improper payment during the safe buy, by type of improper payment.

Table VI-1. Percentage of WIC Vendors Involved in an Improper Payment, by Type of Improper Payment for the Safe Buy

Type of Improper Payment	Safe Buy
Vendors Overcharging the WIC Program	3.3
Vendors Allowing Credit	0.2
Vendors Undercharging the WIC Program	4.6

Source: 2005 WIC Vendor Management Study.

The national rates of improper payment activity (i.e., for traditional and WIC-only stores combined) shows that 7.1 percent of all WIC vendors were involved in only one improper payment activity and none were involved in 2 or more.

For traditional WIC vendors only (such as grocery stores and pharmacies) improper payment rates closely mirrored the national rates, with 6.9 percent of traditional vendors involved in only one improper payment activity. Rates for WIC-only stores were different 85.7 percent of WIC-only stores were never involved in an improper payment, but 14.3 percent were involved in one. (Tables D-1 through D-3 in Appendix D display additional information on the percentage of WIC vendors involved in improper payments.)

B. National Annual Estimate of the Dollar Value of Improper Payments

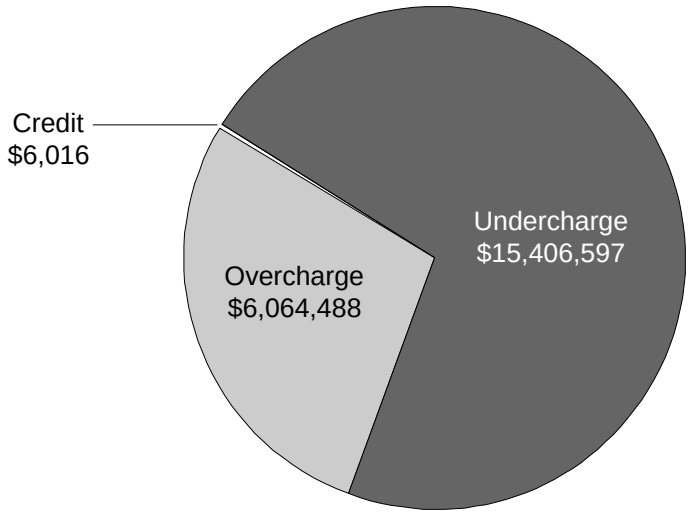
The total dollar values of improper payments were calculated applying the methodology described in Chapter 5 and using safe buys only. Table VI-2 shows the three contributing factors to improper payments (overcharge, undercharge, and credit) and the dollar value associated with each. As shown on Table VI-2, the total estimated dollar value of these improper payments is $21,477,100, which represents 0.5 percent of the 2005 total redemptions. A visual breakdown of the estimated dollar values of overcharges, undercharges, and credits is provided in Figure VI-1.

Table VI-2. 2004 National Annual Estimate of Improper Payments by Type of Improper Payment [25]

Type of Improper Payment	National Estimate of Dollar Value	90% Confidence Interval	95% Confidence Interval	Percentage
Overcharge	$6.06 million	($2.52 million; $9.61 million)	($1.82 million; $10.30 million)	28.2%
Undercharge	-$15.41 million	(-$23.65 million; -$7.16 million)	(-$25.26 million; -$5.55 million)	71.7%
Credit	$6,016	(-$3,986; $16,017)	(-$5,938; $17,970)	0.03 %
Total	$21.48 million			100%

Source: 2005 WIC Vendor Management Study.

Figure VI-1. Breakdown of National Estimates of Dollar Values for Overcharges, Undercharges, and Credits



Source: 2005 WIC Vendor Management Study.

The great majority (72 percent) of improper payment dollars is attributable to undercharge, with overcharge accounting for 28 percent. The contribution of credit is negligible.

[25] Estimates are based on the study sample. Excluded from the study were States with direct delivery systems (Mississippi), home delivery systems (Vermont), State-run WIC vendors (parts of Illinois), military commissaries, and pharmacies which only provided WIC participants with special order infant formula or WIC-eligible medical foods. Vendors in Alaska, Hawaii, North Dakota, and the U.S. Territories, as well as vendors authorized by Indian Trial Organizations, were also excluded from the study population.

CHAPTER 7: FINDINGS ON SUBSTITUTIONS

This chapter examines the results of compliance buyers' attempts to substitute unauthorized food items for those designated on the WIC FIs. Substitution of WIC-approved foods with non-approved foods is a violation of Federal and State regulations and rules. However, unlike under- and overcharges or administrative violations, substitutions require the involvement of both the WIC participant and the vendor. In some cases, the vendor might initiate the substitution, as when a vendor may be out of a particular approved WIC product, and offer the WIC participant the opportunity to substitute a non-approved item for the product that is not available. At other times, the participant may attempt to purchase a non-approved item in place of the WIC approved food and request that the vendor allow this substitution to take place.

For the 2005 study, the compliance buyer initiated the request to substitute, and the percentage of vendors that allow this practice was estimated. However, this study does not attempt to quantify the overall frequency of participant-initiated substitutions, as it is not known how many or how often WIC participants attempt to substitute unauthorized items for their WIC authorized food items. The purpose of the 2005 study, as with the 1998 study, was to determine how many WIC vendors would accept participant-initiated substitutions.

As described in Chapter II, a minor or major substitution was attempted during the third compliance buy at each WIC Vendor. For the purposes of this study, substitutions are classified into three different groups:

- **Minor substitutions.** A minor substitution occurs when a vendor allows the buyer to substitute an item that is of the same category as the WIC-approved food (e.g., cereal, juice) but is not on the WIC approved list.

- **Major substitutions.** A major substitution occurs when a vendor allows a buyer to purchase an item that does not fall within one of the WIC food categories. For example, the buyer is allowed to purchase soda instead of juice.

- **WIC-only minor substitutions.** Because WIC-only stores carry only WIC-approved foods, the study created a special category of minor substitution to be attempted at these vendors. A minor substitution at a WIC-only store occurs when a vendor allows a participant to purchase more than is authorized of one WIC-approved item on an FI in place of another. For example, buyers attempted to purchase more cereal than was allowed in place of milk.

To ensure that vendors were given the benefit of the doubt with regard to substitutions, compliance buyers were instructed to present the substitution item at the time of purchase along with their other WIC-approved foods and declare that they would like to purchase the unauthorized item with their FI. If the cashier declined the purchase, the buyer was to accept this answer and proceed with the purchase without the unauthorized item. If the cashier asked the buyer if the food was authorized, the buyer was to respond that they did not know and then let the cashier make the decision to allow or not allow the purchase. Under no circumstance was the buyer to try to persuade the cashier to allow the substitution.

A. Overall Results of Substitution Buys

Using a weighted sample of vendors, national rates of vendor acceptance of buyer-initiated substitutions were developed. As shown in Table VII-1, 27.8 percent of vendors accepted buyer-initiated minor substitutions, while 6.5 percent allowed major substitutions to occur. Additional findings are presented in Appendix E.

The overall results vary somewhat from findings in the 1998 study. As shown on Table VII-1, 34.7 percent of all WIC vendors allowed a minor substitution in the 1998 study while the 2005 rate was 27.8 percent — a reduction of 7.9 percent. However, the percentage of vendors allowing major substitutions increased sizably from 3.7 percent in 1998 to 6.5 percent in 2005.

Table VII-1. Comparison of the Percentage of Vendors Allowing Major and Minor Substitution in the 1998 and 2005 Studies in Traditional WIC Stores

Type of Substitution	Study Year	
	1998	2005
Minor Substitution*	34.7%	27.8%
Major Substitution*	3.7%	6.5%

* Significant difference at $p \leq 0.05$ across study years. Source: 2005 WIC Vendor Management Study.

The overall decline in minor substitutions may be influenced by the presence of WIC-only stores. As will be seen later in this chapter, WIC-only stores are far less likely to allow a substitution than grocery stores or pharmacies.

B. Relationships among Type of Substitution and Vendor and State Characteristics

In order to identify characteristics of vendors likely to allow a substitution, the relationships among vendor acceptance of substitutions, vendor characteristics, and State vendor management practices were examined separately for each type of substitution attempted (minor or major).

1. Vendor Characteristics Associated with Substitutions

Vendor Type

Vendors included in the 2005 study were classified as a grocery store, a pharmacy, or a WIC-only store. Vendor type was found to be significantly related to vendor acceptance of minor substitutions: 27.1 percent of grocery stores and 50.7 percent of pharmacies allowed a minor substitution to occur. However, only 4.3 percent of WIC-only stores allowed a minor substitution to occur.

It is not surprising that pharmacies allowed minor substitutions more often than grocery or WIC-only stores. Pharmacies are used mostly for infant formula purchases and are more likely to be under-stocked with WIC-approved formula. Therefore, they may tend to be more flexible in their approach to enforcing WIC-approved formula sales.

Vendor type (grocery v. pharmacy) was not significantly related to vendor acceptance of major substitutions. Again, major substitutions were not conducted at WIC-only stores.

Vendor Size

WIC vendors' allowance of buyer-initiated substitutions was also examined as a function of vendor size, in terms of the number of cash registers in the store (discussed in Chapter III). Vendor size was not significantly related to the acceptance of buyer-initiated minor substitutions. However, vendor size was found to be significantly related to the acceptance of buyer-initiated major substitutions. With respect to major substitutions, 13.8 percent of small vendors allowed a major substitution to occur, whereas only 3.2 percent of medium-sized vendors and 3.1 percent of large vendors permitted a major substitution. As noted previously, no major substitutions were attempted at WIC-only stores.

Vendor Monthly Redemption Dollars

As previously mentioned, vendor monthly redemption amounts were used as an additional proxy for vendor size and also examined in relation to vendor allowance of substitutions. Vendor monthly redemptions were categorized into five groups: $0–$1,649, $1,650–$4,499, $4,500–$11,199, $11,200-24,679, and $24,680 or more. Vendor monthly redemptions were found to be significant with regard to minor substitutions, but not with regard to major substitutions. Of vendors falling into the lowest group of redemption dollars ($0–$1,649), 33.2 percent allowed a minor substitution, whereas of the vendors in the highest group ($24,680 or more), only 14.8 percent allowed a minor substitution.

Use of Scanning Equipment

Data were analyzed to determine the relationship between vendors' use of scanning equipment and type of substitution. With respect to minor substitutions, this relationship was not statistically significant. However, vendors not using scanning equipment were significantly more likely to allow a major substitution - 12.4 percent compared to only 4.2 percent of vendors using scanning equipment. This finding is interesting because many scanning systems have Universal Product Code identification systems that can be used to identify a non-approved food. It is likely that a cashier must make the decision to override this feature and allow the substitution. The finding is also consistent with the finding that small stores are more likely to allow major substitutions, as many small stores do not use scanning equipment.

Purchase Price Entered Electronically

As previously mentioned, there was an increase in the use of automatic check-writing systems between 1998 and 2005. The rates of vendor allowance of buyer-initiated minor and major substitutions were compared between vendors that used automatic check-writing and those that did not. Automatic check-writing was not found to be significantly associated with minor substitutions, but was significantly related to major substitutions. There were no vendors that used automatic check-writing and allowed a major substitution. However, 6.1 percent of all vendors that did not enter the purchase price electronically on the FI allowed a major substitution.

Cashier Familiarity with WIC Transactions

One of the study concerns was whether or not cashier familiarity impacted allowance of a substitution. The results showed that neither minor nor major substitutions were found to

be significantly associated with cashier familiarity with WIC transactions. From notes in the compliance buy form, compliance buyers reported that many cashiers who were not familiar with a WIC transaction asked for help and the staff person helping the cashier denied the substitution.

2. State Characteristics Associated with Substitutions

Vendors' acceptance of substitutions was examined as a function of four State-level characteristics: vendor-to-participant ratio, vendor system (whether a State system is vendor-specific or open), the geographic location of a vendor within the State, and whether a State allows partial buys.[26] While none of these characteristics was found to be significantly associated with vendor acceptance of major substitutions, two features (vendor system and allowance of partial buys) were found to be significantly related to minor substitutions.

Vendor-Specific vs. Open Systems

Vendors operating in States with a vendor-specific FI system appear less likely to allow a minor substitution attempted by a participant. In vendor-specific States, 14.7 percent of vendors allowed a buyer-initiated minor substitution compared to 30.9 percent of vendors in States with open systems. This statistically significant difference is important because States that were vendor-specific in 2005 when data were collected and that are now open-system States might expect an increase in minor substitutions.

Partial Buys Allowed

Vendors located in States where partial buys are allowed by regulation were more likely to allow a buyer-initiated minor substitution to occur. Among vendors in States allowing partial buys, 31.2 percent allowed a minor substitution. Also, among vendors in States allowing partial buys except for infant formula, 24.5 percent allowed a minor substitution. In contrast, in States where participants must buy all items on the FI, only 15.8 percent of vendors allowed a minor substitution. These differences were statistically significant.

[26]Some States require the vendor to fill the complete food prescription and forbid the participant to only obtain some foods on the FI. Most of the time, this provision is limited to the purchase of infant formula. This practice is necessary not only to ensure that the WIC participant uses all the food prescribed but to count infant formula purchases accurately for rebate calculation.

CHAPTER 8: FINDINGS ON WIC-ONLY STORES

This chapter examines the distinct characteristics of WIC-only stores and the differences in sales practices between these newer WIC vendors and their traditional counterparts. Federal WIC regulations define "above-50-percent vendors" as vendors that derive more than 50 percent of their annual food sales revenue from WIC FIs. WIC-only stores are therefore a subset of "above 50-percent vendors" that handles WIC FIs exclusively (or nearly so) and carry only WIC authorized foods. WIC-only stores do not compete for non-WIC customers, and thus there is no market pressure for them to reduce prices. Studies conducted in California and Texas have indicated that the more limited WIC-only stores charge higher prices, on average, than do other stores that handle a comparable number of WIC vouchers. Because WIC customers receive their authorized items irrespective of price, they are not price sensitive and are not directly impacted by the price differences.

The numbers and impacts of WIC-only stores are growing; in 2005, 40 percent of California WIC food voucher redemptions were through WIC-only stores, compared to only 11 percent 5 years earlier. This is leading to an increase in the number of WIC vendors charging higher prices, driving up the costs of the WIC program, which in turn will lead to a reduction in the number of WIC clients that can be served by the program.

The 2005 WIC Vendor Management Study over sampled WIC-only stores in three States where they are most prominent, including California, Florida, and Texas. Because of the predominance of WIC-only stores in Los Angeles, this area was considered a unique sampling stratum. Texas, Florida, and all the remaining areas in California constituted a separate sampling stratum.

The over sampling of WIC-only stores in California, Florida, and Texas provides the opportunity to derive national estimates on them based on the collected data. The following research questions were investigated relative to WIC-only stores:

- Did WIC-only store food package costs exceed the State's average food package cost?

- Did WIC-only store food package costs exceed the costs of other peer groupings as calculated using compliance buy data?
- Did WIC-only stores post prices of their WIC foods where a participant can see easily what the program is being charged?
- Did WIC-only stores offer incentives to shoppers, and if so, what types of incentives were offered?

Table VIII-1. Sampling Strata

WIC-only vs. Non-WIC-only	**Stratum 1** (all States except CA, FL, and TX)	**Stratum 2 Los Angeles County, CA**	**Stratum 3 FL, TX, and CA** (except Los Angeles County)
WIC-only vendors	4*	90	149
Non-WIC-only vendors	1,116	32	219

*These vendors were selected independent of their WIC-only status.

Source: 2005 WIC Vendor Management Study.

A. WIC-only Store Food Package Costs Compared to Average Food Package Cost

In the 2005 study, the assumption was made, based on other reports, that the cost of a WIC food package from a WIC-only store would be higher than that at an average grocery store. This assumption was tested by comparing the cost of safe buys conducted at a WIC-only store with the cost of safe buys conducted at grocery stores within the three States that are part of this sub-analysis. Safe buys are more consistent across WIC-only stores and other grocery stores than are other types of purchase and were thus deemed to be a more consistent unit of measure for comparison. As noted earlier, there was an apparent difference in the cost of a safe buy at a WIC-only store ($16.75) and an ordinary grocery store ($13.51) - a mean difference of $3.24 or 24 percent. This difference was not statistically significant.[27]

27 The study found an apparent difference in the cost of a typical food package between WIC-only and regular grocery stores. The study was not designed to investigate reasons for this difference. However, possible reasons include variations in brand names carried by different store types and the selection behavior of compliance buyers. Compliance buyers were not given special instruction on the choice of food brands. But since store brand authorization varied among States, compliance buyers were encouraged to select name brands unless the State required a store brand. In States where the brand name is printed on the food instrument, the compliance buyer will choose the same brand in all store-types. Where the brand name is not printed on the food instrument, brands selected by compliance buyers would not be comparable between store-types. Therefore, some of the difference may attributable to this factor.

B. WIC-only Store Food Package Costs Compared to Different "Peer Groupings"

WIC-only stores often compare themselves and their prices to stores of similar size that do a much smaller volume of WIC business. For the 2005 study, safe buys were compared between WIC-only stores and grocery stores for different sizes within the three predominant States (California, Texas, and Florida). Grocery stores were classified into three "peer groupings" by size: small, medium, and large. The number of cash registers in each store was used as a proxy for store size, with 0-2 cash registers constituting small, 3-7 medium, and 8 or more large.

The results of the comparison indicated that the average cost of a safe buy at a WIC-only store ($16.75) was not statistically significantly different (p = 0.05) from that at small ($16.65) and medium ($13.65) size grocery stores, but was significantly different from large grocery stores ($12.56). (Note: the large grocery store is the size most similar to WIC-only store in this sample in terms of the dollar volume of WIC purchase). However, even though not statistically significant, the absolute differences in actual dollar amounts for safe buys appear considerable as shown on Table VIII-2. (See footnote 26 for possible reasons for the difference).

Table VIII-2. Average Cost of Safe Buy, WIC-Only Store Compared to Grocery store, by Size

Store Type	Statistics		All States			
WIC-only	Sample (n)		212			
	Weighted	N	714.7			
		Total	$11973.48			
		Mean	$16.75			
		SE Mean	$1.27			
		Size of Store	**Small**	**Medium**	**Large**	**Total**
Grocery	Sample (n)		39	66	133	238
	Weighted	N	1060.49	1860.47	3788.84	6709.79
		Total	$17655.46	$25390.05	$47573.65	$90619.16
		Mean	$16.65	$13.65	$12.56	$13.51
		SE Mean	$3.28	$1.73	$1.02	$1.23
Difference, WIC-only vs. Grocery	Mean Difference		$0.10	$3.10	$4.19	$3.24
	Percent Mean Difference		0.60	22.71	33.35	23.98

Source: 2005 WIC Vendor Management Study.

C. WIC-only Stores, Price Posting and Cash Registers

Grocery stores are required to post food prices directly on shelves so that consumers can compare prices as part of their purchasing decisions. Customers at WIC-only stores are presumed to be price insensitive, because they do not have to tender any cash when buying approved goods. Instead, WIC customers exchange their WIC vouchers for the foods at the WIC-only store, which they receive regardless of the purchase price that will be charged to the government.

For the 2005 study, one of the compliance buyers' responsibilities, irrespective of type of store, was to note and record shelf prices. Compliance buyers were unable to record any shelf prices at 5.4 percent of WIC-only stores. Most commonly, this was due to inconsistent posting of shelf prices. Prices of formula, in particular, were either frequently not displayed at all or not posted in a way that was visible to the shopper. Indeed, a common complaint among compliance buyers in WIC-only stores was that prices were posted such that they were difficult to see or examine carefully (e.g., using small print, displaying in an odd location, etc.). These findings suggest that some WIC-only stores made little effort to inform the shopper about the cost of their purchases.

Another factor which suggested pricing problems in food costs in WIC-only stores was the comparatively high number of these stores without cash registers. The use of cash registers makes it possible for customers to note the price of goods as they are entered in the cash register. It also validates that a transaction has taken place. Whereas in non WIC-only stores only five stores in the entire had no cash registers, and all pharmacies had registers, among WIC-only stores, 52 stores (23 percent of the total) had no cash registers. There was no variation in this finding in the three States surveyed (California, Florida and Texas).

D. The Use of Incentives at WIC-only Stores

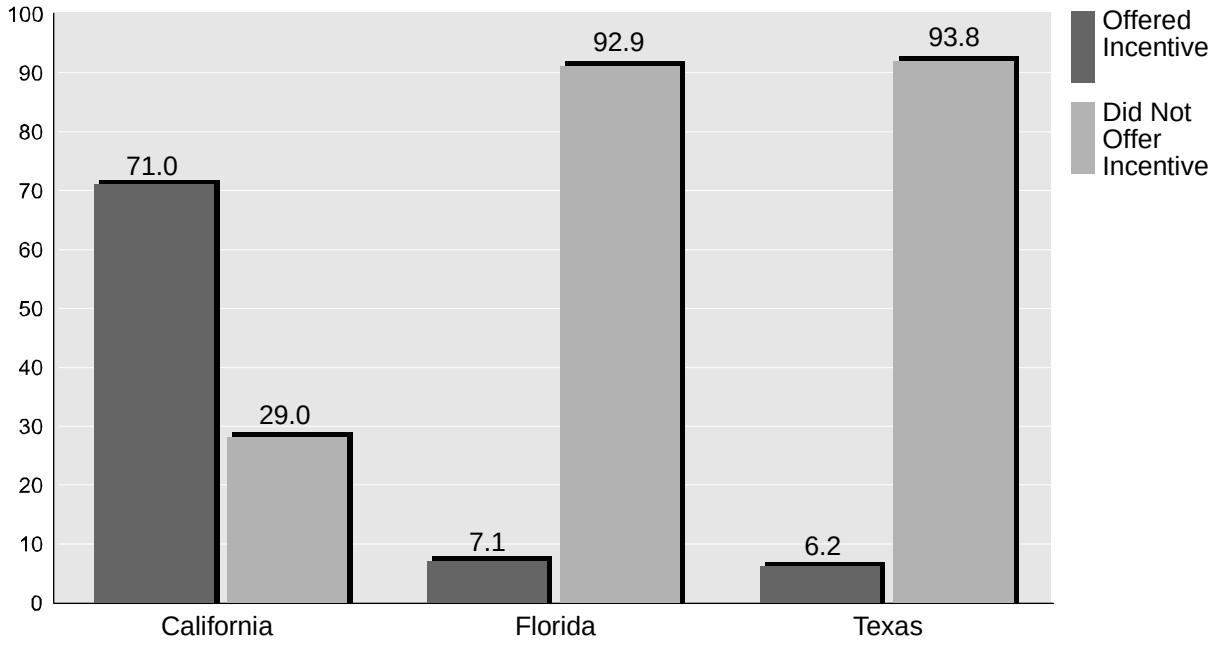
One of the compliance buyer's responsibilities was to note any incentives offered by vendors that might encourage shoppers to continue shopping at the vendor location. Whether incentives were offered by WIC-only vendors was of particular interest because all (or almost all) of a WIC-only store's source of income is the U.S Treasury, and Federal funds are not supposed to be used to purchase incentives, except those of nominal value set by USDA at less than $2.00.

Of the non-WIC-only stores, review of compliance buy forms showed that only a few large grocery chains offered any type of incentive, which tended to be coupons for infant cereal, infant formula, or milk, or coupons based on a "point" system whereby the shopper could earn points

toward prizes. Most of the incentives offered by non-WIC-only stores appeared to be the type of coupons that would be offered to all clients, irrespective of their WIC status.

In contrast, WIC-only vendors offered a wide variety of gifts and incentives, many on more than one buy. Thus, at the 224 WIC-only vendors where all three buys were completed, 67 percent (149 vendors) offered an incentive or gift on at least one buy, and 26 percent offered an incentive or gift for all three buys. There were important geographic differences in the use of incentives among WIC-only stores. As shown in Figure VIII-1, incentives were far more common in California than either Texas or Florida. Incentives were offered by 71 percent of the vendors in California, compared to 7 percent in Florida and 6 percent in Texas.

Figure VIII-1. Percentage of WIC-only Vendors that Ever Offered Incentives



Source: 2005 WIC Vendor Management Study.

Most of the compliance buyers whose assignment included WIC-only vendors reported receiving some type of gift or incentive on their first visit just for being a first-time customer. Incentives included everything from umbrella strollers to tortillas, but consisted primarily of raffle tickets and redeemable stamps or tickets (a comprehensive list is shown in Table VIII-3). Raffle tickets were for weekly or monthly drawings for prizes such as microwaves, bicycles, trips, or free gifts of the customer's choice. Redeemable stamps and raffle tickets were given at each visit, based upon the amount of food purchased, and were collected by customers to be redeemed for larger gifts. The majority of incentives were aimed at encouraging shoppers to return and continue shopping there.

WIC-only vendors also gave buyers referral cards designed to help spread the word about their business. For each referral, customers received a special prize. Other incentives included offers of free transportation to the vendor, free rides to the WIC clinic, and home delivery services.

Table VIII-3. Type of Incentives Offered (Frequencies)

Gift Category	Types of Gifts/Incentives Offered and Frequency [28]	
Baby Gifts (18)	▪ Diapers (1) ▪ Mittens (1) ▪ Baby blanket (2) ▪ Shoes (1) ▪ Umbrella stroller (1)	▪ Sippy cups (4) ▪ Rattle (1) ▪ Baby wipes/baby wipe holder (4) ▪ Baby plate/bowl/spoon (3)
Child Toys/Items (52)	▪ Back pack (3) ▪ Barbie doll (1) ▪ Dolls (5) ▪ Coloring book/Crayons (2) ▪ Plastic cars/trucks (7) ▪ Flash cards (learning colors, etc) (1) ▪ Dart board (1)	▪ Balls (1) ▪ Frisbee (1) ▪ Jump rope (1) ▪ Piggy bank (1) ▪ Barbie notebook (1) ▪ Toy basket (1) ▪ Unspecified toys (26)
Food (61)	▪ Oatmeal (2) ▪ Cheerios (1) ▪ Rice (6) ▪ Milk (1) ▪ Pasta (2) ▪ Eggs (18) ▪ Beans (1) ▪ Infant formula (1)	▪ Macaroni and cheese (2) ▪ Tortillas (7) ▪ Cooking oil (1) ▪ Soft drinks (2) ▪ Apple juice (9) ▪ Crackers (2) ▪ Kool-Aid (1) ▪ Unspecified Buy One Get One Free (5)
Household Goods (31)	▪ Toilet paper (2) ▪ Kleenex tissues (1) ▪ Hand soap (1) ▪ Toilet brush (1) ▪ Cotton balls (1) ▪ Laundry detergent (5) ▪ Aluminum foil (1)	▪ Dish detergent (3) ▪ Iron (4) ▪ Dish towels (3) ▪ Clothes hamper (1) ▪ Cleaning cloths/dust cloths (4) ▪ Sponges (4)

Continued on next page

[28] Some vendors offered multiple incentives/gifts on the same visit.

Table VIII-3 continued.

Gift Category	Types of Gifts/Incentives Offered and Frequency	
Kitchen Appliances/Tools (51)	▪ Orange juicer (1) ▪ Waffle iron (1) ▪ Toaster (1) ▪ Blender (1) ▪ Toaster oven (1) ▪ Mixing bowls (8) ▪ Coffee maker (1) ▪ Spice rack (1) ▪ Cooking spoons (1) ▪ Cutlery set (1)	▪ Tongs (1) ▪ Stock pot (2) ▪ Trays (1) ▪ Cookie jar (1) ▪ Dishes (9) ▪ Pitchers (2) ▪ Flatware (1) ▪ Sets of drinking glasses (6) ▪ Tupperware/storage containers (10) ▪ Thermos/Picnic set (1)
Miscellaneous (203)	▪ Clock (4) ▪ Picture frame (4) ▪ Vases (1) ▪ Barrettes (4) ▪ Book (1) ▪ Jewelry (1) ▪ Notepads (1) ▪ Calendar (1)	▪ Cash (1) ▪ Lamp light (1) ▪ Unspecified gift (10) ▪ Raffle tickets (88) ▪ Tickets/points earned with purchase, redeemable for gift (73) ▪ Coupons for prizes, earned by referring other customers (13)

Source: 2005 WIC Vendor Management Study.

CHAPTER 9: CONCLUSIONS AND RECOMMENDATIONS

The findings of the 2005 WIC Vendor Management Study show a reduction in most violations from 1998. In particular, the rates of overcharge, undercharge, and minor substitution have declined. Only the rate of major substitutions has increased.

Information from this study serves a number of purposes. First, it documents program improvements in the categories of violation that directly result in improper payments. However, it is important to note that identification of reasons for the decrease in violations was not within the scope of this study. One might assume that a primary reason for the decrease would be improved vendor management practices, but data were not collected to substantiate that.

A. Challenges and Recommendations

A number of challenges remain for FNS and State WIC programs with regard to vendor management. Some of the potential opportunities that may be explored to continue the improvement trend and better measure progress in the future are hereby highlighted.

1. States should examine methods to improve accuracy of vendor transactions with regard to proper payments.

The study findings indicate that States should place a greater emphasis on improving accuracy in payment to vendors. As noted earlier, State WIC agencies do not want WIC vendors necessarily to undercharge, and they especially do not want vendors to overcharge. Many States have fraud detection systems that rely on post-payment editing, peer grouping of vendors based upon prices, onsite vendor monitoring, and compliance buys to detect an improper payment such as an overcharge. Many of these systems are based on the theory that a vendor that intentionally overcharges will do so at a level to maximize the payment. However, the average dollar amount of overcharge that was found for the safe buy seems to indicate that the maximum variance of overcharge and undercharge to the actual proper price is somewhat small ($0.06), which is not so easily detected through these systems.

It seems likely that much of the overcharge and undercharge results more from transferring payment information onto the FI rather than deliberate fraud. Because smaller vendors are the most likely to overcharge and undercharge, and since most of these stores do not use scanning systems, it would appear that efforts should focus on training cashiers to tally prices accurately on the WIC foods and double-check entries on FIs. Improved accuracy would seem to be in the best interest of the vendor, given that the total dollar amount of undercharge now exceeds overcharge.

Additionally, since the provision of a receipt is so strongly associated with overcharge and undercharge, requiring or encouraging that may help improve payment accuracy. Vendors that provide receipts may be more inclined to use the receipt to transfer the information accurately onto the FI prior to handing the receipt to the participant. This would improve accuracy over the practice of the cashier trying to remember the amount tallied and then transferring it the FI. This requirement could be enforced through routine vendor monitoring visits, education efforts directed at increasing accuracy of transactions, and compliance buys. In addition, State and local WIC agencies occasionally could request participants to turn in their receipts to local agencies in order to check the accuracy of transactions. For example, totals from receipts could be entered locally into a database along with the participant identification number and sent to the State for matching with the total dollar amount entered on the FI. This would give State officials information on stores that err in conducting WIC transactions.

2. National estimates of the level of partial buys could help detect and estimate the scope of potential fraud.

It seems very clear from both the 1998 and 2005 data that the partial buy provides the greatest opportunity for large overcharge amounts. This may be because the partial buy leaves more room for fraud. For the most part, States have no way to determine if a client actually purchases all of their WIC foods and therefore cannot determine if the amount entered on the FI accurately reflects the actual cost of foods provided. For example, if a participant does not purchase all of the milk on the FI and the vendor charges the WIC program for milk not provided, there is no way for a State agency to determine if the charge is fraudulent, as the total amount entered on the FI actually may represent the total amount that would have been charged properly if the food had been provided.

The study found that the average dollar amount of overcharge for the partial buy jumped from $0.06 to $0.36 representing a significant increase. However, the corresponding average

dollar amount for undercharge for the partial buy stayed about the same as for the safe buy. This means that greater loss may occur to the program when a participant does not purchase all of the approved foods.

Measuring the total dollar loss resulting from partial buys is not possible, as the frequency of partial buys is currently unknown. However, it is important to note that two factors may contribute to partial buys. First, the vendor may be out of a particular WIC food, so the participant cannot purchase all of a food that is listed on the FI. In the 2005 study, 11.5 percent of all vendors did not have enough WIC foods for the compliance buyer to complete the purchase of all foods on the FI. Second, a participant may decide not to purchase all of the foods on the FI. This may occur for any number of reasons, including having excess foods at home and not wanting more, unavailability of the desired food (such as a particular brand of cereal) with no acceptable alternative, or transportation issues which may prohibit buyers from carrying a large quantity of food.

FNS should consider opportunities to estimate the percentage of partial buys that take place. This could be accomplished by adding questions to surveys of WIC participants, analyzing transaction and UPC data from WIC purchases, or reviewing receipts and comparing the redemption record with the food issuance record. Acquiring data on the number of participants that only purchase part of their food package would greatly help in estimating improper payments.

3. Improve efforts to reduce the percentage of vendors allowing participant-initiated substitutions.

One of the troubling findings of this study is that while the rate of vendor acceptance of participant-initiated minor substitutions declined from 1998, it is still relatively high at almost 28 percent. In addition, the doubling of the percentage of vendors allowing major substitutions, although relatively small, is still a disturbing trend.

There seem to be significant differences in the factors associated with minor and major substitutions, and each problem may need to be addressed by State WIC agencies separately. Minor substitutions occur across all vendor types, vendor size, and total WIC volume. They also occur whether items are scanned or not. It would appear that the single key issue that contributes to minor substitution is the willingness of the cashier or store manager to allow it.

Vendors may have a number of reasons for allowing minor substitutions. For example, requiring a WIC participant to return an unauthorized item and present the authorized food

may hold up checkout lines and create problems with others waiting for service. It may be easier to simply allow the substitution than to enforce WIC program rules. Another possible reason is that authorized foods may be out of stock and the cashier or manager may not want the participant to leave the store without something close to what is authorized.

With regard to major substitutions, there seems to be some very clear associations of store type with this violation. Small grocery stores that do not scan items appear to be the most likely to allow a major substitution. These stores may be in the best position to allow it, as they may know most of their WIC participants, feel that they would be less likely to be caught, and believe that they can avoid State compliance efforts.

The key element that is missing from the analysis is an estimate of the percentage of WIC participants that attempt to substitute non-approved foods. Having an estimate of these attempts would improve greatly the ability to estimate total dollar loss attributed to overcharge. Finding a source of these data would be difficult, as there is no real means of routinely collecting information. Individual participants are not likely to report their own attempts to substitute, even if results were kept confidential, as they know this is a program violation and may fear program sanctions. One potential method would be to ask a representative sample of different types of vendors to track participant-initiated substitutions for a period of time to create an estimate of occurrence. However, it is most likely that vendors that allow substitutions would underreport in order not to reflect badly on their business. Moreover, vendors that adhere to the rules may not have as many participants who request substitutions.

4. Track the impact of WIC-only stores on vendor management.

As noted earlier, the presence of WIC-only stores has had an impact on study results. These stores present a vendor management challenge, as their methods for providing WIC foods differ greatly from those of traditional grocery stores or pharmacies. In addition, the newly devised category of "above-50-percent vendors" includes two different categories of vendors: true WIC-only stores that serve only WIC clients and traditional grocery stores that just happen to serve a high percentage of WIC clients than other shoppers. For example, a small, independent market located near a large WIC clinic may carry a large quantity of WIC-approved foods but may not operate the same way as a true WIC-only store. Clients using the small market will likely shop for themselves, selecting foods from the shelves and presenting them to a cashier. In a traditional WIC-only store, the participant is often provided the foods by a worker from shelves located behind a counter or in another room.

Price posting and use of cash registers is infrequent in traditional WIC-only stores, so measuring violations by them is significantly more difficult than in the traditional store.

Because States will be reporting vendor monitoring activities for the combined group of traditional WIC-only stores and other "above 50-percent" stores, it may be difficult to measure the true impact of traditional WIC-only stores in the future. States may want to consider dividing the two for program management purposes so as to monitor the impact of traditional WIC-only stores if their use continues to grow.

B. Conclusion

This study provides important information to FNS and State WIC officials on the status of vendor management in the WIC program. Program managers can be proud of the fact that significant improvements have been made in reducing the rate of stores committing program violations. Data from the study can be used to continue the improvement of vendor management practices, track ongoing progress in the future, and document outcomes of vendor management for policymakers and program administrators.

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APPENDICES

Regulatory Changes that Impacted WIC Vendor Management Between 1998 and 2004

Highlights

FNS issued the following two regulations in the period between the 1998 and 2004 WIC Vendor Management studies.[1] These regulations were specifically intended to reduce the incidence of vendor violations, including overcharging and substitution of unauthorized foods and non-food items during WIC transactions.

- *The WIC/Food Stamp Program Vendor Disqualification Final Rule* was published on March 18, 1999, to mandate uniform sanctions across State agencies for the most serious WIC Program vendor violations. The implementation of these mandatory sanctions was intended to curb vendor-related fraud and abuse in the WIC Program. State agencies were required to implement the provisions by October 1, 1999.
- *The WIC Food Delivery Systems Final Rule* was published on December 29, 2000, to strengthen vendor management in retail food delivery systems by establishing mandatory vendor selection criteria, training and monitoring requirements, and criteria to be used to identify high-risk vendors. The rule also was intended to increase program accountability and efficiency in food delivery and related areas and to decrease vendor violations of program requirements and loss of program funds. State agencies were required to implement the provisions by October 1, 2002.

Selected Provisions of These Rules

- Required State agencies to disqualify, for a prescribed length of time, a vendor that has a pattern of (1) charging participants more for supplemental food than non-WIC customers or charging participants more than the current shelf or contract price; (2) providing credit or non-food items in exchange for food instruments; (3) providing unauthorized food items in exchange for food instruments; and (4) committing other serious violations identified in the rule.

1 These regulations responded to concerns about fraud and abuse in the WIC Program raised by the OIG's National Vendor Audit in 1988 and the WIC Vendor Issues Study in 1993, both of which indicated that significant levels of vendor violations persisted despite regulatory changes made in 1982 (47 FR 23626). The May 1982 regulations had not resulted in an acceptable level of improvement in vendor management.

- Established four mandatory selection criteria (including competitive price and price limitations; minimum variety/quantity of supplemental foods; business integrity; no FSP disqualification or civil money penalty for hardship).
- Required annual training of vendors on policies and procedures related to WIC transactions and redemptions.
- Clarified (as a term of the vendor agreement) that the purchase price must be entered on food instruments before participants sign them.
- Required State agencies to identify high-risk vendors using statistically-based criteria approved by FNS.
- Required State agencies to conduct routine monitoring visits on at least 5% of their authorized vendors annually, and compliance investigations on another 5% including all high-risk vendors (up to the 5%) minimum.

Sample Sizes Used Throughout the Analysis

The following table provides weighted and unweighted sample sizes for each buy separately and across all three buys for two different scenarios: (a) for all vendors where at least one buy was completed, and (2) for only those vendors where all three buys (safe, partial, and substitution) were completed. These sample sizes appear in most of the Appendices tables either in a 'Total' row or as a footnote. When the weighted sample size does not sum to one of the numbers found in Table A-1, a footnote has been provided to indicate missing data.

Weighted and Unweighted Sample Sizes

Buy	Vendors where at least one buy was completed		Vendors where all three buys were completed	
	Sample Size	Weighted N	Sample Size	Weighted N
Across all buys	1,600	38,995	1,564	38,687
Safe	1,594	38,853	1,564	38,104
Partial	1,588	38,853	1,564	38,265
Minor substitution	1,113	25,881	1,108	25,771
Major substitution	459	12,806	456	12,722

Appendix A: Characteristics of Vendors

Table A-1. Number and Percent of WIC Vendors by Various State-level Characteristics

State-Level Characteristics	Sample Size	Weighted		
		N	%	SE %
TOTAL	1600	38995	100%	--
Vendor-to-participant ratio[1]				
1:<112	465	12719	32.6	1.8
1:112-157	471	13034	33.4	2.5
1:158-192	173	4782	12.3	2.2
1:192+	491	8460	21.7	2.9
Vendor-specific	399	6887	17.7	3.6
Location				
Urban	1224	28723	73.7	3.1
Large rural city/town	154	4111	10.5	1.5
Small rural town	116	3182	8.2	1.2
Isolated small rural town	106	2978	7.6	1.6
Partial buys allowed				
Yes	1067	28638	73.4	4.4
Yes, except formula[2]	80	2246	5.8	2.5
No	453	8111	20.8	3.7

1 These vendors will allow participants to complete a partial buy, or not purchase the full food prescription listed on their WIC voucher for items other than formula. If the Food Instrument includes formula, the participant must purchase all of the formula prescribed to them.

2 Vendor-to-participant ratio groupings are based on the groupings used in the 1998 study.

Table A-2. Number and Percent of WIC Vendors by Store Characteristics

Store Characteristics	Sample Size	Weighted		
		N	%	SE %
TOTAL	1600	38995	100%	--
WIC Vendor type				
Grocery	1309	36490	93.6	1.0
Pharmacy	61	1660	4.3	0.9
WIC-only	230	846	2.2	0.3
How purchase price entered[1]				
By cashier, electronically	200	4865	12.8	2.2
By cashier, by hand	1175	29161	76.5	2.6
Buyer asked to enter	11	293	0.8	0.5
Not entered	115	2270	6.0	0.8
Don't know	62	1527	4.0	0.7
When asked to countersign[2]				
After price entered on FI	931	23791	62.4	2.5
After rung up/before price entered	178	4567	12.0	1.3
Before rung up	422	8814	23.1	2.1
Not asked to countersign	34	935	2.5	1.2
Number of registers[3]				
WIC-only	230	846	2.2	0.3
0-2 cash registers	388	10617	27.4	2.0
3-7 cash registers	435	12144	31.3	1.8
8 or more cash registers	540	15197	39.2	2.2
Vendor monthly redemption dollars[4]				
$0-1649	345	9580	24.6	1.7
$1650-4499	343	9576	24.6	1.0
$4500-11199	380	9892	25.4	1.3
$11200-24679	275	6315	16.2	1.0
$24680+	253	3527	9.1	0.8
Scanning Equipment[5]				
Had equipment/used it	1031	28177	73.5	2.3
Had equipment/didn't use	7	170	0.4	0.2
Didn't have equipment	536	9986	26.1	2.2
Cashier unfamiliar[6]	117	3224	8.3	0.8
How indicated unfamiliarity[6]				
New employee	9	254	0.7	0.2
Never completed WIC transaction	13	364	0.9	0.3
Cashier received assistance	75	2092	5.4	0.7
Communicated in other way	84	2315	6.0	0.7

Footnotes appear on page A-3

1 Data reflects how the purchase price was entered on the food instrument for the safe buy only (n=1563, missing=31).

2 Data reflects vendor countersignature procedures during the safe buy only (n=1565, missing=29).

3 Missing data on number of registers for 7 vendors.

4 Missing data on monthly redemption dollars for 4 vendors.

5 Data reflects use of scanning equipment during the safe buy only (n=1574, missing=20).

6 Data reflects cashier unfamiliarity during the safe buy only (n=1586, missing=8).

Table A-2a. Number and Percent of WIC Vendors by Number of Cash Registers

Number of cash registers	Sample size	Weighted			
		N	%	Cumulative %	SE %
0	2	50	0.1	0.1	0.1
1	244	6648	17.1	17.2	2.0
2	142	3918	10.1	27.2	1.1
3	98	2713	7.0	34.2	0.9
4	88	2477	6.4	40.5	0.7
5	83	2327	6.0	46.5	0.6
6	96	2677	6.9	53.4	0.8
7	70	1949	5.0	58.4	0.7
8	94	2605	6.7	65.1	0.8
9	94	2625	6.7	71.8	0.8
10	71	2043	5.2	77.0	0.8
11	50	1391	3.6	80.6	0.6
12	32	898	2.3	82.9	0.4
13	42	1171	3.0	85.9	0.5
14	34	974	2.5	88.4	0.5
15	24	668	1.7	90.1	0.4
16	9	251	0.6	90.8	0.2
17	9	251	0.6	91.4	0.2
18	10	275	0.7	92.1	0.2
19	11	305	0.8	92.9	0.3
20	8	232	0.6	93.5	0.3
21	5	149	0.4	93.9	0.2
22	1	24	0.1	93.9	0.1
23	2	57	0.2	94.1	0.1
24	0	0	0.0	94.1	0.0
25	0	0	0.0	94.1	0.0
26	1	27	0.1	94.1	0.1
27	4	128	0.3	94.5	0.2

Table A2a continued on page A-4

Table A-2a. continued

Number of cash registers	Sample size	Weighted			
		N	%	Cumulative %	SE %
28	0	0	0.0	94.5	0.0
29	2	56	0.1	94.6	0.1
30	4	114	0.3	94.9	0.2
31	9	257	0.7	95.6	0.2
32	9	258	0.7	96.2	0.2
33	3	82	0.2	96.4	0.1
34	2	69	0.2	96.6	0.1
35	0	0	0.0	96.6	0.0
36	2	62	0.2	96.8	0.1
37	4	115	0.3	97.1	0.1
38	1	27	0.1	97.1	0.1
39	1	27	0.1	97.2	0.1
40	1	28	0.1	97.3	0.1
41	1	27	0.1	97.3	0.1
Missing	7	191	0.5	97.8	0.2
Non WIC-only	1370	38149	97.8	--	--
WIC-only	230	846	2.2	100.0	0.3
TOTAL	**1600**	**38995**	**100**	**100**	**--**

Table A-3. Comparison of State-level Characteristics: 1998 Study and 2004 Study

State-level characteristics	1998 Study Weighted N=36,908		2004 Study Weighted N=38,995	
	Weighted %	SE	Weighted %	SE
Vendor-to-participant ratio[1]				
1:<112	24.6	3.1	32.6	1.8
1:112-157	27.0	4.2	33.4	2.5
1:158-192	24.3	4.1	12.3	2.2
1:192+	24.1	2.9	21.7	2.9
Vendor-specific	20.5	0.4	17.7	3.6

1 Vendor-to-participant ratio groupings are based on the groupings used in the 1998 study.

Table A-4. Comparison of Store Characteristics: 1998 Study and 2004 Study

Store characteristics	1998 Study Weighted N=36,908		2004 Study Weighted N= 38,995	
	Weighted %	SE	Weighted %	SE
WIC Vendor type				
Grocery	97.8	2.2	93.6	1.0
Pharmacy	2.2	0.5	4.3	0.9
WIC-only	--	--	2.2	0.3
Number of registers[1]				
0-2	31.2	2.1	29.4	2.0
3-7	35.3	20	31.4	1.8
8 or more	33.5	2.4	39.2	2.2
Number of registers (no WIC-only) [2]				
0-2	31.2	2.1	28.0	2.0
3-7	35.3	2.0	32.0	1.9
8 or more	33.5	2.4	40.0	2.3
Scanning Equipment[3]				
Had equipment/used it	69.0	2.0	73.5	2.3
Had equipment/didn't use	3.6	0.8	0.4	0.2
Didn't have equipment	27.4	2.0	26.1	2.2
Cashier unfamiliar[4]	8.0	0.8	8.3	0.8
How indicated unfamiliarity[4]				
New employee	0.6	0.1	0.7	0.2
Never completed WIC trans.	1.2	0.3	0.9	0.3
Cashier received assistance	6.2	0.7	5.4	0.7
Communicated in other way	1.9	0.3	6.0	0.7

1 In the 1998 report, the first category for number of registers ranged from 1 to 2 (not 0 to 2), however, there were only 5 grocery stores with zero registers in the 2004 study, so these groups should be comparable.

2 In the 1998 report, the first category for number of registers ranged from 1 to 2 (not 0 to 2), however, there were only 5 grocery stores with zero registers in the 2004 study, so these groups should be comparable. Also, WIC-only stores are not included in this distribution because WIC-only stores did not exist, and thus were not included in the 1998 report.

3 The 1998 data is based on a weighted estimate of 36,417 vendors who were each visited three times (for a safe, partial and substitution buy). The 2004 data is based on a weighted estimate of 38,853 vendors who were each visited for the safe buy.

4 The 1998 data is based on a weighted estimate of 36,668 vendors who were each visited three times (for a safe, partial and substitution buy). The 2004 data is based on a weighted estimate of 38,853 vendors who were each visited for the safe buy.

Appendix B: Administrative Violations

Table B-1. National Estimate of Vendors Committing Administrative Violations by Type of Violation, Across All Buys[1]

Administrative Violations	Statistics		Yes	No
Failed to countersign	Sample size		965	599
	Weighted	N	22724	15963
		%	58.7	41.3
		SE %	2.8	2.8
Failed to provide a receipt	Sample size		995	569
	Weighted	N	23649	15038
		%	61.1	38.9
		SE %	3.2	3.2
Insufficient stock	Sample size		171	1393
	Weighted	N	4449	34238
		%	11.5	88.5
		SE %	1.1	1.1
Cashier Unfamiliar with Conducting a WIC Transaction	Sample size		294	1270
	Weighted	N	8070	30617
		%	20.9	79.1
		SE %	1.8	1.8
Raincheck	Sample size		8	1556
	Weighted	N	219	38468
		%	0.6	99.4
		SE %	0.2	0.2
Asked to pay cash in addition to food Instrument	Sample size		3	1561
	Weighted	N	57	38630
		%	0.2	99.9
		SE %	0.1	0.1

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy), and who committed the particular violation at least once.

Table B-1a. National Estimate of Vendors Committing Administrative Violations by Type of Violation, Safe Buy Only[1]

Administrative Violations	Statistics		Yes	No
Failed to countersign[2]	Sample size		623	913
	Weighted	N	14016	23368
		%	37.5	62.5
		SE %	2.5	2.5
Failed to provide a receipt[3]	Sample size		804	737
	Weighted	N	18784	18738
		%	50.1	49.9
		SE %	3.3	3.3
Insufficient stock	Sample size		60	1504
	Weighted	N	36602	36602
		%	1502.3	96.1
		SE %	3.9	0.7
Cashier Unfamiliar with Conducting a WIC Transaction[4]	Sample size		115	1441
	Weighted	N	3169	34715
		%	8.4	91.6
		SE %	0.8	0.8
Raincheck	Sample size		3	1561
	Weighted	N	79	38025
		%	0.2	99.8
		SE %	0.1	0.1
Asked to pay cash in addition to food Instrument[5]	Sample size		2	1551
	Weighted	N	33	37782
		%	0.1	99.9
		SE %	0.1	0.1

1 This data is based on the safe buy only with a weighted estimate of 38,104 vendors who were each visited three times (for a safe, partial, and substitution buy), and who committed the particular violation at least once.

2 Missing data on countersignature procedures for 28 vendors.

3 Missing data on provision of receipt for 23 vendors.

4 Missing data on cashier familiarity with WIC for 8 vendors.

5 Missing data on paying cash in addition to food instrument for 11 vendors.

Table B-1b. National Estimate of Vendors Committing Administrative Violations by Type of Violation, Partial Buy Only[1]

Administrative Violations	Statistics		Yes	No
Failed to countersign[2]	Sample size		634	896
	Weighted	N	14743	22644
		%	39.4	60.6
		SE %	2.7	2.7
Failed to provide a receipt[3]	Sample size		817	715
	Weighted	N	18838	18580
		%	50.3	49.7
		SE %	3.4	3.4
Insufficient stock	Sample size		91	1473
	Weighted	N	2314	35951
		%	6.1	94.0
		SE %	0.8	0.8
Cashier Unfamiliar with Conducting a WIC Transaction[4]	Sample size		128	1422
	Weighted	N	3410	34468
		%	9.0	91.0
		SE %	1.1	1.1
Raincheck	Sample size		4	1560
	Weighted	N	109	38156
		%	0.3	99.7
		SE %	0.1	0.1
Asked to pay cash in addition to food instrument[5]	Sample size		2	1538
	Weighted	N	54	37556
		%	0.1	99.9
		SE %	0.1	0.1

1 This data is based on the partial buy only with a weighted estimate of 38,265 vendors who were each visited three times (for a safe, partial, and substitution buy), and who committed the particular violation at least once.

2 Missing data on countersignature procedures for 34 vendors.

3 Missing data on provision of receipt for 32 vendors.

4 Missing data on cashier familiarity with WIC for 14 vendors.

5 Missing data on paying cash in addition to food instrument for 24 vendors.

Table B-1c. National Estimate of Vendors Committing Administrative Violations by Type of Violation, Minor Substitution Buy Only[1]

Administrative Violations	Statistics		Yes	No
Failed to countersign[2]	Sample size		458	625
	Weighted	N	9346	15804
		%	37.2	62.8
		SE %	2.9	2.9
Failed to provide a receipt[3]	Sample size		575	505
	Weighted	N	12401	12672
		%	49.5	50.5
		SE %	3.8	3.8
Insufficient stock[4]	Sample size		81	1023
	Weighted	N	2149	23514
		%	8.4	91.6
		SE %	1.1	1.1
Cashier Unfamiliar with Conducting a WIC Transaction[5]	Sample size		97	1004
	Weighted	N	2695	22909
		%	10.5	89.5
		SE %	1.5	1.5
Raincheck	Sample size		1	1107
	Weighted	N	30	25741
		%	0.1	99.9
		SE %	0.1	0.1
Asked to pay cash in addition to food Instrument[6]	Sample size		0	1095
	Weighted	N	0	25424
		%	0.0	100.0
		SE %	0.0	0.0

1 This data is based on the minor substitution buy only with a weighted estimate of 25,771 vendors who were each visited three times (for a safe, partial, and substitution buy), and who committed the particular violation at least once.

2 Missing data on countersignature procedures for 25 vendors.

3 Missing data on provision of receipt for 28 vendors.

4 Missing data on availability of stock for 4 vendors.

5 Missing data on cashier familiarity with WIC for 7 vendors.

6 Missing data on paying cash in addition to food instrument for 13 vendors.

Table B-1d. National Estimate of Vendors Committing Administrative Violations by Type of Violation, Major Substitution Buy Only[1]

Administrative Violations	Statistics		Yes	No
Failed to countersign[1]	Sample size		167	286
	Weighted	N	4565	8073
		%	36.1	63.9
		SE %	3.4	3.4
Failed to provide a receipt[2]	Sample size		245	208
	Weighted	N	6803	5842
		%	53.8	46.2
		SE %	4.0	4.0
Insufficient stock[3]	Sample size		16	438
	Weighted	N	437	12228
		%	3.5	96.6
		SE %	0.9	0.9
Cashier Unfamiliar with Conducting a WIC Transaction[4]	Sample size		43	407
	Weighted	N	1205	11349
		%	9.6	90.4
		SE %	1.7	1.7
Raincheck	Sample size		0	456
	Weighted	N	0	12722
		%	0.0	100.0
		SE %	0.0	0.0
Asked to pay cash in addition to food Instrument[5]	Sample size		0	455
	Weighted	N	0	12694
		%	0.0	100.0
		SE %	0.0	0.0

1 This data is based on the major substitution buy only with a weighted estimate of 12,722 vendors who were each visited three times (for a safe, partial, and substitution buy), and who committed the particular violation at least once.

2 Missing data on countersignature procedures for 3 vendors.

3 Missing data on provision of receipt for 3 vendors.

4 Missing data on availability of stock for 2 vendors.

5 Missing data on cashier familiarity with WIC for 6 vendors.

6 Missing data on paying cash in addition to food instrument for 1 vendor.

Table B-2. National Estimate of Frequency of Vendors Committing Administrative Violations by Type of Violation[1]

Administrative Violations	Statistics		Overall	Number of Occurrences of Administrative Violations			
				None	One	Two	Three
Failed to countersign	Sample size		1564	599	381	251	333
	Weighted	N	38687	15963	9546	5948	7231
		%	**100**	**41.3**	**24.7**	**15.4**	**18.7**
		SE %	0	2.8	1.7	1.3	2.2
Failed to provide a receipt	Sample size		1564	569	199	146	650
	Weighted	N	38687	15038	5116	3405	15128
		%	**100**	**38.9**	**13.2**	**8.8**	**39.1**
		SE %	0	3.2	1.2	0.9	3.3
Insufficient stock	Sample size		1564	1393	112	41	18
	Weighted	N	38687	34238	2913	1078	458
		%	**100**	**88.5**	**7.5**	**2.8**	**1.2**
		SE %	0	1.1	0.8	0.5	0.3
Cashier Unfamiliar with Conducting a WIC Transaction	Sample size		1564	1270	221	57	16
	Weighted	N	38687	30617	6017	1613	440
		%	**100**	**79.1**	**15.6**	**4.2**	**1.1**
		SE %	0	1.8	1.3	0.7	0.3

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy).

Table B-3. Propensity of Vendors to Commit Administrative Violations, Across All Buys[1]

Administrative Violations[2]	Sample size	Weighted		
		N	%	SE %
TOTAL	1564	38687	**100**	--
No Violations	184	5028	**13.0**	1.9
1	203	5334	**13.8**	1.5
2	173	4694	**12.1**	1.1
3	361	8964	**23.2**	1.8
4	217	5039	**13.0**	1.1
5	181	4165	**10.8**	1.2
6	180	3777	**9.8**	1.3
7	44	1129	**2.9**	0.6
8	17	445	**1.2**	0.4
9	3	84	**0.2**	0.1
10	1	28	**0.1**	0.1

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy).

2 In this table, administrative violations includes failing to have participant countersign, failing to provide receipt, having insufficient stock, allowing cashiers to be unfamiliar with WIC transactions, allowing rainchecks, and asking participant to pay cash in additional food instrument.

Table B-4. Percent of WIC Vendors Committing Administrative Violations by Type of Violation and Location, Across All Buys[1]

Administrative Violations	Statistics		Overall	Urban focused	Large Rural City/Town Focused	Small Rural Town Focused	Isolated Sm. Rural Town Focused
Failed to countersign	Sample size		965	809	77	45	34
	Weighted	N	22724	18448	2053	1229	994
		Col %	**58.7**	**64.9**	**50.5**	**38.8**	**32.9**
		SE Col %	2.8	2.9	5.2	6.1	7.1
		Total %	58.7	47.7	5.3	3.2	2.6
		SE Total%	2.8	3.1	1.0	0.7	0.8
Failed to provide a receipt	Sample size		995	759	87	72	77
	Weighted	N	23649	17105	2298	2013	2233
		Col %	**61.1**	**60.2**	**56.5**	**63.5**	**73.9**
		SE Col %	3.4	3.5	6.7	6.0	5.3
		Total %	61.1	44.2	5.9	5.2	5.8
		SE Total%	3.4	3.2	1.1	1.0	1.3
Insufficient stock	Sample size		171	132	15	9	15
	Weighted	N	4449	3366	411	252	419
		Col %	**11.5**	**11.8**	**10.1**	**8.0**	**13.9**
		SE Col %	1.1	1.3	2.5	3.0	3.8
		Total %	11.5	8.7	1.1	0.7	1.1
		SE Total%	1.1	1.1	0.3	0.3	0.4
Cashier Unfamiliar with Conducting a WIC Transaction	Sample size		294	223	39	18	14
	Weighted	N	8070	6088	1084	497	402
		Col %	**20.9**	**21.4**	**26.6**	**15.7**	**13.3**
		SE Col %	1.8	2.0	5.0	4.0	3.7
		Total %	20.9	15.7	2.8	1.3	1.0
		SE Total%	1.8	1.6	0.7	0.4	0.4

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy), and who committed the particular violation at least once.

Table B-5. Percent of Compliance Buys Where Administrative Violations Were Committed by Type of Violation and Food Package, Across All Buys[1]

Administrative Violations	Statistics		Overall (n=4692)	Type of Food Package		
				Woman (n=1581)	Infant (n=1521)	Child (n=1590)
Failed to countersign	Sample size		2895	909	1005	981
	Weighted	N	68173	21348	23340	23486
		Col %	**58.7**	**54.2**	**62.9**	**59.4**
		SE Col %	2.8	3.5	3.1	3.5
		Total %	58.7	18.4	20.1	20.2
		SE Total%	2.8	1.3	1.5	1.4
Failed to provide a receipt	Sample size		2985	1026	933	1026
	Weighted	N	70948	24593	21605	24750
		Col %	**61.1**	**62.4**	**58.3**	**62.6**
		SE Col %	3.2	3.6	4.1	3.6
		Total %	61.1	21.2	18.6	21.3
		SE Total%	3.2	1.4	1.6	1.5
Insufficient stock	Sample size		513	90	321	102
	Weighted	N	13346	2294	8415	2637
		Col %	**11.5**	**5.8**	**22.7**	**6.7**
		SE Col %	1.1	1.4	2.5	1.6
		Total %	11.5	2.0	7.3	2.3
		SE Total%	1.1	0.5	0.9	0.5
Cashier Unfamiliar with Conducting a WIC Transaction	Sample size		882	315	315	252
	Weighted	N	24209	8822	8685	6703
		Col %	**20.9**	**22.4**	**23.4**	**16.9**
		SE Col %	1.8	2.1	2.5	2.2
		Total %	20.9	7.6	7.5	5.8
		SE Total%	1.8	0.8	0.9	0.8

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy) yielding a total estimate of 116,061.

Table B-6. Percent of Vendors Committing Administrative Violations by Type of Violation and Buy Type[1]

Administrative Violations	Statistics		Overall	Safe	Partial	Substitution	
						Minor	Major
Failed to countersign	Sample size		1882	623	634	458	167
	Weighted	N	43135	14232	14930	9377	4596
		Col %	**37.9**	**37.5**	**39.5**	**37.1**	**36.2**
		SE Col %	2.5	2.5	2.8	2.9	3.4
		Total %	37.9	12.5	13.1	8.2	4.0
		SE Total%	2.5	0.8	0.9	0.7	0.4
Failed to provide a receipt	Sample size		2441	804	817	575	245
	Weighted	N	57310	18997	19010	12455	6847
		Col %	**50.3**	**49.9**	**50.2**	**49.4**	**53.9**
		SE Col %	3.3	3.3	3.4	3.8	4.0
		Total %	50.3	16.7	16.7	10.9	6.0
		SE Total%	3.3	1.1	1.1	0.9	0.5
Insufficient stock	Sample size		248	60	91	81	16
	Weighted	N	6442	1513	2335	2156	438
		Col %	**5.6**	**3.9**	**6.0**	**8.4**	**3.4**
		SE Col %	0.6	0.7	0.8	1.1	0.9
		Total %	5.6	1.3	2.0	1.9	0.4
		SE Total%	0.6	0.2	0.3	0.2	0.1
Cashier Unfamiliar with Conducting a WIC Transaction	Sample size		383	115	128	97	43
	Weighted	N	10562.1	3189.9	3447.0	2715.9	1209.3
		Col %	**9.2**	**8.3**	**9.0**	**10.6**	**9.6**
		SE Col %	0.9	0.8	1.0	1.5	1.7
		Total %	9.2	2.8	3.0	2.4	1.1
		SE Total%	0.9	0.3	0.3	0.3	0.2

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy) yielding a total estimate of 116,061.

Table B-7. Percent of WIC Vendors Committing Administrative Violations by Type of Violation and Involvement in a Substitution, Overcharge, or Undercharge, Across All Buys[1]

Administrative Violations	Statistics		Overall	Involved in a Substitution, Overcharge, or Undercharge	NOT Involved in a Substitution, Overcharge, or Undercharge
Failed to countersign	Sample size		965	184	781
	Weighted	N	22724	4308	18416
		Col %	**58.7**	**61.8**	**58.1**
		SE Col %	2.8	4.2	2.9
		Total %	58.7	11.1	47.6
		SE Total%	2.8	1.2	2.5
Failed to provide receipt	Sample size		995	270	725
	Weighted	N	23649	6480	17169
		Col %	**61.1**	**93.0**	**54.1**
		SE Col %	3.2	1.8	3.5
		Total %	61.1	16.8	44.4
		SE Total%	3.2	1.4	2.7
Insufficient stock	Sample size		171	40	131
	Weighted	N	4449	1061	3387
		Col %	**11.5**	**15.2**	**10.7**
		SE Col %	1.1	2.3	1.2
		Total %	11.5	2.7	8.8
		SE Total%	1.1	0.4	1.0
Cashier Unfamiliar with Conducting a WIC Transaction	Sample size		294	56	238
	Weighted	N	8070	1483	6586
		Col %	**20.9**	**21.3**	**20.8**
		SE Col %	1.8	3.4	1.7
		Total %	20.9	3.8	17.0
		SE Total%	1.8	0.7	1.5

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy), and who committed the particular violation at least once.

Table B-8. Percent of WIC Vendors with Insufficient Stock by State-level Characteristics, Across All Buys[1]

State-Level Characteristics	Sample Size	Weighted		
		N	%	SE %
TOTAL WIC Vendors with Insufficient Stock	171	4449	**11.5**	1.1
Vendor-to-participant ratio[2]				
1:<112	68	1861	**14.8**	2.0
1:112-157	41	1089	**8.4**	1.5
1:158-192	14	382	**8.0**	3.3
1:192+	48	1117	**13.4**	2.7
Vendor-specific**				
Yes	15	357	**5.3**	1.8
No	156	4092	**12.8**	1.3
Location				
Urban	132	3366	**11.8**	1.3
Large rural city/town	15	411	**10.1**	2.5
Small rural town	9	252	**8.0**	3.0
Isolated small rural town	15	419	**13.9**	3.8
Partial buys allowed[3]				
Yes	123	3171	**11.1**	1.4
Yes, except formula	10	275	**12.4**	6.1
No	38	1003	**12.5**	2.0

** Significant at the 0.01 level, based on the chi-square test of significance.

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy), and who had insufficient stack on at least one buy.

2 Vendor-to-participant ratio groupings are based on the groupings used in the 1998 study.

3 These vendors will allow participants to complete a partial buy, or not purchase the full food prescription listed on their WIC voucher for items other than formula. If the Food Instrument includes formula, the participant must purchase all of the formula prescribed to them.

Table B-9. Percent of WIC Vendors with Insufficient Stock by Store Characteristics, Across All Buys[1]

Store Characteristics	Sample Size	Weighted		
		N	%	SE %
TOTAL WIC Vendors with Insufficient Stock	**171**	**4449**	**11.5**	**1.1**
WIC Vendor type[a,]* **				
Grocery	123	3391	**9.4**	1.1
Pharmacy	37	1019	**64.0**	5.4
WIC-only	11	38	**4.7**	1.9
Purchase price entered electronically[2]				
Yes	21	531	**11.0**	2.0
No	123	3264	**10.3**	1.1
Number of registers[3,b,]* **				
0-2	71	1939	**18.3**	2.2
3-7	59	1629	**13.6**	5.1
8 or more	27	763	**5.1**	1.3
WIC-only	11	38	**4.7**	1.9
Vendor monthly redemption dollars[4,c,]* **				
$0-1649	68	1884	**19.9**	2.6
$1650-4499	35	993	**10.4**	1.9
$4500-11199	35	860	**8.9**	1.8
$11200-24679	19	425	**6.7**	1.6
$24680+	12	236	**6.6**	2.8
Scanning Equipment[5,]* **				
Scanned	84	2267	**8.1**	1.2
Did not scan	73	1802	**17.8**	2.1
Cashier unfamiliar[6]				
Yes	20	550	**17.2**	3.8
No	145	3732	**10.6**	1.1

*** Significant at the 0.001 level, based on the chi-square test of significance.

a Pharmacy is significantly different from grocery; pharmacy is significantly different from WIC-only.

b 0-2 registers is significantly different from 8+ registers and WIC-only; 3-4 registers is significantly different from 8+ registers and WIC-only.

c $0-1649 is significantly different from each of the other monthly redemption dollar groups.

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy), and who had insufficient stack on at least one buy.

2 Data reflects how purchase price was entered for the safe buy only since this information could vary across buys (n=1475, missing=89).

3 Missing data on number of registers for 7 vendors.

4 Missing data on monthly redemption dollars for 4 vendors.

5 Data reflects use of scanning equipment during the safe buy only since this information could vary across buys (n=1545, missing=19).

6 Data reflects cashier unfamiliarity during the safe buy only since this information could vary across buys (n=1556, missing=8).

Table B-10. Percent of WIC Vendors Who Failed to Countersign by State-level Characteristics, Across All Buys[1]

State-Level Characteristics	Sample Size	Weighted		
		N	%	SE %
TOTAL WIC Vendors who Failed to Countersign	965	22724	**58.7**	2.8
Vendor-to-participant ratio[2,a] **,*****				
1:<112	209	5808	**46.1**	5.1
1:112-157	240	6606	**51.1**	5.0
1:158-192	108	3036	**63.3**	8.2
1:192+	408	7275	**87.0**	4.0
Vendor-specific				
Yes	289	4667	**68.8**	7.0
No	676	18057	**56.6**	3.3
Location[b,] *******				
Urban	809	18448	**64.9**	2.9
Large rural city/town	77	2053	**50.5**	5.2
Small rural town	45	1229	**38.8**	6.1
Isolated small rural town	34	994	**32.9**	7.1
Partial buys allowed[3,c,] ******				
Yes	596	15938	**56.0**	3.4
Yes, except formula	25	695	**31.3**	8.2
No	344	6092	**76.2**	5.0

** Significant at the 0.01 level, based on the chi-square test of significance.

*** Significant at the 0.001 level, based on the chi-square test of significance.

a 1:<112 is significantly different from each of the other groups.

b Urban-focused is significantly different from isolated small rural town.

c All three groups are significantly different from each other.

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy), and who failed to countersign properly on at least one buy.

2 Vendor-to-participant ratio groupings are based on the groupings used in the 1998 study.

3 These vendors will allow participants to complete a partial buy, or not purchase the full food prescription listed on their WIC voucher for items other than formula. If the Food Instrument includes formula, the participant must purchase all of the formula prescribed to them.

Table B-11. Percent of WIC Vendors Who Failed to Countersign by Store Characteristics, Across All Buys[1]

Store Characteristics	Sample Size	Weighted		
		N	%	SE %
TOTAL WIC Vendors who Failed to Countersign	965	22724	**58.7**	2.8
WIC Vendor type[a,*]**				
Grocery	744	20942	**57.7**	2.9
Pharmacy	41	1117	**70.1**	7.3
WIC-only	180	666	**81.8**	3.4
Purchase price entered electronically[2]				
Yes	136	3406	**70.3**	6.3
No	761	17684	**55.9**	2.9
Number of registers[3,b,*]**				
0-2	217	6013	**56.8**	4.1
3-7	236	6618	**55.1**	3.9
8 or more	330	9374	**62.1**	3.5
WIC-only	180	666	**81.8**	3.4
Vendor monthly redemption dollars[4,c,]**				
$0-1649	176	4918	**51.9**	4.0
$1650-4499	185	5175	**54.4**	3.5
4500-11199	229	5835	**60.4**	3.8
$11200-24679	178	4047	**63.5**	3.9
$24680+	193	2645	**74.4**	4.4
Scanning Equipment[5]				
Scanned	600	16479	**58.7**	3.2
Did not scan	357	6051	**59.8**	4.0
Cashier unfamiliar[6]				
Yes	75	2080	**65.2**	5.2
No	886	20533	**58.2**	2.9

** Significant at the 0.01 level, based on the chi-square test of significance.

*** Significant at the 0.001 level, based on the chi-square test of significance.

a Grocery is significantly different from pharmacy and WIC-only.

b WIC-only is significantly different from all other cash register groups.

c $0-1649 and $1650-4499 are significantly different from $24680+.

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy), and who failed to countersign on at least one buy.

2 Data reflects how purchase price was entered for the safe buy only since this information could vary across buys (n=1475, missing=89).

3 Missing data on number of registers for 7 vendors.

4 Missing data on monthly redemption dollars for 4 vendors.

5 Data reflects use of scanning equipment during the safe buy only since this information could vary across buys (n=1545, missing=19).

6 Data reflects cashier unfamiliarity during the safe buy only since this information could vary across buys (n=1556, missing=8).

Table B-12. Percent of WIC Vendors Who Failed to Provide a Receipt by State-level Characteristics, Across All Buys[1]

State-Level Characteristics	Sample Size	Weighted		
		N	%	SE %
TOTAL WIC Vendors who Failed to Provide Receipt	995	23649	**61.1**	3.3
Vendor-to-participant ratio[2]				
1:<112	317	8747	**69.4**	5.2
1:112-157	264	7338	**56.8**	5.9
1:158-192	80	2160	**45.1**	9.6
1:192+	334	5405	**64.7**	6.4
Vendor-specific**				
Yes	218	3005	**44.3**	4.1
No	777	20644	**64.7**	3.7
Location				
Urban	759	17105	**60.2**	3.5
Large rural city/town	87	2298	**56.5**	6.7
Small rural town	72	2013	**63.5**	6.0
Isolated small rural town	77	2233	**73.9**	5.3
Partial buys allowed[3]				
Yes	662	17509	**61.5**	3.9
Yes, except formula	23	655	**29.5**	9.7
No	310	5485	**68.6**	5.5

** Significant at the 0.01 level, based on the chi-square test of significance.

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy), and who failed provide a receipt on at least one buy.

2 Vendor-to-participant ratio groupings are based on the groupings used in the 1998 study.

3 These vendors will allow participants to complete a partial buy, or not purchase the full food prescription listed on their WIC voucher for items other than formula. If the Food Instrument includes formula, the participant must purchase all of the formula prescribed to them.

Table B-13. Percent of WIC Vendors Who Failed to Provide a Receipt by Store Characteristics, Across All Buys[1]

Store Characteristics	Sample Size	Weighted		
		N	%	SE %
TOTAL WIC Vendors who Failed to Provide Receipt	995	23649	**61.1**	3.3
WIC Vendor type[a,*]**				
Grocery	789	22199	**61.2**	3.3
Pharmacy	29	792	**49.7**	9.2
WIC-only	177	658	**80.9**	3.7
Purchase price entered electronically[2]				
Yes	103	2536	**52.3**	8.2
No	832	19645	**65.1**	3.4
Number of registers[3,b,*]**				
0-2	354	9904	**93.6**	1.5
3-7	246	6966	**58.0**	4.0
8 or more	216	6068	**40.2**	4.7
WIC-only	177	658	**80.9**	3.7
Vendor month. redemption dollars[4,c,*]**				
$0-1649	246	6927	**73.1**	4.1
$1650-4499	218	6135	**64.5**	3.9
$4500-11199	228	5755	**59.6**	4.3
$11200-24679	148	3145	**49.4**	4.9
$24680+	152	1609	**45.3**	5.8
Scanning Equipment[5,*]**				
Scanned	509	13918	**49.6**	3.9
Did not scan	478	9531	**94.2**	1.5
Cashier unfamiliar[6]				
Yes	66	1825	**57.2**	5.5
No	923	21659	**61.4**	3.2

*** Significant at the 0.001 level, based on the chi-square test of significance.

a WIC-only is significantly different from pharmacy and grocery.

b All cash register groups are significantly different from each other.

c $0-1649 is significantly different from $11200-24679 and $24680+; $1650-4499 is significantly different from $24680+.

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy), and who failed to provide a receipt on at least one buy.

2 Data reflects how purchase price was entered for the safe buy only since this information could vary across buys (n=1475, missing=89).

3 Missing data on number of registers for 7 vendors.

4 Missing data on monthly redemption dollars for 4 vendors.

5 Data reflects use of scanning equipment during the safe buy only since this information could vary across buys (n=1545, missing=19).

6 Data reflects cashier unfamiliarity during the safe buy only since this information could vary across buys (n=1556, missing=8).

Table B-14. Percent of WIC Vendors with Cashier Unfamiliar with Conducting a WIC Transaction by State-level Characteristics, Across All Buys[1]

State-Level Characteristics	Sample Size	Weighted		
		N	%	SE %
TOTAL WIC Vendors with a Cashier Unfamiliar with Conducting WIC Transactions	294	8070	**20.9**	1.8
Vendor-to-participant ratio[2]				
1:<112	100	2775	**22.0**	3.5
1:112-157	106	3023	**23.4**	2.9
1:158-192	22	610	**12.7**	2.7
1:192+	66	1663	**19.9**	4.0
Vendor-specific				
Yes	44	1087	**16.0**	3.9
No	250	6983	**21.9**	2.0
Location				
Urban	223	6088	**21.4**	2.0
Large rural city/town	39	1084	**26.6**	5.0
Small rural town	18	497	**15.7**	4.0
Isolated small rural town	14	402	**13.3**	3.7
Partial buys allowed[3]				
Yes	224	6277	**22.0**	2.1
Yes, except formula	20	551	**24.8**	8.7
No	50	1242	**15.5**	3.2

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy), and who had a cashier that was unfamiliar with WIC on at least one buy.

2 Vendor-to-participant ratio groupings are based on the groupings used in the 1998 study.

3 These vendors will allow participants to complete a partial buy, or not purchase the full food prescription listed on their WIC voucher for items other than formula. If the Food Instrument includes formula, the participant must purchase all of the formula prescribed to them.

Table B-15. Percent of WIC Vendors with Cashier Unfamiliar with Conducting a WIC Transaction by Store Characteristics, Across All Buys[1]

Store Characteristics	Sample Size	Weighted		
		N	%	SE %
TOTAL WIC Vendors with a Cashier Unfamiliar with WIC Transactions	294	8070	**20.9**	1.8
WIC Vendor type[a,]* **				
Grocery	259	7275	**20.1**	1.8
Pharmacy	28	771	**48.4**	6.3
WIC-only	7	24	**2.9**	1.3
Purchase price entered electronically[2]				
Yes	50	1381	**28.5**	4.6
No	225	6163	**19.5**	1.8
Number of registers [3,b,]* **				
0-2	61	1715	**16.2**	2.5
3-7	95	2675	**22.3**	2.4
8 or more	130	3627	**24.0**	2.6
WIC-only	7	24	**2.9**	1.3
Vendor monthly redemption dollars[4,c,]* **				
$0-1649	104	2928	**30.9**	3.3
$1650-4499	74	2116	**22.3**	2.8
$4500-11199	61	1699	**17.6**	2.3
$11200-24679	40	1011	**15.9**	3.3
$24680+	12	236	**6.7**	2.2
Scanning Equipment**				
Scanned	233	6533	**23.3**	2.0
Did not scan	57	1430	**14.1**	2.5

** Significant at the 0.01 level (Chi-square test of significance). *** Significant at the 0.001 level.

a All vendor types are significantly different from each other.

b WIC-only is significantly different from all other cash register groups.

c $0-1649 vs. $4500-11199, $11200-24679, and $24680+, $1650-4499 vs. $24680+, and $4500-11199 vs. $24680+ are all significantly different.

1 This data is based on a weighted estimate of 38,687 vendors who were each visited three times (for a safe, partial, and substitution buy), and who had a cashier that was unfamiliar with WIC on at least one buy.

2 Data reflects how purchase price was entered for the safe buy only since this information could vary across buys (n=1475, missing=89).

3 Missing data on number of registers for 7 vendors.

4 Missing data on monthly redemption dollars for 4 vendors.

5 Data reflects use of scanning equipment during the safe buy only since this information could vary across buys (n=1545, missing=19).

6 Data reflects cashier unfamiliarity during the safe buy only since this information could vary across buys (n=1556, missing=8).

Appendix C: Overcharge and Undercharge

For the purposes of this study, overcharge was defined as payment to a vendor that exceeded the price that a non-WIC shopper would have paid for the same foods. Undercharge was defined as the payment to a WIC vendor that was less than the amount a non-WIC customer would have paid for the same foods.

Example of overcharge

The compliance buyer bought four cans of formula that were marked down from $6 to $4. The cashier rang up the formula at $6 each, giving a total purchase amount of $24. The food instrument was redeemed by the State for the amount of $24. In this case the compliance buyer was overcharged $8 [$24 - ($4x4) = $8].

Example of undercharge

Again, the compliance buyer bought four cans of formula that were marked down from $6 to $4. The formula was rung in correctly giving a total amount of $16. This amount was confirmed on the receipt provided to the compliance buyer. However, although the cashier rang the items in correctly, she wrote the incorrect amount on the voucher and it was redeemed by the State for $15. In this case the compliance buyer was undercharged $1.

Example of substitution that does NOT result in over or undercharge

According to the food instrument, the compliance buyer was supposed to purchase 1 gallon of milk ($4), 1 block of cheese ($3), and 1 dozen eggs ($2). Instead, she purchased 1 gallon of milk and 2 blocks of cheese. She was charged $10. This does not constitute an overcharge because, although the vendor allowed the substitution, the compliance buyer was charged the correct amount for the items she purchased.

Table C-1. National Estimate of Undercharge and Overcharge Rates Across All Buys

Type of Purchase Price Deviation	Statistics		Yes[1]	No	Total Buys[2]
Undercharge	Sample size		186	3770	3956
	Weighted	N	4349	96043	100392
		%	**4.3**	**95.7**	**100**
		SE %	0.50	0.50	
Overcharge	Sample size		173	3783	3956
	Weighted	N	4234	96158	100392
		%	**4.2**	**95.8**	**100**
		SE %	0.4	0.4	

1 The 'Yes' column of data in this table indicates the number and percent of vendors that undercharged or overcharged (see row labels).

2 Missing 736 unweighted observations and 15,669 weighted observations

Table C-2. National Estimate of Undercharge and Overcharge Rates for the Safe Buy

Type of Purchase Price Deviation	Statistics		Yes[1]	No	Total Buys[2]
Undercharge	Sample size		72	1258	1330
	Weighted	N	1521	31764	33284
		%	**4.6**	**95.4**	**100**
		SE %	0.7	0.7	
Overcharge	Sample size		46	1284	1330
	Weighted	N	1153	32131	33284
		%	**3.5**	**96.5**	**100**
		SE %	0.5	0.5	

1 The 'Yes' column of data in this table indicates the number and percent of vendors that undercharged or overcharged (see row labels).

2 Missing 234 unweighted observations and 4820 weighted observations

Table C-3. National Estimate of Undercharge and Overcharge Rates for the Partial Buy

Type of Purchase Price Deviation	Statistics		Yes[1]	No	Total Buys[2]
Undercharge	Sample size		40	1287	1327
	Weighted	N	971	32178	33149
		%	**2.9**	**97.1**	**100**
		SE %	0.6	0.6	
Overcharge	Sample size		64	1263	1327
	Weighted	N	1512	31636	33149
		%	**4.6**	**95.4**	**100**
		SE %	0.7	0.7	

1 The 'Yes' column of data in this table indicates the number and percent of vendors that undercharged or overcharged (see row labels).

2 Missing 237 unweighted observations and 5116 weighted observations

Table C-4. National Estimate of Undercharge and Overcharge Rates for the Minor Substitution Buy

Type of Purchase Price Deviation	Statistics		Yes[1]	No	Total Buys[2]
Undercharge	Sample size		51	859	910
	Weighted	N	1131	20912	22043
		%	**5.1**	**94.9**	**100**
		SE %	0.9	0.9	
Overcharge	Sample size		39	871	910
	Weighted	N	851	21193	22043
		%	**3.9**	**96.1**	**100**
		SE %	0.8	0.8	

1 The 'Yes' column of data in this table indicates the number and percent of vendors that undercharged or overcharged (see row labels).

2 Missing 198 unweighted observations and 3728 weighted observations

Table C-5. National Estimate of Undercharge and Overcharge Rates for the Major Substitution Buy

Type of Purchase Price Deviation	Statistics		Yes[1]	No	Total Buys[2]
Undercharge	Sample size		23	366	389
	Weighted	N	656	10224	10880
		%	**6.0**	**94.0**	**100**
		SE %	1.6	1.6	
Overcharge	Sample size		24	365	389
	Weighted	N	679	10201	10880
		%	**6.2**	**93.8**	**100**
		SE %	1.3	1.3	

1 The 'Yes' column of data in this table indicates the number and percent of vendors that undercharged or overcharged (see row labels).

2 Missing 58 unweighted observations and 1842 weighted observations

Table C-6. Number and Percent of WIC Vendors by Frequency of Undercharging or Overcharging Across All Buys

Type of Purchase Price Deviation	Statistics		Number of Undercharges or Overcharges				Total Buys[2]
			None	One	Two	Three	
Undercharge	Sample size		1299	141	15	5	1460
	Weighted	N	32788.7	3387	346	91	36611
		%	**89.6**	**9.3**	**0.9**	**0.3**	**100**
		SE %	1.1	1.0	0.3	0.1	
Overcharge	Sample size		1301	145	14	0	1460
	Weighted	N	32728	3533	350	0	36611
		%	**89.39**	**9.7**	**1.0**	**0**	**100**
		SE %	1.0	0.9	0.3	0	

1 The 'Yes' column of data in this table indicates the number and percent of vendors that undercharged or overcharged (see row labels).

2 Missing 104 unweighted observations and 2076 weighted observations.

Table C-7. National Estimates of Undercharge and Overcharge Rates by Type of Buy

Type of Purchase Price Deviation	Statistics		Type of Buy					Total Buys[1]
			Safe Buy	Partial Buy	Minor Substitution	Major Substitution	All Buys	
Undercharge	Sample size		72	40	51	23	186	3956
	Weighted	N	1521	971	1131	656	4278	99356
		Total %	**1.5**	**1.0**	**1.1**	**0.7**	**4.3**	
		SE %	0.2	0.2	0.2	0.2	0.5	
Overcharge	Sample size		46	64	39	24	173	3956
	Weighted	N	1153	1512	851	679	4195	99356
		Total %	**1.2**	**1.5**	**0.9**	**0.7**	**4.2**	
		SE %	0.2	0.2	0.2	0.2	0.4	

* Weighted sample size for total buys will not match table C-1 because different weights are used for analyses using all buys versus individual buys

1 Missing 104 unweighted observations and 15,507 weighted observations

Table C-8. Average Amount of Undercharge and Overcharge by Type of Buy

Type of Purchase Price Deviation	Statistics	Type of Buy				Total Buys[1]
		Safe Buy	Partial Buy	Minor Substitution	Major Substitution	
Overcharge	Sample size	1330	1327	910	389	3956
	Weighted N	33284	33149	22043	10880	99356
	Total	2097.88	11921.38	3727.93	1065.06	18812.25
	Mean Overcharge ($)	**0.06**	**0.36**	**0.17**	**0.10**	**0.19**
	SE of Mean ($)	0.02	0.12	0.09	0.03	0.06
Undercharge	Sample size	1330	1327	910	389	3956
	Weighted N	33284	33149	22043	10880	99356
	Total	1462.37	1392.47	2725.31	628.46	6208.61
	Mean Undercharge ($)	**0.04**	**0.04**	**0.12**	**0.06**	**0.06**
	SE of Mean ($)	0.01	0.01	0.03	0.02	0.01
Difference	Sample size	1330	1327	910	389	3956
	Weighted N	33284	33149	22043	10880	99356
	Total	635.51	10528.92	1002.61	436.6	12603.64
	Mean Difference ($)[2]	**0.02**	**0.32**	**0.05**	**0.04**	**0.13**
	SE of Mean ($)	0.02	0.12	0.09	0.03	0.06
Mischarge	Sample size	1330	1327	910	389	3956
	Weighted N	33284	33149	22043	10880	99356
	Total	3560.24	13313.85	6453.24	1693.52	25020.86
	Mean Mischarge ($)[3]	**0.11**	**0.4**	**0.29**	**0.16**	**0.25**
	SE of Mean ($)	0.02	0.12	0.09	0.04	0.06

Footnotes located on next page.

* Weighted sample size for total buys will not match table C-1 because different weights are used for analyses using all buys versus individual buys

1 Missing 104 unweighted observations and 15,507 weighted observations

2 Difference=Overcharge-Undercharge

3 Mischarge=|Overcharge| + |Undercharge|

Table C-9. Number and Percentage of WIC Vendors that Undercharged and Overcharged by Type of Food Package Across All Buys

Type of Purchase Price Deviation	Statistics		Type of Food Package			Total Vendors
			Woman	Child	Infant	
Undercharge		Sample size	67	62	32	161
	Weighted	N	1632	1548	643	3823
		Row %	42.7	40.5	16.8	100
		Row SE %	4.01	3.9	2.6	0
		Column %	**12.4**	**11.7**	**5.2**	**9.9**
		Column SE%	1.8	1.6	1.0	1.1
Overcharge		Sample size	60	61	38	159
	Weighted	N	1405	1514	964	3883
		Row %	36.2	39.0	24.8	100
		Row SE %	4.0	4.4	3.6	0
		Column %	**10.7**	**11.5**	**7.8**	**10.0**
		Column SE%	1.5	1.6	1.3	0.9
Mischarge*		Sample size	116	106	67	289
	Weighted	N	2784	2636	1550	6970
		Row %	39.9	37.8	22.2	100
		Row SE %	3.0	3.1	2.5	0
		Column %	**21.2**	**20.0**	**12.5**	**18.0**
		Column SE%	2.2	2.3	1.7	1.5

*"The term "mischarge" is not mutually exclusive. A vendor may have overcharged in one buy and undercharged in another buy."

Table C-10. Number and Percentage of WIC Vendors that Undercharged and Overcharged by Use of Scanning Equipment Across All Buys

Type of Purchase Price Deviation	Statistics		Scanning Equipment		Total Vendors
			Used Scanning Equipment	Did Not Use Scanning Equipment	
Undercharge*		Sample size	89	70	159
	Weighted	N	2416	1347	3763
		Row %	64.2	35.8	100
		Row SE %	5.2	5.2	0
		Column %	**8.7**	**12.9**	**9.8**
		Column SE %	1.3	1.8	1.1
Overcharge±		Sample size	81	76	157
	Weighted	N	2185	1638	3823
		Row %	57.2	42.9	100
		Row SE %	5.4	5.4	0
		Column %	**7.9**	**15.6**	**10**
		Column SE %	1.0	2.2	0.9

*Missing 2 vendors that undercharged for which we do not have information on use of scanning equipment

±Missing 2 vendors that overcharged for which we do not have information on use of scanning equipment

Table C-11. Number and Percentage of WIC Vendors that Undercharged and Overcharged by Use of Electronic Check Writing Equipment

Type of Purchase Price Deviation	Statistics		Use of Electronic Check Writing		Total Vendors
			Use of Electronic Equipment	No Use of Electronic Equipment	
Undercharge*		Sample size	10	141	151
	Weighted	N	251	3300	3550
		Row %	7.1	92.9	100
		Row SE %	2.8	2.8	0
		Column %	**7.9**	**10.2**	**10.0**
		Column SE %	3.2	1.1	1.1
Overcharge±		Sample size	10	137	147
	Weighted	N	202	3417	3620
		Row %	5.6	94.4	100
		Row SE %	2.3	2.3	0
		Column %	**6.4**	**10.5**	**10.2**
		Column SE %	2.6	1.0	1.0

*Missing 10 vendors that undercharged for which we do not have information on use of electronic check writing equipment

±Missing 12 vendors that overcharged for which we do not have information on use of electronic check writing equipment

Table C-12. Number and Percentage of WIC Vendors that Undercharged and Overcharged by Vendor Size Across All Buys

Type of Purchase Price Deviation	Statistics		Vendor Size				Total Vendors
			Small	Medium	Large	WIC-Only	
Undercharge		Sample size	53	42	35	31	161
	Weighted	N	1500	1248	968	106	3823
		Row %	39.3	32.6	25.3	2.8	100
		Row SE %	5.2	4.5	4.5	0.7	0
		Column %	**14.1**	**10.5**	**6.4**	**13.0**	**9.9**
		Column SE%	2.1	1.8	1.3	2.4	1.1
Overcharge		Sample size	66	34	33	26	159
	Weighted	N	1879	973	917	114	3883
		Row %	48.4	25.1	23.6	2.9	100
		Row SE %	4.9	3.9	4.4	0.9	0
		Column %	**17.6**	**8.2**	**6.1**	**14.0**	**10.1**
		Column SE%	2.1	1.5	1.2	3.7	0.9

Table C-13. Number and Percentage of WIC Vendors that Undercharged and Overcharged by Vendor Monthly Redemption Dollars Across All Buys

Type of Purchase Price Deviation	Statistics		Monthly Redemption Dollars					Total Vendors
			$0-1649 1st Group	$1650-4499 2nd Group	$4500-11199 3rd Group	$11200-24679 4th Group	$24680+ 5th Group	
Undercharge		Sample size	27	43	39	29	23	161
	Weighted	N	784	1256	961	559	262	3823
		Row %	20.5	32.9	25.1	14.6	6.9	100
		Row SE %	4.1	4.3	3.4	3.2	2.1	0
		Column %	**8.3**	**13.2**	**9.9**	**8.8**	**7.4**	9.9
		Column SE%	2.0	2.0	1.5	2.1	2.3	**1.1**
Overcharge±		Sample size	49	37	33	22	17	158
	Weighted	N	1376	1024	868	441	151	3859
		Row %	35.6	26.5	22.5	11.4	3.9	100
		Row SE %	4.0	4.0	4.0	2.5	1.6	0
		Column %	**14.5**	**10.8**	**9.0**	**6.9**	**4.3**	10
		Column SE%	2.1	1.7	1.9	1.6	1.7	**0.9**

±Missing one vendor that overcharged for which we do not have information on monthly redemption dollars

Table C-13a. Number and Percentage of WIC Vendors that Undercharged and Overcharged by Vendor Monthly Redemption Dollars for the Safe Buy

Type of Purchase Price Deviation	Statistics		Monthly Redemption Dollars					Total Vendors
			$0-1649 1st Group	$1650-4499 2nd Group	$4500-11199 3rd Group	$11200-24679 4th Group	$24680+ 5th Group	
Undercharge		Sample size	8	18	19	17	10	72
	Weighted	N	245	521	432	256	107	1560.
		Row %	15.7	33.4	27.7	16.4	6.8	100
		Row SE %	4.7	5.4	5.4	5.0	3.0	0
		Column %	**3.0**	**6.4**	**5.1**	**4.4**	**3.2**	**4.6**
		Column SE%	1.03	1.48	1.13	1.53	1.43	0.71
Overcharge±		Sample size	16	12	7	5	5	45
	Weighted	N	463	359	172	111	40	1144
		Row %	40.5	31.4	15.0	9.7	3.5	100
		Row SE %	7.3	7.0	5.4	4.5	2.3	0
		Column %	**5.7**	**4.4**	**2.0**	**1.9**	**1.2**	**3.4**
		Column SE%	1.3	1.2	0.8	0.9	0.8	0.5

±Missing 1 vendor that overcharged for which we do not have information on monthly redemption dollars

Table C-13b. Number and Percentage of WIC Vendors that Undercharged and Overcharged by Vendor Monthly Redemption Dollars for the Partial Buy

Type of Purchase Price Deviation	Statistics		Monthly Redemption Dollars					Total Vendors
			$0-1649 1st Group	$1650-4499 2nd Group	$4500-11199 3rd Group	$11200-24679 4th Group	$24680+ 5th Group	
Undercharge		Sample size	10	9	8	7	6	40
	Weighted	N	290	267	225	126	91	999
		Row %	29	26.7	22.6	12.6	9.1	100
		Row SE %	7.9	8.7	7.3	5.5	4.6	0
		Column %	**3.7**	**3.3**	**2.7**	**2.2**	**2.7**	**3.0**
		Column SE%	1.3	1.2	1.0	1.0	1.4	0.6
Overcharge		Sample size	21	18	10	7	8	64
	Weighted	N	551	481	294	123	75	1523
		Row %	36.2	31.6	19.3	8.1	4.9	100
		Row SE %	6.6	6.8	5.2	3.7	2.3	0
		Column %	**7.1**	**5.9**	**3.5**	**2.1**	**2.3**	**4.6**
		Column SE%	1.7	1.5	1.0	1.0	1.2	0.7

Table C-13c. Number and Percentage of WIC Vendors that Undercharged and Overcharged by Vendor Monthly Redemption Dollars for the Major Substitution Buy

Type of Purchase Price Deviation	Statistics		Monthly Redemption Dollars					Total Vendors
			$0-1649 1st Group	$1650-4499 2nd Group	$4500-11199 3rd Group	$11200-24679 4th Group	$24680+ 5th Group	
Undercharge		Sample size	9	11	10	10	11	51
	Weighted	N	262	310	238	196	129	1135
		Row %	23.1	27.3	21.0	17.2	11.4	100
		Row SE %	7.0	5.8	5.6	6.1	4.8	0
		Column %	**5.0**	**6.0**	**4.4**	**5.1**	**5.5**	**5.1**
		Column SE%	1.7	1.7	1.4	2.0	2.4	0.9
Overcharge		Sample size	10	5	12	7	5	39
	Weighted	N	291	139	290	95	41	856
		Row %	34.0	16.2	33.9	11.1	4.8	100
		Row SE %	8.1	6.4	8.8	5.5	3.2	0
		Column %	**5.5**	**2.7**	**5.3**	**2.5**	**1.8**	**3.9**
		Column SE%	1.7	1.2	1.8	1.3	1.2	0.8

Table C-13d. Number and Percentage of WIC Vendors that Undercharged and Overcharged by Vendor Monthly Redemption Dollars for the Minor Substitution Buy

Type of Purchase Price Deviation	Statistics		Monthly Redemption Dollars					Total Vendors
			$0-1649 1st Group	$1650-4499 2nd Group	$4500-11199 3rd Group	$11200-24679 4th Group	$24680+ 5th Group	
Undercharge		Sample size	5	6	8	3	1	23
	Weighted	N	141	181	228	79	26	656
		Row %	21.4	27.6	34.8	12.1	4.0	100
		Row SE %	10.3	10.4	9.9	10.1	3.1	0
		Column %	**5**	**7.2**	**8.1**	**4.4**	**2.9**	**6.0**
		Column SE%	2.4	2.8	2.7	4.2	2.8	1.6
Overcharge		Sample size	9	4	6	4	1	24
	Weighted	N	268	106	172	115	26	686
		Row %	39.1	15.4	25.0	16.7	3.9	100
		Row SE %	10.8	7.2	8.4	7.5	3.7	0
		Column %	**9.5**	**4.2**	**6.1**	**6.3**	**2.9**	**6.3**
		Column SE%	3.4	2	2.4	3.1	2.8	1.3

Table C-14. National Estimate of Undercharge and Overcharge Rates by Proper Countersignature Procedures Across All Buys

Type of Purchase Price Deviation	Statistics		Undercharge		Overcharge±	
			Yes	No	Yes	No
Improper Countersignature Procedures		Sample size	79	1803	64	1818
	Weighted	N	1722	41412	1657	41478
		%	**4.0**	**96.0**	**3.8**	**96.2**
		SE %	0.7	0.7	0.5	0.5
Proper Countersignature Procedures		Sample size	107	2613	107	2613
	Weighted	N	2627	67983	2543	68067
		%	**3.7**	**96.3**	**3.6**	**96.4**
		SE %	0.5	0.5	0.5	0.5
Total Buys[1]		Sample size	186	4416	171	4431
		Weighted N	4349.1	109395.2	4199.5	109544.8

±Missing 2 vendors that overcharged for which we do not have information on countersignature procedures

1 Missing 90 unweighted observations and 2317 weighted observations

Table C-15. National Estimate of Undercharge and Overcharge Rates by Receipt Provision Across All Buys

Type of Purchase Price Deviation	Statistics		Undercharge±		Overcharge	
			Yes	No	Yes	No
Provided with Register Receipt		Sample size	16	2149	15	2150
	Weighted	N	346	56191	395	56141
		%	**0.6**	**99.4**	**0.7**	**99.3**
		SE %	0.2	0.2	0.2	0.2
Not Provided with Register Receipt		Sample size	169	2272	158	2283
	Weighted	N	3978	53332	3839	53471
		%	**6.9**	**93.1**	**6.7**	**93.3**
		SE %	0.7	0.7	0.7	0.7
Total Buys[1]		Sample size	185	4421	173	4433
		Weighted N	4323.1	109523.1	4233.9	109612.4

±Missing 1 vendors that undercharged for which we do not have information on providing a register receipt

1 Missing 90 unweighted observations and 2317 weighted observations

Table C-16. Improper Payments by Buy Type for Traditional WIC Stores

Buys/Variables		Traditional WIC Stores						
		Overcharge	Allowing Credit	Undercharge	Allowing Substitution	Percent of Vendors Committing Violations[1]		
Type of Buy	Variable					Once	Twice	3+ Times
Safe Buy (N = 1340)	% Vendors (weighted)	3.2	0.2	4.5	N/A	6.9	0	0
	% dollars (weighted)	0.3	0.0	0.2				
	Total dollar amount of errors±	$1984.10	$46.60	$1411.50	N/A			
	Total dollar amount of safe buys⊥	$576213.70						
Partial Buy (N = 1340)	% Vendors (weighted)	4.2	0.3	3.0	N/A	6.4	0	0
	% of dollars (weighted)	2.0	0.3	0.2				
	Total dollar amount of errors±	$11829.00	$1848.09	$1354.70	N/A			
	Total dollar amount of partial buys⊥	$582591.10						
Minor Substitution (N = 884)	% Vendors (weighted)	3.7	0.1	5.1	28.6	31.2	2.1	0
	% of dollars (weighted)	0.5	0.0	0.4				
	Total dollar amount of errors±	$3706.40	$173.19	$2668.00	N/A			
	Total dollar amount of minor buys⊥	$707284.40						
Major Substitution (N = 456)	% Vendors (weighted)	6.3	0	6.0	6.5	15.6	0.7	0
	% of dollars (weighted)	0.6	0	0.3				
	Total dollar amount of errors±	$1065.10	$0.00	$628.46	N/A			
	Total dollar amount of major buys⊥	$184758.40						
Across All Buys (N = 4020)	% Buys	4.0	0.2	4.3	21.1*	28.1	6.0	0.9
	% Vendors w/ at least 1 error	9.6	0.2	9.2				
	% Vendors w/ at least 2 errors	1.0	---	0.9				
	% Vendors w/ at least 3 errors	---	---	0.2	N/A			
	% of dollars (weighted)	0.9	0.1	0.3				
	Total dollar amount of errors	$18677.54	$2067.88	$6142.28				
	Total dollar amount across all buys	$2070517.00						

Footnotes located on next page.

Note: Percentages of over and undercharges do not include rebates, earlier tables do reflect the addition of rebates

* Total N=1340

± Total value of overcharges committed by the vendors in this sample

⊥ Total value of purchases for buy by vendors in this sample

** Different weights were used for individual buys compared to all buys

1 These percentages represent the number of violations a vendor committed. Violations include overcharging, undercharging, allowing credit, and allowing a substitution. Sample sizes vary across violation types due to missing data; therefore, the percent of vendors committing violations might not equal the sum of the percentages for the individual violation types.

Table C-17. Improper Payments by Buy Type for WIC-only Stores

Buys/Variables		WIC-Only Stores						
		Overcharge	Allowing Credit	Undercharge	Allowing Substitution	Percent of Vendors Committing Violations[1]		
Type of Buy	Variable					Once	Twice	3+ Times
Safe Buy (N = 1340)	% Vendors (weighted)	8.2	0	11.9	N/A	14.3	0	0
	% dollars (weighted)	1.4	0	0.6	N/A			
	Total dollar amount of errors±	$113.77	$0.00	$50.84				
	Total dollar amount of safe buys⊥	8422.06						
Partial Buy (N = 1340)	% Vendors (weighted)	6.9	0	3.4	N/A	7.2	0	0
	% of dollars (weighted)	0.8	0	0.3	N/A			
	Total dollar amount of errors±	$92.52	$0.00	$37.82				
	Total dollar amount of partial buys⊥	$11916.25						
Minor Substitution (N = 884)	% Vendors (weighted)	6.8	0	8.1	4.4	13.8	0	0
	% of dollars (weighted)	0.1	N/A	0.4	N/A			
	Total dollar amount of errors±	$21.5	N/A	$57.32				
	Total dollar amount of minor buys⊥	$15832.52						
Major Substitution (N = 456)	% Vendors (weighted)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	% of dollars (weighted)	N/A	N/A	N/A	N/A			
	Total dollar amount of errors±	N/A	N/A	N/A				
	Total dollar amount of major buys⊥	N/A	N/A	N/A				
Across All Buys (N = 4020)	% Buys	7.3	0	7.8	4.3*	20.1	6.5	0.8
	% Vendors w/ at least 1 error	15.0	0	12.7	N/A			
	% Vendors w/ at least 2 errors	1.1	0	1.4				
	% Vendors w/ at least 3 errors	---	0	0.9				
	% of dollars (weighted)	0.7	0	0.4				
	Total dollar amount of errors	$237.67	$0.00	$147.05				
	Total dollar amount across all buys	$36534.34						

Footnotes located on next page.

Note: Percentages of over and undercharges do not include rebates, earlier tables do reflect the addition of rebates

* Total N=884 (only 1 substitution buy per vendor and no major substitutions were attempted among WIC-only stores)

± Total value of overcharges committed by the vendors in this sample

⊥ Total value of purchases for the buy by vendors in this sample

** Different weights were used for individual buys compared to all buys

1 These percentages represent the number of violations a vendor committed. Violations include overcharging, undercharging, allowing credit, and allowing a substitution. Sample sizes vary across violation types due to missing data; therefore, the percent of vendors committing violations might not equal the sum of the percentages for the individual violation types.

Table C-18. Improper Payments by Buy Type for all Stores

Buys/Variables		Total Stores						
		Overcharge	Allowing Credit	Undercharges	Allowing Substitution	Percent of Vendors Committing Violations[1]		
Type of Buy	Variable					Once	Twice	3 + Times
Safe Buy (N = 1340)	% Vendors (weighted)	3.3	0.2	4.6	N/A	7.1	0	0
	% dollars (weighted)	0.4	0.0	0.3				
	Total dollar amount of errors±	$2097.90	$46.60	$1462.40	N/A			
	Total dollar amount of safe buys⊥	$584635.74						
Partial Buy (N = 1340)	% Vendors (weighted)	4.2	0.3	3.0	N/A	6.4	0	0
	% of dollars (weighted)	2.0	0.3	0.2				
	Total dollar amount of errors±	$11921.00	$1392.50	$1848.09	N/A			
	Total dollar amount of partial buys⊥	$594507.35						
Minor Substitution (N = 884)	% Vendors (weighted)	3.7	0.1	5.1	27.7	31.2	2.1	0
	% of dollars (weighted)	0.5	0.0	0.4				
	Total dollar amount of errors±	$3727.90	$2725.30	$173.19	N/A			
	Total dollar amount of minor buys⊥	$723116.90						
Major Substitution (N = 456)	% Vendors (weighted)	6.3	0	6.0	6.5	15.6	0.7	0
	% of dollars (weighted)	0.6	0	0.3				
	Total dollar amount of errors	$1065.10	$628.46	$0.00	N/A			
	Total dollar amount of major buys⊥	$184758.43						
Across All Buys (N = 4020)	% Buys	4.0	0.3	4.3	20.8*	28.1	6.0	0.9
	% Vendors w/ at least 1 error	9.7	0.3	9.3				
	% Vendors w/ at least 2 errors	1.0	---	0.9				
	% Vendors w/ at least 3 errors	--	---	.3	N/A			
	% of dollars (weighted)	0.9	0.1	0.3				
	Total dollar amount of errors	$18915.21	$2067.88	$6289.33				
	Total dollar amount across all buys	$2107050.88						

Footnotes located on next page.

Note: Percentages of over and undercharges do not include rebates, earlier tables in this appendix do reflect the addition of rebates

Total N=1564 (only 1 substitution buy per vendor)

± Total value of overcharges committed by the vendors in this sample

⊥ Total value of purchases for the buy by vendors in this sample

** Different weights were used for individual buys compared to all buys

1 These percentages represent the number of violations a vendor committed. Violations include overcharging, undercharging, allowing credit, and allowing a substitution. Sample sizes vary across violation types due to missing data; therefore, the percent of vendors committing violations might not equal the sum of the percentages for the individual violation types.

Multivariate Models Describing Factors Contributing to Overcharge

Logistic Regression Models

Along with univariate analyses, multivariate models were developed to predict vendor proclivity to overcharge. Several modeling methods were used for different models across all buy types. These methods and models are listed in Table C-24. Overall, there were several multivariate models that predicted the same amount of variance (R^2 = 0.032–0.035). However, the five-variable model, including vendor size, failure to use scanning equipment, failure to provide a receipt, vendor's monthly redemption dollars, and insufficient stock, not only satisfied criteria for a statistically significant model across all buy types (R^2 = 0.035), but was also repeatedly identified as the best-fit model.

Furthermore, this five-variable logistic regression model was selected as the most appropriate because it is the most useful from a programmatic or practical standpoint. Factors such as providing a receipt, maintaining stock, and using scanning equipment not only help predict overcharge and explain some variance but they are also factors that can be modified to reduce the occurrence of overcharging. In other words, if the provision of a receipt is enforced at the vendor level through monitoring and training, then the occurrence of overcharging will decrease.

Other factors of significance can be targeted for high-risk vendor monitoring or compliance buys. For example, while vendor size is predictive of overcharging, it cannot necessarily be programmatically controlled. However, if State officials target smaller vendors for monitoring, they may be able to reduce the level of overcharge and substitution.

When selecting the best predictive model, it is important to identify one that is both statistically sound and practical for use by State officials in managing vendors. In the five-variable model, the contributions of individual variables were examined. Failure to provide a receipt was the only factor that remained significant; vendors that failed to provide a receipt were 8.0 times more likely to overcharge than were vendors that did provide a receipt (see Table C-25). Although scanning, monthly redemption dollars, vendor size, and insufficient stock do not remain significant in the five-variable model, they were kept in the model because they do help explain some of the variance related to overcharges.

Close inspection of models suggested that some variables may have assumed a mediating (or partial mediating) role. In other words, the effect of one variable on an outcome is lessened when another variable is introduced. For example, failure to provide a receipt is associated with overcharging. In States that at one time had vendor-specific food delivery systems, the effect of failing to provide a receipt on overcharging was mitigated. Providing a receipt might have been

more common in vendor-specific States because clients may have tended to select larger stores that normally provide receipts, use scanning equipment, and maintain high stock levels. When the mediating variable, issuing vendor-specific vouchers, enters the equation, receipt provision no longer affects overcharging. This would be regarded as an instance of complete mediation. Partial mediation is the case in which the association from failure to provide a receipt to overcharge is reduced in absolute size but is still different from 0, when controlling for the issuance of vendor-specific vouchers (Baron and Kenny, 1986 and Judd and Kenny, 1981).

Because issuing vendor-specific vouchers appears to be a mediator, it was tested for inclusion in a new six-variable model. This new model, which includes vendor specific food delivery systems, did satisfy criteria for a statistically significant model across all buy types ($R^2 = 0.039$). When the contributions of individual variables contained in this six-variable model were examined, failure to provide a receipt remained significant; a vendor that failed to provide a receipt was 9.2 times more likely to overcharge than a vendor that did provide a receipt (see Table C-26). Issuing vendor-specific vouchers and insufficient stock were both marginally significant.

Similarly, vendor-to-participant ratio also appeared to mediate at least partially the influence of vendor size and monthly redemption dollars on overcharge. However, when vendor-to-participant ratio was included in the five-variable model, it was not found to be an important mediator. Other store and State-level characteristics that were not predictors of overcharge were tested as potential mediators of factors, but none were found to have any mediating effect.

As found in the previous studies, vendors that overcharged on all three buys are the most likely to be intentionally overcharging the WIC Program. However, there were no vendors in 2004 that overcharged on all three buys.

Odds ratios were calculated for the six-variable model mentioned above to examine the contribution of each individual model variable when applied to vendors that overcharged on only one buy and on two out of the three buys (see Table C-27). The contribution of individual variables in the six-variable model were examined among vendors that overcharged only once, while failure to provide a receipt remained highly significant; vendors that failed to provide a receipt were 8.6 times more likely to overcharge than vendors that did provide a receipt. Issuing vendor-specific vouchers also remained significant; vendors in vendor-specific States were 2.5 times more likely to overcharge.

Due to a small sample size of vendors that overcharge twice, statistical tests could not be performed. An odds ratio for failing to provide a receipt could not be estimated, because every vendor that overcharged twice also failed to provide a receipt. This finding alone suggests a strong relationship between failing to provide a receipt and proclivity to overcharge. No other variables included in this multivariate model were significantly related to overcharge.

Table C-19. Over All Buys: Univariate Models of Overcharge

Variable	R^2	Variable Value	Odds Ratio	Overall Model		Parameter			Design Effect
				Wald χ^2 Saiterwaite F Saiterwaite Adj. χ^2	Wald P Saiterwaite P Saiterwaite Adj. P	Beta (SE)	T-test B=0	P	
Vendor size	0.017	Small compared to Medium-sized Vendor	2.7	922.22 277.57 913.29	0.000 0.000 0.000	0.98 (0.22)	4.53	0.000	1.33
		Small compared to Large-Sized Vendors	4.7			1.54 (0.28)	5.42	0.000	2.04
		Small compared to WIC-only Vendors	1.3			0.22 (0.31)	0.71	0.479	0.42
Did NOT scan items	0.012	Did NOT scan items	3.2	896.54 395.81 780.88	0.000 0.000 0.000	1.16 (0.23)	5.06	0.000	2.08
Failed to provide receipt	0.029	Failed to provide receipt	11.1	819.22 482.80 897.79	0.000 0.000 0.000	2.41 (0.30)	7.9	0.000	0.98
Monthly redemption dollars	0.006	1st group vs. 2nd group	1.5	968.31 216.00 984.33	0.000 0.000 0.000	0.40 (0.24)	1.66	0.101	1.39
		1st group vs. 3rd group	1.8			0.60 (0.23)	1.22	0.012	2.58
		1st group vs. 4th group	2.7			0.98 (0.28)	3.53	0.001	1.05
		1st group vs. 5th group	3.7			1.32 (0.48)	2.77	0.007	1.58
Insufficient Stock	0.003	Insufficient stock	2.2	857.86 507.34 979.57	0.000 0.000 0.000	0.80 (0.24)	3.40	0.001	1.28

Table C-20. Safe Buys Only: Univariate Models of Overcharge[1]

Variable	R^2	Variable Value	Odds Ratio	Overall Model		Parameter			Design Effect
				Wald χ^2 Saiterwaite F Saiterwaite Adj. χ^2	Wald P Saiterwaite P Saiterwaite Adj. P	Beta (SE)	T-test B=0	P	
Vendor size	0.022	Small compared to Medium-sized Vendor	3.3	449.58 116.10 437.56	0.000 0.000 0.000	1.18 (0.37)	3.18	0.002	1.08
		Small compared to Large-Sized Vendors	7.7			2.04 (0.46)	4.41	0.000	1.12
		Small compared to WIC-only Vendors	1.1			0.06 (0.61)	0.09	0.928	0.58
Did NOT scan items	0.012	Did NOT scan items	3.5	479.44 185.42 347.69	0.000 0.000 0.000	1.26 (0.37)	3.36	0.001	1.56
Monthly redemption dollars	0.009	1st group vs. 2nd group	1.3	461.17 95.09 460.74	0.000 0.000 0.000	0.29 (0.36)	0.82	0.417	1.00
		1st group vs. 3rd group	3.0			1.08 (0.47)	2.28	0.025	1.09
		1st group vs. 4th group	3.1			1.13 (0.53)	2.13	0.036	1.00
		1st group vs. 5th group	4.9			1.60 (0.70)	2.27	0.026	0.73
Insufficient Stock	0.009	Insufficient stock	3.8	461.85 197.95 387.27	0.000 0.000 0.000	1.34 (0.40)	3.33	0.001	1.38

1 Failed to provide a receipt is not presented in this table because there were no vendors that overcharged and provided a receipt.

Table C-21. Partial Buys Only: Univariate Models of Overcharge

Variable	R^2	Variable Value	Odds Ratio	Overall Model		Parameter			Design Effect
				Wald χ^2 Saiterwaite F Saiterwaite Adj. χ^2	Wald P Saiterwaite P Saiterwaite Adj. P	Beta (SE)	T-test B=0	P-value	
Vendor size	0.028	Small compared to Medium-sized Vendor	2.5	456.05 110.37 340.02	0.000 0.000 0.000	0.91 (0.31)	2.95	0.004	1.09
		Small compared to Large-Sized Vendors	8.5			2.14 (0.49)	4.35	0.000	1.52
		Small compared to WIC-only Vendors	1.6			0.48 (0.39)	1.24	0.219	0.21
Did NOT scan items	0.021	Did NOT scan items	4.2	357.75 182.68 359.66	0.000 0.000 0.000	1.44 (0.29)	4.96	0.000	1.22
Failed to provide receipt	0.026	Failed to provide receipt	7.8	353.52 172.32 328.04	0.000 0.000 0.000	2.05 (0.48)	4.30	0.000	1.17
Monthly redemption dollars	0.009	1st group vs. 2nd group	1.2	387.55 93.37 411.14	0.000 0.000 0.000	0.21 (0.36)	0.58	0.561	1.24
		1st group vs. 3rd group	2.1			0.75 (0.36)	2.07	0.041	0.97
		1st group vs. 4th group	3.5			1.26 (0.53)	2.38	0.019	1.04
		1st group vs. 5th group	3.3			1.20 (0.55)	2.62	0.010	0.55
Insufficient Stock	0.002	Insufficient stock	2.0	364.13 199.50 395.29	0.000 0.000 0.000	0.71 (0.41)	1.72	0.089	1.23

Table C-22. Minor Substitution Buys Only: Univariate Models of Overcharge

Variable	R^2	Variable Value	Odds Ratio	Overall Model		Parameter			Design Effect
				Wald χ^2 Saiterwaite F Saiterwaite Adj. χ^2	Wald P Saiterwaite P Saiterwaite Adj. P	Beta (SE)	T-test B=0	P	
Vendor size	0.006	Small compared to Medium-sized Vendor	1.8	279.37 76.31 227.52	0.000 0.000 0.000	0.61 (0.54)	1.12	0.266	1.58
		Small compared to Large-Sized Vendors	2.6			0.94 (0.53)	1.76	0.082	1.56
		Small compared to WIC-only Vendors	0.9			-0.06 (0.54)	-0.11	0.915	0.34
Did NOT scan items	0.004	Did NOT scan items	2.0	258.74 109.78 212.31	0.000 0.000 0.000	0.71 (0.49)	1.46	0.148	1.71
Failed to provide receipt	0.018	Failed to provide receipt	5.5	227.37 118.62 231.64	0.000 0.000 0.000	1.7 (0.54)	3.17	0.002	1.14
Monthly redemption dollars	0.006	1st group vs. 2nd group	2.1	270.98 59.28 274.19	0.000 0.000 0.000	0.75 (0.54)	1.38	0.171	1.09
		1st group vs. 3rd group	1.1			0.05 (0.44)	0.11	0.915	1.09
		1st group vs. 4th group	2.3			0.82 (0.65)	1.26	0.211	1.19
		1st group vs. 5th group	3.2			1.17 (0.76)	1.55	0.124	0.83
Insufficient Stock	0.002	Insufficient stock	1.9	239.36 142.08 272.44	0.000 0.000 0.000	0.65 (0.44)	1.49	0.139	0.98

Table C-23. Major Substitution Buys Only: Univariate Models of Overcharge

Variable	R^2	Variable Value	Odds Ratio	Overall Model		Parameter			Design Effect
				Wald χ^2 Saiterwaite F Saiterwaite Adj. χ^2	Wald P Saiterwaite P Saiterwaite Adj. P	Beta (SE)	T-test B=0	P	
Vendor size	0.013	Small compared to Medium-Sized Vendor	3.6	139.24 40.01 117.18	0.000 0.000 0.000	1.28 (0.75)	1.71	0.091	1.74
		Small compared to Large-Sized Vendors	1.8			0.58 (0.54)	1.08	0.282	1.53
Did NOT scan items	0.009	Did NOT scan items	2.3	145.96 73.23 145.74	0.000 0.000 0.000	0.82 (0.45)	1.85	0.067	1.21
Failed to provide receipt	0.044	Failed to provide receipt	15.9	121.93 58.27 115.99	0.000 0.000 0.000	2.76 (1.06)	2.60	0.011	1.27
Monthly redemption dollars	0.006	1st group vs. 2nd group	2.4	143.55 31.21 139.25	0.000 0.000 0.000	0.86 (0.64)	1.33	0.185	1.20
		1st group vs. 3rd group	1.6			0.49 (0.57)	0.86	0.393	1.25
		1st group vs. 4th group	1.6			0.45 (0.65)	0.68	0.496	1.28
		1st group vs. 5th group	3.4			1.24 (1.09)	1.14	0.260	1.12
Insufficient Stock	<0.001	Insufficient stock	0.8	147.78 74.33 147.05	0.000 0.000 0.000	-0.25 (1.09)	-0.23	0.821	1.26

1 The odds ratio for the comparison of small vendors to WIC-only vendors is not presented here because major substitutions were only attempted at grocery stores.

Table C-24. Logistic Regression Models for Overcharge

Model Type	Independent Variables	R^2	Wald χ^2 Saiterwaite F Saiterwaite Adj. χ^2	Wald P Saiterwaite P Saiterwaite Adj. P
Single Variable Models	Size	0.017	922.22 277.57 913.29	0.000 0.000 0.000
	Scanning equipment	0.012	896.54 395.81 780.88	0.000 0.000 0.000
	Receipt NOT provided	0.029	819.22 482.80 897.79	0.000 0.000 0.000
	Monthly redemption dollars	0.006	968.31 216.00 984.33	0.000 0.000 0.000
	Insufficient stock	0.003	857.86 507.34 979.57	0.000 0.000 0.000
Best-Fit Two-Variable Model	Receipt Not Provided, Scanning Equipment	0.032	829.17 283.98 779.92	0.000 0.000 0.000
Best-Fit Three-Variable Model	Receipt Not Provided, Scanning Equipment, Insufficient Stock	0.033	823.11 225.52 837.95	0.000 0.000 0.000
Best-Fit Four-Variable Model	Receipt Not Provided, Size, Insufficient Stock, Scanning Equipment	0.035	837.59 137.19 815.95	0.000 0.000 0.000

Table C-24 continued on page C-32

Table C-24 continued

Model Type	Independent Variables	R^2	Wald χ^2 Saiterwaite F Saiterwaite Adj. χ^2	Wald P Saiterwaite P Saiterwaite Adj. P
Five Variable Model	Size, Scanning Equipment, Receipt Not Provided, Monthly Redemption Dollars, Insufficient Stock	0.035	975.39 84.94 743.54	0.000 0.000 0.000
Overall Demographic and Administrative Model[1]	Number of registers, Insufficient stock, failed to provide a receipt	0.034	840.78 174.39 887.09	0.000 0.000 0.000
Stepwise	Size, Scanning Equipment, Receipt Not Provided, Monthly Redemption Dollars, Insufficient Stock	0.035	975.39 84.94 743.54	0.000 0.000 0.000

1 This model includes variables that remained significant when included in an administrative violations model (insufficient stock and receipt provision) or a vendor characteristic model (size, scanning equipment, and monthly redemption dollars).

Table C-25. Final Logistic Regression Models for Overcharge Across All Buys

Model	Variable Value	Odds Ratio	Overall Model		Parameter			Design Effect
			Wald χ^2 Saiterwaite F Saiterwaite Adj. χ^2	Wald P Saiterwaite P Saiterwaite Adj. P	Beta (SE)	T-test B=0	P-Value	
Vendor Size, Use of Scanning Equipment, Provision of Receipt, Monthly Redemption Dollars, Insufficient Stock	*Vendor Size*		975.39 84.94 743.54	0.000 0.000 0.000				
	Small compared to Medium-sized Vendor	1.5			0.39 (0.29)	1.37	0.17	1.22
	Small compared to Large-Sized Vendors	1.7			0.54 (0.36)	1.49	0.13	1.33
	Small compared to WIC-only Vendors	0.7			-0.54 (0.49)	-1.10	0.27	0.70
	Did NOT scan items	1.1			0.10 (0.31)	0.31	0.76	1.62
	Failed to provide receipt	8.0			2.1 (0.30)	6.93	0.00	0.88
	Monthly Redemption Dollars							
	1st quartile vs. 2nd quartile	1.2			0.14 (0.25)	0.58	0.57	1.46
	1st quartile vs. 3rd quartile	1.1			0.11 (0.30)	0.42	0.68	1.28
	1st quartile vs. 4th quartile	1.5			0.31 (0.30)	0.95	0.13	0.95
	1st quartile vs. 5th quartile	2.2			0.77 (0.55)	1.40	0.166	1.30
	Insufficient stock	1.7			0.53 (0.27)	1.97	0.05	1.38

Table C-26. Correlation Matrix for Variables Included in the Multivariate Model for Overcharge.

	Statistic	Vendor Size	Did Not Scan Items	Failed to Provide Receipt	Monthly Redemption Dollars	Insufficient Stock
Vendor Size	R	1.000	-0.606	0.392	0.504	0.179
	P-value		<.0001	<.0001	<.0001	<.0001
	Sample Size	4674	4622	4674	4662	4674
Did Not Scan Items	R	-0.606	1.000	-0.407	-0.268	-0.159
	P-value	<.0001		<.0001	<.0001	<.0001
	Sample Size	4622	4631	0:00	4619	4631
Failed to Provide Receipt	R	0.392	-0.407	1.000	0.187	0.063
	P-value	<.0001	<.0001		<.0001	<.0001
	Sample Size	4674	4631	4692	4680	4692
Monthly Redemption Dollars	R	0.504	-0.268	0.187	1.000	0.138
	P-value	<.0001	<.0001	<.0001		<.0001
	Sample Size	4662	4619	4680	4680	4680
Insufficient Stock	R	0.179	-0.159	0.063	0.138	1.000
	P-value	<.0001	<.0001	<.0001	<.0001	
	Sample Size	4674	4631	4692	4680	4692

Table C-27. Final Logistic Regression Models for Overcharge Across All Buys with Mediators

Model	Variable Value	Odds Ratio	Overall Model		Parameter			Design Effect
			Wald χ^2 Saiterwaite F Saiterwaite Adj. χ^2	Wald P Saiterwaite P Saiterwaite Adj. P	Beta (SE)	T-test B=0	P-Value	
Vendor Size, Use of Scanning Equipment, Provision of Receipt, Monthly Redemption Dollars, Insufficient Stock, Vendor Specific or Open Stores[1]	*Vendor Size*		941.14 79.45 790.23	0.000 0.000 0.000				
	Small compared to Medium-sized Vendor	1.6			0.45 (0.28)	1.58	0.117	1.16
	Small compared to Large-Sized Vendors	1.8			0.59 (0.36)	1.65	0.102	1.30
	Small compared to WIC-only Vendors	1.0			0.03 (0.57)	1.16	0.965	0.77
	Did NOT scan items	1.0			0.04 (0.30)	0.13	0.902	1.49
	Failed to provide receipt	9.2			2.22 (0.32)	6.93	0.000	0.96
	Monthly Redemption Dollars							
	1st quartile vs. 2nd quartile	1.1			0.11 (0.25)	0.43	0.670	1.49
	1st quartile vs. 3rd quartile	1.1			0.06 (0.25)	0.22	0.824	1.22
	1st quartile vs. 4th quartile	1.3			0.29 (0.30)	0.98	0.329	0.92
	1st quartile vs. 5th quartile	2.0			0.70 (0.57)	1.24	0.220	1.32
	Insufficient stock	1.8			0.59 (0.27)	2.22	0.029	1.37
	Vendor-specific	2.3			0.84 (0.25)	3.39	0.001	1.42

1 Vendor-specific (versus open stores) was included in this model because was found to be a significant mediator.

Table C-28. Logistic Regression Model for Overcharge for Repeat Offenders

Model	Variable Value	Proclivity of Vendor Overcharge for 1-Time Offender					Proclivity of Vendor Overcharge for 2-Time Offender[2]				
		Odds Ratio	Beta (SE)	T-test B=0	P-Value	Design Effect	Odds Ratio	Beta (SE)	T-test B=0	P-Value	Design Effect
Vendor Size, Use of Scanning Equipment, Provision of Receipt, Monthly Redemption Dollars, Insufficient Stock, Vendor Specific or Open Stores[1]	*Vendor Size*										
	Small compared to Medium-sized Vendor	1.8	0.60 (0.32)	1.86	0.066	1.09	6.0	1.80 (1.19)	1.50	0.136	1.69
	Small compared to Large-Sized Vendors	1.6	0.53 (0.42)	1.26	0.211	1.40	8.9	2.19 (1.27)	1.79	0.077	1.27
	Small compared to WIC-only Vendors	1.2	-0.14 (0.57)	-0.24	0.812	0.74	4.4	1.48 (1.50)	0.99	0.325	0.47
	Did NOT scan items	0.8	-0.26 (0.34)	-0.78	0.440	1.08	0.7	-0.39 (0.81)	-0.39	0.696	1.79
	Failed to provide receipt	8.6	2.16 (0.35)	6.18	0.000	1.08	-	-	-	-	-
	Monthly Redemption Dollars										
	1st quartile vs. 2nd quartile	1.0	-0.05 (0.28)	-0.19	0.848	1.29	2.5	0.92 (0.78)	0.42	0.251	1.07
	1st quartile vs. 3rd quartile	1.0	-0.01 (0.31)	-0.03	0.892	1.32	1.7	0.53 (0.84)	0.63	0.530	1.09
	1st quartile vs. 4th quartile	1.2	0.12 (0.35)	0.44	0.661	1.12	17.8	2.88 (1.18)	2.45	0.016	0.17
	1st quartile vs. 5th quartile	2.9	1.05 (0.54)	1.97	0.052	0.87	1.0	0.04 (1.19)	0.03	0.972	0.96
	Insufficient stock	1.8	0.56 (0.29)	1.90	0.060	1.22	1.4	0.37 (0.79)	0.47	0.672	1.10
	Vendor-specific	2.5	0.91 (0.31)	2.94	0.004	1.66	2.6	0.94 (0.67)	1.41	0.161	0.98

1 Vendor-specific (versus open stores) was included in this model because was found to be a significant mediator.

2 An odds ratio for receipt provision could not be calculated because there were no vendors that overcharged twice and provided a receipt.

Table C-29. Over All Buys: Univariate Models of Undercharge

Variable	R^2	Variable Value	Odds Ratio	Overall Model		Parameter			Design Effect
				Wald χ^2 Saiterwaite F Saiterwaite Adj. χ^2	Wald P Saiterwaite P Saiterwaite Adj. P	Beta (SE)	T-test B=0	P	
Vendor size	0.008	Small compared to Medium-sized Vendor	1.5	803.26 243.11 718.23	0.000 0.000 0.000	0.40 (0.25)	1.59	0.115	1.80
		Small compared to Large-Sized Vendors	2.9			1.07 (0.29)	3.63	0.001	2.12
		Small compared to WIC-only Vendors	0.9			-0.12 (0.25)	-0.50	0.616	0.27
Location	0.002	Urban compared to Large rural	2.3	738.82 276.06 899.36	0.000 0.000 0.000	0.83 (0.38)	2.19	0.031	1.18
		Urban compared to Small rural	1.0			0.02 (0.27)	0.07	0.941	0.98
		Urban compared to Isolated sm. rural	1.2			0.14 (0.32)	0.42	0.674	1.18
Did NOT scan items	0.003	Did NOT scan items	1.8	731.18 361.52 634.35	0.000 0.000 0.000	0.59 (0.24)	2.46	0.016	1.99
Failed to provide receipt	0.033	Failed to provide receipt	15.4	655.97 365.02 720.60	0.000 0.000 0.000	2.73 (0.44)	6.28	0.000	1.52

Nonresponse Analysis for the National Dollar Estimate of Overcharge and Undercharge

In estimating the national overcharge and undercharge dollar amount for the 2005 WIC Vendor Management Study we compared, for each safe buy, the dollar amount of the receipt price to the post-audit redeemed WIC voucher dollar amount. Only safe buys with both the redeemed WIC voucher amount and the receipt amount were included in the study estimates. Roughly 15 percent of the completed safe buys did not meet these criteria and thus were not included in the study estimates; we refer to these safe buys as missing for the national overcharge and undercharge analysis. A nonresponse analysis, investigating differences in vendor type and weighted annualized vendor redemption amounts between the vendors included in the study estimates and those characterized as missing, is described below.

Nonresponse by Vendor Type

Of the 15 percent missing from the national overcharge and undercharge estimates most were grocery stores (62.8 percent) followed by WIC-only vendors (28.1 percent) and pharmacies (9.1 percent), see Table 1. In comparison, however, grocery stores make-up 81.8 percent of all vendors with a safe buy and WIC-only vendors comprise 14.4 percent. The disproportionately higher percent of WIC-only vendors missing from the national overcharge and undercharge estimates are mostly explained by the lack of receipts and other price information attributable to the WIC-only vendors. Of the 68 missing WIC-only vendors, 60 (88.2 percent) were missing because a receipt price was not available. Overall, receipt prices were missing for 176 of the 242 not included in the analysis. The remaining 66 were missing because the redeemed WIC voucher dollar amount could not be established.

Table 1. Comparison of Nonresponse by Vendor Type

		Grocery	Pharmacy	WIC-only	Total
Safe Buys Included in the Analysis	Frequency	1152	39	161	1352
	Row %	85.2	2.9	11.9	84.8
Safe Buys Missing from the Analysis	Frequency	152	22	68	242
	Row %	62.8	9.1	28.1	15.2
All Safe Buys	Frequency	1304	61	229	1594
	Row %	81.8	3.8	14.4	100

Nonresponse by Vendor Weighted Annualized Redemption Amount

After investigating nonresponse by vendor type alone, we expanded the analysis to explore nonresponse differences in the weighted vendor redemption amounts. We used the weighted annualized vendor redemption amount because it indicates the effect each vendor will have on the national overcharge and undercharge analysis. The national overcharge and undercharge estimates are weighted by each vendor's analysis weight and each vendor's annualized redemption amount. Thus, a vendor with a large analysis weight and a large annualized redemption amount will have more effect on the final estimate than a vendor with a small weight and a smaller redemption amount.

The weighted mean vendor redemption amounts by vendor type and nonresponse are shown in Table 2. Across vendor type, the average redemption amount was significantly higher (p-value =0.0276) for vendors included in the analysis (118, 456 vs. 93, 481). This pattern remained the same for grocery stores and WIC-only vendors and is reversed for pharmacies.

Table 2. Mean *Weighted* Annualized Redemption Amounts by Vendor Type and Nonresponse

Weighted Mean Annualized Vendor Redemption Amounts ($)				
	Grocery	**Pharmacy**	**WIC-only**	**Overall**
Safe Buys Included in the Analysis	111,731	23,811	663,894	118,456
Safe Buys Missing from the analysis	76,923	47,268	463,560	93,481
All Safe Buys	107,747	32,146	602,109	115,235

Potential Nonresponse Bias

Ideally, the characteristics of the vendors that were not included in the national overcharge and undercharge estimates would mirror those of the vendors that were included in the estimates. If this were true, the assumption could be made that the 1,352 vendors included in the estimates are representative of the 242 vendors that are not. However, the nonresponse analysis has indicated that there are proportionally more WIC-only vendors and proportionally fewer grocery stores missing from the national overcharge and undercharge estimates. This may suggest that the estimates are biased toward reflecting more of the WIC-only vendors' overcharging and undercharging habits. We also found, however, the weighted mean redemption amounts to be less among vendors missing from the analysis; hence the effects of these missing vendors are weighted less, on average, and contribute less than the vendors included in the analysis.

The factors cited above make it difficult to quantify the bias due to the 15 percent missing from the national overcharge and undercharge analysis. As indicated earlier, many of the buys from the WIC-only vendors were missing price information due to the nature of the WIC-only vendors. We have found, though, that smaller vendors and WIC-only vendors (with price information available) tend to overcharge and undercharge more than larger grocery vendors. Considering this finding with the disproportionately higher percent of WIC-only stores missing leads us to conclude that the national overcharge and undercharge estimates are probably biased low (i.e. the dollar amount for the overcharge and undercharge estimate is probably understated).

Appendix D: Improper Payments

Table D-1. Improper Payments by Type of Store, for Safe Buys Only

Buys/Variables		Traditional WIC Stores						
		Overcharge	Allowing Credit	Undercharge	Allowing Substitution	Percent of Vendors Committing Violations[1]		
Type of Store	Variable					Once	Twice	3+ Times
Traditional (n=1340)	% Vendors (weighted)	3.2	0.2	4.5	N/A	6.9	0	0
	% dollars (weighted)	0.3	0.0	0.2	N/A			
	Total dollar amount of errors±	$1984.10	$46.60	$1411.50				
	Total dollar amount of safe buys⊥	$576,213						
WIC-only (n=224)	% Vendors (weighted)	8.2	0	11.9	N/A	14.3	0	0
	% dollars (weighted)	1.4	0	0.6	N/A			
	Total dollar amount of errors±	$113.77	$0.00	$50.84				
	Total dollar amount of safe buys⊥	$8,422						
Total (n=1564)	% Vendors (weighted)	3.3	0.2	4.6	N/A	7.1	0	0
	% dollars (weighted)	0.4	0.0	0.3	N/A			
	Total dollar amount of errors±	$2097.90	$46.60	$1462.40				
	Total dollar amount of safe buys⊥	$584,635						

± Total value of overcharges committed by the vendors in this sample

⊥ Total value of purchases for buy by vendors in this sample

1 These percentages represent the number of violations a vendor committed. Violations include overcharging, undercharging, allowing credit, and allowing a substitution. Sample sizes vary across violation types due to missing data; therefore, the percent of vendors committing violations might not equal the sum of the percentages for the individual violation types.

Appendix E - Substitutions

Table E-1. National Rate of WIC Vendors Accepting Buyer-Initiated Substitutions

Substitutions	Statistics		Substitution Accepted	Substitution Not Accepted
Minor	Sample size		260	853
	Weighted	N	7197	18684
		%	27.8	72.2
		SE %	2.2	2.2
Major	Sample size		29	430
	Weighted	N	837	11970
		%	6.5	93.5
		SE %	1.3	1.3

Table E-2. Percent of WIC Vendors Accepting Buyer-Initiated Minor Substitutions by Use of Scanning Equipment

Statistics		Total Accepting Substitution	Scanning Equipment	
			Scanned items	Did not scan items
Sample size		260	192	68
Weighted	N	7197	5531	1666
	Row %	100	76.9	23.1
	SE Row %	0	3.4	3.4
	Total %	28.2	21.7	6.5
	SE Total%	2.3	2.0	1.1

Table E-3. Percent of WIC Vendors Accepting Buyer-Initiated Major Substitutions by Use of Scanning Equipment

Statistics		Total Accepting Substitution	Scanning Equipment	
			Scanned items	Did not scan items
Sample size		29	13	16
Weighted	N	837	378	459
	Row %	100.0	45.2	54.8
	SE Row %	0.0	10.6	10.6
	Total %	6.6	3.0	3.6
	SE Total%	1.4	0.9	1.0

Table E-4. Percent of WIC Vendors Accepting Buyer-Initiated Major Substitutions by Vendor Size

Statistics		Total Accepting Substitution	Vendor Size[1]		
			Small	Medium	Large
Sample size		29	20	4	5
Weighted	N	836.5	569.1	126.6	140.8
	Row %	100	68.0	15.1	16.8
	SE Row %	0	9.1	6.6	6.8
	Total %	6.6	4.5	1.0	1.1
	SE Total%	1.4	1.1	0.5	0.5

1 Vendor size is based on the number of registers at the store: small (0-2), medium (3-7), large (8+). There were no major substitutions attempted at WIC-only stores.

Table E-5. Percent of WIC Vendors Accepting Buyer-Initiated Major Substitutions by Cashier's Indication of Unfamiliarity with WIC Transactions

Statistics		Total Accepting Substitution	Cashier Unfamiliar with WIC Transactions	
			Yes	No
Sample size		29	3	26
Weighted	N	836.5	81.7	754.8
	Row %	100	9.8	90.2
	SE Row %	0	5.4	5.4
	Total %	6.6	0.6	6.0
	SE Total%	1.4	0.4	1.3

Table E-6. Percent of WIC Vendors Allowing Minor Substitutions by State-level Characteristics

State-level characteristics	Sample size	Weighted		
		N	%	SE %
TOTAL WIC Vendors allowing minor substitution	**260**	**7197**	**27.8**	**2.3**
Vendor-to-participant ratio				
1:<95	82	2230	33.4	4.2
1:95-134	47	1419	25.3	5.4
1:135-188	64	1878	27.7	4.5
1:189+	67	1670	24.5	3.9
Vendor-specific*				
Yes	29	728	14.7	3.9
No	231	6469	30.9	2.5
Location				
Urban	181	4894	25.3	2.2
Large rural city/town	27	770	30.8	5.8
Small rural town	32	943	46.4	8.3
Isolated small rural town	20	590	30.0	5.4
Partial buys allowed*				
Yes	213	6013	31.2	2.7
Yes, except formula	14	379	24.5	10.7
No	33	805	15.8	3.5

* Significant at the 0.05 level

Table E-7. Percent of WIC Vendors Allowing Minor Substitutions by Store Characteristics

Store characteristics	Sample size	Weighted		
		N	%	SE %
TOTAL WIC Vendors allowing minor substitution	**260**	**7197**	**27.8**	**2.3**
WIC Vendor type*				
Grocery	221	6353	27.1	2.3
Pharmacy	29	808	50.7	8.8
WIC-only	10	35	4.3	1.3
Purchase price entered electronically[1]				
Yes	16	461	22.2	6.4
No	220	6122	28.5	2.5
Number of registers[2]				
0-2	73	1805	24.8	3.4
3-7	84	2453	30.8	3.9
8 or more	101	2882	27.5	2.9
Vendor monthly redemption dollars*				
$0-1649	75	2095	33.2	4.1
$1650-4499	67	1938	30.6	3.5
$4500-11199	68	1822	28.2	3.5
$11200-24679	35	959	23.1	4.3
$24680+	15	383	14.8	3.9
Scanning Equipment				
Scanned	192	5531	29.4	2.6
Not scanned	68	1666	24.7	3.5
Cashier unfamiliar[3]				
Yes	29	795	29.5	5.3
No	230	6376	27.7	2.4

* Significant at the 0.05 level

1 Due to missing data, the weighted number of vendors allowing minor substitutions was 6582, and the weighted percent was 28.0%.

2 Due to missing data, the weighted number of vendors allowing minor substitutions was 7140, and the weighted percent was 27.7%.

3 Due to missing data, the weighted number of vendors allowing minor substitutions was 7171, and the weighted percent was 27.9%.

Table E-8. Percent of WIC Vendors Allowing Major Substitutions by State-level Characteristics

State-level characteristics	Sample size	Weighted		
		N	%	SE %
TOTAL WIC Vendors allowing major substitution	**459**	**12806**	**100%**	**--**
Vendor-to-participant ratio				
1:<95	14	390	10.7	2.8
1:95-134	5	182	5.9	3.4
1:135-188	4	108	3.3	1.6
1:189+	6	156	5.5	2.4
Vendor-specific				
Yes	3	77	4.2	2.2
No	26	760	6.9	1.5
Location				
Urban	23	645	7.1	1.5
Large rural city/town	2	67	4.3	3.1
Small rural town	2	56	4.9	3.4
Isolated small rural town	2	68	6.5	4.6
Partial buys allowed				
Yes	17	492	5.3	1.5
Yes, except formula	0	0	0	0
No	12	345	11.9	3.1

* Significant at the 0.05 level

Table E-9. Percent of WIC Vendors Allowing Major Substitutions by Store Characteristics

Store characteristics	Sample size	Weighted		
		N	%	SE %
TOTAL WIC Vendors allowing major substitution	459	12806	100%	--
WIC Vendor type				
Grocery	29	837	6.5	1.3
Pharmacy	0	0	0	0
WIC-only	0	0	0	0
Purchase price entered electronically*				
Yes	0	0	0	0
No	24	670	6.1	1.3
Number of registers*				
0-2	20	569	13.8	3.3
3-7	4	127	3.2	1.6
8 or more	5	141	3.1	1.3
Vendor monthly redemption dollars				
$0-1649	12	356	11.2	3.3
$1650-4499	8	216	6.9	2.3
$4500-11199	6	168	5.1	2.0
$11200-24679	2	71	2.3	2.3
$24680+	0	0	0	0
Scanning Equipment*				
Scanned	13	378	4.2	1.2
Did not scan	16	459	12.4	3.4
Cashier unfamiliar				
Yes	3	82	6.8	3.6
No	26	755	6.6	1.4

* Significant at the 0.05 level

Appendix F: WIC-Only

Table F-1. Average Cost of a Safe Buy for WIC-Only Stores for California, Florida, and Texas (where WIC-Only stores were oversampled)

Store Type	Statistics		States			Total[1]
			CA	FL	TX	
WIC-Only*		Sample Size	177	13	22	212
	Weighted	N	593	47	75	715
		Total	$8486.29	$526.99	$2960.19	$11973.48
		Mean	$14.3	$11.34	$39.5	$16.75
		SE Mean	$0.23	$0.32	$3.99	$1.27

1 Missing 10 unweighted observations and 36 weighted observations

Table F-2. Average Cost of a Safe Buy for Grocery Stores for California, Florida, and Texas (where WIC-Only stores were oversampled)

Store Type	Statistics		Size of Store			
			Small	Medium	Large	Total[1]
Grocery		Sample size	39	66	133	238
	Weighted	N	1061	1861	3789	6710
		Total	$17655.46	$25390.05	$47573.65	$90619.16
		Mean	$16.65	$13.65	$12.56	$13.51
		SE Mean	$3.28	$1.73	$1.02	$1.23

1 Missing 15 unweighted observations and 423 weighted observations

Appendix G: Comparisons Across Study Years: 1991, 1998, and 2004

2-Year Comparisons

Table G-1. Percentage of WIC Vendors Overcharging: Rate of Occurrence by Buy Type

Buy Type	Study Year		Difference
	1998	2004	
Safe Buy	7.0%	3.5%	-3.5%
Partial Buy	9.5%	5.3%	-4.2%
Minor Substitution	9.7%	4.3%	-5.4%
Major Substitution	10.4%	6.7%	-3.7%

Table G-2. Percentage of WIC Vendors Undercharging: Rate of Occurrence by Buy Type

Buy Type	Study Year		Difference
	1998	2004	
Safe Buy	7.0%	4.6%	-2.4%
Partial Buy	5.5%	4.0%	-1.5%
Minor Substitution	7.8%	6.0%	-1.8%
Major Substitution	8.2%	6.5%	-1.7%

Table G-3. Average Dollar Amount of Overcharge by Buy Type

Buy Type	Study Year		Difference
	1998	2004	
Safe Buy	$0.19	$0.06	-$0.13
Partial Buy	$0.47	$0.34	-$0.13
Minor Substitution	$0.36	$0.25	-$0.11
Major Substitution	$0.41	$0.12	-$0.29

Table G-4. Average Dollar Amount of Undercharge by Buy Type

Buy Type	Study Year		Difference
	1998	2004	
Safe Buy	$0.08	$0.04	-$0.04
Partial Buy	$0.11	$0.06	-$0.05
Minor Substitution	$0.31	$0.19	-$0.12
Major Substitution	$0.13	$0.07	-$0.05

Table G-5. Percentage of Vendors Overcharging by Frequency of Overcharge

Frequency of Overcharge	Study Year		Difference
	1998	2004	
Never Overcharged	81.9%	88.5%	6.6%
Overcharged Once	12.4%	10.4%	-2.0%
Overcharged Twice	4.2%	1.1%	-3.1%
Overcharged Three	1.5%	--	-1.5%

Table G-6. Percentage of Vendors Allowing Substitutions by Type of Substitution

Type of Substitution	Study Year		Difference
	1998	2004	
Minor Substitution	34.7%	27.8%	-6.9%
Major Substitution	3.7%	6.5%	2.8%

Table G-7. Percentage of Vendors Undercharging by Frequency of Undercharge

Frequency of Undercharge	Study Year		Difference
	1998	2004	
Never Overcharged	83.7%	88.3%	4.6%
Overcharged Once	13.4%	10.0%	-3.4%
Overcharged Twice	2.3%	1.3%	-1.0
Overcharged Three Times	0.06%	0.25%	0.19

3-Year Comparisons

Table G-8. Percentage of WIC Vendors Overcharging—Safe Buy Only

Study Year	Percent	Difference
1991	9.9%	--
1998	7.0%	-2.9%
2004	3.5%	-3.5%

Table G-9. Percentage of WIC Vendors Undercharging—Safe Buy Only

Study Year	Percent	Difference
1991	8.3%	--
1998	7.0%	-1.3%
2004	4.6%	-2.4%

Table G-10. Percentage of Vendors Overcharging by Vendor Size—Safe Buy Only

Study Year	Vendor Size*			
	Large	Difference	Small	Difference
1991	4.6%	--	13.3%	--
1998	3.0%	-1.6%	10.9%	-2.4%
2004	8.7%	5.7%	15.1%	4.2%

*small =1-5 registers / large = 6 or more registers

Table G-11. Percentage of Vendors Overcharging by Food Package Type—Safe Buy Only

Study Year	Food Package Type			
	Women and Child	Difference	Infant	Difference
1991	10.9%	--	8.0%	--
1998	7.5%	-3.4%	6.0%	-2.0%
2004	12.1%	4.6%	8.3%	2.3%

Table G-12. Percentage of Vendors Allowing Major Substitutions by Vendor Size

Study Year	Vendor Size*			
	Large	Difference	Small	Difference
1991	1.7%	--	1.0%	--
1998	5.5%	3.8%	2.6%	1.6%
2004	5.1%	-0.4%	1.3%	-1.3%

*small =1-5 registers / large = 6 or more registers

Appendix H: WIC Vendor Management Sampling Plan

2005 WIC VENDOR MANAGEMENT STUDY: SAMPLING PLAN

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CONTRACT TITLE:

2005 WIC Vendor Management Study
Contract No.: 53-3198-C-04-04

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2005 WIC Vendor Management Study

Sampling Plan Report

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1. Introduction

The **2004 WIC (Special Supplemental Nutrition Program for Women, Infants, and Children) Vendor Management Study** was designed to determine the extent to which retail grocers, called vendors, who are authorized to provide food to WIC participants, violated program rules and regulations. Data collectors, posing as WIC participants, completed a series of standardized compliance purchases at a nationally representative probability sample of WIC vendors. These data collectors, called Compliance Buyers, completed three purchases at each sampled vendor in their assigned areas. The compliance buys were designed to be different, thus testing the WIC vendor under different situations. Three compliance purchases were made: a **safe buy**, a **partial buy**, and a **substitution buy**.

This section (Appendix H) describes RTI International's[1] sampling plan for the 2004 WIC Vendor Management Study. This sampling plan had four primary components:

1. Defining the survey population.
2. Constructing a comprehensive sample frame of WIC vendors.
3. Constructing a suitable sample frame of geographic Primary Sampling Units (PSUs).
4. Selecting the vendor sample. The sample was selected using a two-stage cluster design, with PSUs defined by geographic clusters of counties. WIC-only vendors were oversampled by creating two WIC-only strata in order to yield a sufficient number of respondents in this important subdomain of recent interest to the Food and Nutrition Service (FNS). **Section 5** provides additional details on this stratification. A cluster design was used to minimize the cost associated with data collection.

The steps involved in selecting the vendor sample and assigning the survey treatments were as follows:

a. Stage 1: Randomly select PSUs.

b. Stage 2: Randomly select vendors within previously selected PSUs.

c. Randomly assign vendors to WIC participant groups. There are three types of WIC participant groups in this study: woman, infant, and child. The WIC participant group determines the type of food the data collector will purchase

[1] RTI International is a trade name of Research Triangle Institute.

from a particular vendor. Each vendor will be assigned to only one WIC participant group.

d. Randomly assign vendors to type of substitution buy. The third purchase made by each data collector from every sampled vendor is called a substitution buy. There are two types of substitution buys in this study: major and minor. A minor substitution buy is defined as an instance where a data collector will attempt to make a "minor" substitution for one of their designated WIC items (e.g., a non-WIC-approved type of cereal for a WIC-approved type). A major substitution buy entails a more significant substitution (e.g., soft drinks for milk).

2. Defining the Survey Population

The target population for this study included all vendors operating in states with retail delivery operations. These included chain grocery stores, independent grocery stores, convenience stores, general stores, and "WIC-only" stores (vendors that serve only WIC participants and only stock WIC items). Excluded from the study were states with direct delivery systems (Mississippi), home delivery systems (Vermont), state-run WIC vendors (parts of Illinois), military commissaries, and pharmacies that provide only special order infant formula. The decision to exclude these types of food delivery systems was made because of the inordinate cost of collecting data from these special types of WIC vendor operations, which are different from the other retail vendors and which represent a small fraction of all WIC vendors.

Also excluded from the target population were the following:

- Vendors operating in Alaska, North Dakota, Hawaii, Puerto Rico, and the U.S. territories
- Vendors managed by Native American agencies
- Vendors that report zero redemption dollars
- Vendors that have a WIC administrative action pending.

In total, 45 states and the District of Columbia were represented in whole, or in part, in the survey population.

3. Constructing a National Frame of WIC Vendors

Vendor lists from each of the 45 eligible states and the District of Columbia were obtained by Health Systems Research (HSR) and forwarded to RTI, where they were processed and converted to SAS datasets. Following receipt and processing of all lists, a national frame of WIC vendors was constructed by combining each of the 45 component files. During this process, three key sampling variables were created from each state's list:

1. **Vendor type** describes the characteristics of each vendor. Vendor type was used for two purposes. First, it was used to identify WIC-only vendors and to facilitate the oversampling of WIC-only vendors. Second, after the sample was drawn, vendor type was used to determine the type of standardized compliance purchases to be performed at each vendor. This information was used to assign the sample of vendors to one of the three WIC participant groups: woman, infant, or child. Because pharmacies typically sell infant formula and seldom dispense other authorized women's or children's foods, they were always assigned to the infant compliance purchase group.
2. **Vendor county** was essential in constructing the state's PSUs.
3. **Vendor redemption dollars** provided a measure of each vendor's volume of WIC business and was a critical element in second-stage sampling (see Section 5.3).

Two final steps were taken to finalize the national frame of WIC vendors. First, vendors from adjacent states included on a given state's list—along with their redemption dollars—were reassigned to the state and county in which they are physically located. If the vendor was listed on two or more state lists, the final vendor redemption amount was calculated as the sum of the individual redemption dollars. Second, vendors with no redemption dollar amount, whether zero or missing, were removed from the sample frame.

4. Constructing the Primary Sampling Units

Following completion of the national frame of WIC vendors, the PSUs were constructed. PSUs used county as a building block; thus, no county extended into more than one PSU. Each PSU consisted of at least 80 vendors and no vendor was included in more than one PSU. Many PSUs contained only one county, if there were at least 80 vendors in the county. Counties with less than 80 vendors were aggregated with contiguous counties

to form a PSU. When possible, operational considerations (e.g., driving distances) were noted as multiple counties were aggregated. Geographical information system (GIS) software was employed to facilitate this process. PSUs did not cross state boundaries.

5. Selecting the Vendor Sample

A two-stage stratified cluster design, with two strata designed to facilitate the oversampling of WIC-only vendors, was used to obtain a nationally representative sample of WIC vendors. The study's precision requirements were to meet national proportions estimates within 3 percentage points and with 95% confidence. Previous optimization analyses suggested that a sample size of 100 PSUs and 15 responding vendors per PSU was sufficient to meet the specified precision levels. Subsequent discussions and analysis indicated that 225 of the 1,500 responding vendors should be WIC-only vendors to facilitate analysis of this subgroup and produce proportion estimates within 6 percentage points and with 95% confidence.

Descriptions of both stages of the sample selection and the stratification employed to yield the desired sample sizes (in expectation) are provided in the following sections.

5.1 First-Stage Sampling – Stratification

FNS was interested in providing estimates for WIC-only vendors as well as comparing groups of states by their vendor-to-participant ratios. These comparisons were addressed in this design by first creating three strata: one stratum for the sampling of non-WIC-only vendors and two strata to facilitate the oversampling of WIC-only vendors.

1. **Stratum 1.** This was comprised of states with very few WIC-only vendors (all 45 states and the District of Columbia, except California, Florida, and Texas). For simplicity we referred to these states as non-WIC-only states, even though a small percentage of the vendors in a given state (<0.001) may indeed be WIC-only vendors.

   Within this stratum, we further substratified on a three-level variable (low, medium, high) created from the state-level vendor-to-participant ratios documented in the FNS report titled *The Integrity Profile TIP) Report for Fiscal*

Year 2001[2]. This ensured enough sample to make relatively precise comparisons of the low, medium, and high vendor-to-participant ratio groups.

2. **Stratum 2.** This stratum was made up of all vendors located in Los Angeles County, CA. Los Angeles County was placed in its own stratum because it contains an extremely high proportion (38%) of the WIC-only vendors.

3. **Stratum 3.** This stratum held the remaining vendors (WIC-only and non-WIC-only) located in California, as well as vendors located in the entire states of Florida and Texas.

Following the creation of the three-level stratification variable, the 100 PSUs were allocated proportionally to the number of desired non-WIC-only and WIC-only vendors in each stratum. A total of 1,275 non-WIC-only vendors and 225 WIC-only vendors were desired. Table 1 presents a summary of the frame counts by strata and Table 2 presents a summary of the sample sizes. The data in Table 1 indicate that 81.7% of the non-WIC-only vendors are in Stratum 1, 2.2% are in Stratum 2, and 16.1% are in Stratum 3. This table also shows that 38.0% of the WIC-only vendors are in Stratum 2 and 62.0% are in Stratum 3. Applying these percentages to the desired vendor sample size in Table 2 yields 70 PSUs (1,042 non-WIC vendors) in Stratum 1, 7 PSUs (28 non-WIC vendors, 85 WIC-only vendors) in Stratum 2, and 23 PSUs (205 non-WIC vendors and 140 WIC-only vendors) in Stratum 3.

Table 1. Counts and Proportions by Stratum

	Stratum 1 All Other States	Stratum 2 Los Angeles County	Stratum 3 FL, TX, and CA (minus Los Angeles County)	TOTAL
No. of vendors		1,206	7,161	8,367
No. of WIC-only vendors		322	525	847
Proportion of WIC-only vendors		322/847 = **0.380**	525/847 = **0.620**	1.0
No. of non-WIC-only vendors	33,607	884	6,636	41,127
Proportion of non-WIC-only vendors	33607/41127 = **0.817**	884/41127 = **0.022**	6636/41127= **0.161**	1.0
Total (all vendors)	33,607	2,090	13,,797	49,494
Sampling Proportion (all vendors)	0.679	0.042	0.279	1.0

[2] Available at *http://www.fns.usda.gov/wic/resources/tipreport2001.htm.*

Table 2. Desired Number of Respondents by Stratum

	Stratum 1 All Other States	Stratum 2 Los Angeles County	Stratum 3 FL, TX, and CA (minus Los Angeles County)
Proportion of WIC-only vendors		0.380	0.620
Desired # of WIC-only respondents		0.380*225 = **85**	0.620*225 = **140**
Proportion of non-WIC-only vendors	0.817	0.022	0.161
Desired # of non-WIC-only respondents	0.817*1275 = **1,042**	0.022*1275 = **28**	0.161*1275 = **205**
Total # of respondents	**1,042**	85 + 28 = **113**	205 + 140 = **345**
# of PSUs	**70**	**7**	**23**

5.2 First-Stage Sampling – Selecting the Sample Within Strata

In order to maintain efficiency in the sample design, the first-stage sample selection procedures differed within each of the three main strata, as summarized below.

First Stage of Selection in Stratum 1

1. Each state in Stratum 1 (see **Table 2**) was assigned to one of three substratification levels defined by the vendor-to-participant ratios as noted in the FNS report titled *The Integrity Profile Report for Fiscal Year 2001*. Table 3 presents a summary of the results from this assignment.
2. The 70 PSUs in Stratum 1 were allocated to each substratum proportional to the number of vendors. The final PSU sample size within each substratum is noted in the last row of Table 3.
3. Within each level of the substratification variable, the PSUs were sorted by state. This sorting was an implicit geographic stratification that facilitated selection of a wide geographic range of PSUs.

4. After sorting within each substratum, a procedure developed by Chromy[3]—probability proportional to size with minimum replacement selection—was used to select the PSUs. The PSU size measure is the number of eligible vendors.

Table 3. State Assignments for Average Number of Participants to Vendor Ratio Stratification Level (States within strata are listed in ascending order of participant-to-vendor ratio)

	Low	Medium	High
State	Connecticut Maine New Hampshire Montana Nebraska South Dakota Iowa Kentucky Rhode Island Minnesota West Virginia North Carolina New York Wisconsin Wyoming	Massachusetts South Carolina Alabama Michigan Virginia Georgia Tennessee Louisiana Idaho Arkansas Oklahoma Oregon Kansas Pennsylvania Missouri	Colorado Maryland Utah New Mexico Ohio Indiana Washington New Jersey Illinois Delaware Nevada Arizona DC
Range of Ratios	54-101	110-154	165-511
# of Vendors	12, 840	13, 284	7, 483
# of PSUs Allocated	27	27	16

First Stage of Selection in Stratum 2

Stratum 2 was composed only of Los Angeles County and there was no practical benefit from forming geographic PSUs within Los Angeles County (e.g., using Census Blocks). Therefore, no geographic, first-stage selection analogous to the first-stage selection in Strata 1 and 3 was used for Stratum 2. This stratum was assigned 7 PSUs with approximately 15 responding vendors expected within each PSU. Consequently the first stage of selection within this stratum entailed the selection of WIC-only and non-WIC-only vendors, as described in detail in **Section 5.3**.

[3] Chromy, J.R. (1979). Sequential Sample Selection Methods, Proceedings of the Section on Survey Research Methods, American Statistical Association, p. 401-406.

First Stage of Selection in Stratum 3

The first stage of sample selection for Stratum 3 proceeded as follows:

1. Stratum 3 was not further stratified as was done in Stratum 1. Note that Texas and California had high vendor-to-participant ratios, whereas Florida had a medium ratio.
2. The 23 PSUs allocated to Stratum 3 were selected proportional to each PSU's composite size measure[4] (S_i) where,

   S_i = $f_{wic\text{-}only}$ *(# of WIC-only stores in PSU_i) + $f_{non\text{-}wic\text{-}only}$ *(# of non-WIC-only stores in PSU_i)

   $f_{wic\text{-}only}$ = number of WIC-only vendors to select divided by the total number of WIC-only vendors in stratum 3 = 140/525 = 0.266,

   $f_{non\text{-}wic\text{-}only}$ = number non-WIC-only vendors to select divided by the total number of non-WIC-only vendors in stratum 3 = 205/6636= 0.031.

In general, for multistage surveys requiring a reasonably self-weighting sample within domains with roughly equal final PSU sizes, a composite size measure technique was used to form and select PSUs. Achieving a near self-weighting sample improved the precision of estimates for the WIC-only and non-WIC-only stores by minimizing the effects of unequal weighting.

5.3 Second-Stage Sampling

The second stage of sampling in this design addressed the selection of vendors within Stratum 2, and within the 93 PSUs previously selected in Strata 1 and 3. The second stage of sampling is designed to capture a sample of WIC vendors that represent those with high and low levels of WIC business, where the level of WIC business is measured by the vendor's monthly WIC redemption amount.

Adjust Sample Size to Account for Ineligible Vendors

The target sample for this study (1,500 respondents) was met by sampling 15 vendors from each PSU, assuming each vendor was eligible and that all three compliance purchases were completed. Based on past experience with state-provided vendor lists, we

[4] Folsom, R.E., Potter F.J. & Williams, S.R. (1987). Notes on a Composite Size Measure for Self-Weighting Samples in Multiple Domains. Proceedings of the American Statistical Association, Section on Survey Research Methods, p. 792-796.

expect that all of the selected vendors in each PSU will be open and available for compliance purchases. In the previous WIC study, all three of the compliance purchases were completed at 96.3% of the eligible vendors and we expected similar results in this study. We were in a unique situation in that, prior to beginning the compliance purchases, we could select extra vendors from each PSU and determine whether they were survey ineligible. This was done by first verifying with the state that the selected vendors were eligible, and then sending data collectors to them to verify whether they were still in existence and licensed as WIC vendors. Taking advantage of this situation, we selected 20 vendors per PSU (5 extra). Four were randomly set aside as "reserve" vendors for each PSU. If any of the 16 vendors were determined to be ineligible, they were replaced with vendors randomly selected from the reserve sample. This plan was expected to yield 16*100*96.3% = 1,540 respondents, assuming all vendors who were eligible at the onset of data collection will remain eligible for the duration of the study (i.e., during all three compliance purchases).

The sample sizes in the sections below refer to the total number of vendors selected, not the number of desired respondents. For example, in Stratum 2, 113 WIC-only vendors were selected, 89 eligible vendors were be identified, and, in expectation, 85 were subjected to all three purchases.

Second Stage of Selection for Stratum 1

The second stage of selection for Stratum 1 proceeded relatively quickly. Twenty vendors were systematically selected within each of the 70 selected PSUs with equal probability and without replacement, sorting the vendors first by redemption dollars.

Second Stage of Selection for Stratum 2

In Stratum 2, the second stage of selection began with dividing the vendors into two groups: WIC-only vendors and non-WIC-only vendors. Within each group the vendors then were sorted by redemption dollars. A systematic sample of 40 non-WIC-only vendors was selected from the non-WIC-only group and another systematic sample of 113 WIC-only vendors was sampled from the WIC-only vendors group.

Second Stage of Selection for Stratum 3

The second stage of selection was slightly more complicated for Stratum 3, as we sought a final vendor sample size that had 140 WIC-only respondents, 205 non-WIC-only respondents, and roughly 20 total selected vendors within each of the 23 PSUs. The

composite size measure used to select the PSUs provided us with an initial sample size of both types of vendors to select within each PSU. These initial sample sizes were summed across the 23 PSUs, and any necessary adjustments were made so that the final expected respondent sample size was 140 WIC-only and 205 non-WIC-only vendors.

After sample sizes were determined within each PSU, for each type of vendor we selected the vendors using the same procedure as used in Stratum 1. For example, if the final sample size for a PSU is 12 WIC-only vendors and 8 non-WIC-only vendors, the 12 vendors were systematically selected from all WIC-only vendors within the PSU. Similarly, the 8 non-WIC-only vendors were systematically selected from all non-WIC-only vendors.

5.4 Random Assignment of WIC Participant Group

Non-pharmacy vendors selected into the sample were randomly assigned with equal probability to one of the three WIC participant groups: woman, infant, or child. As indicated above, pharmacies were automatically assigned to the infant group.

5.5 Random Assignment of WIC Food Package Type

Three standardized compliance purchases were performed at each sampled vendor. The first purchase was a safe compliance buy, the second was a partial compliance buy, and the final purchase was a substitution compliance buy. Approximately half of the substitution buys were minor; the other half were major, with the exception of WIC-only stores. Because only minor substitutions were possible at WIC-only stores, those vendors were automatically assigned to a minor substitution. The remaining vendors were randomly assigned to either a minor or a major substitution buy using a simple random sampling methodology.

Appendix I: Compliance Buy Form

Partial Buy..02
Vendor ID #......................... «vendor_ID»
Case Type............................. «case_type»

WIC VENDOR MANAGEMENT STUDY
COMPLIANCE BUY FORM

PART I: IDENTIFYING INFORMATION

1. Compliance Buyer's Name: ______________________________

2. Compliance Buyer's ID #: [ ][ ][ ][ ][ ][ ]

3. Date of Buy: [ ][ ] (Month) [ ][ ] (Day) [2][0][0][5] (Year)

4. Day of Week of Buy:

Sunday.............................01	Thursday 05
Monday............................02	Friday.............................. 06
Tuesday 03	Saturday 07
Wednesday 04	

5. Time of Buy: [ ][ ] : [ ][ ] a.m. ....01 p.m. ....02 *(Record the time you entered the store)*

6. Vendor Name: «name»

7. Vendor Address: «address»
   «city », «state » «zip»

8. Food Instrument Serial Number: «FI_serial_»

COMPLIANCE BUY RESULT

1. Conducted .... 01 ➔ *Go to PART II*
   Not conducted .... 02 ➔ *Go to #2 below*

2. Reason not conducted
   Vendor out of business 01
   Vendor no longer WIC-authorized.................................. 02
   Other *(specify)* 03

   ____
   ____
   ____
   ____
   ____

CB Initials ____________ *Date* ____________

Partial Buy	02
Vendor ID #	«vendor_ID»
Case Type	«case_type»

PART II: DESCRIPTION OF COMPLIANCE BUY

(Complete This Section Immediately After Leaving the Store.)

(Circle one number for each question)

1. Were all items listed on the food instrument(s) available in the required quantities and sizes?

   Yes 01
   No.....02

2. Were you asked to accept another item in substitution for the WIC foods you attempted to purchase?

   Yes .....01 ➔ *Go to 2a*
   No.....02

   2a. Please explain:

   _____
   _____
   _____
   _____
   _____

3. Could you observe the total amount rung up on the cash register?

   Yes .....01 ➔ *Go to 3a*
   No.....02

   3a. Enter amount on register: ..... $_____._____

4. Were you provided with a register receipt for the WIC purchase?

   Yes .....01 ➔ *Go to 4a*
   No.....02

   4a. Enter amount on receipt: ..... $_____._____ ***Attach receipt(s) on page 8***

5. How was the purchase price entered on the WIC food instrument?

   Cashier entered price electronically ..... 01 ➔ *Go to 5a*
   Cashier entered price by hand ..... 02 ➔ *Go to 5a*
   I was asked to enter price ..... 03 ➔ *Go to 5a*
   Price was not entered 04
   Don't know 05

   5a. Amount entered: ..... $_____._____

Partial Buy 02
Vendor ID # ..... «vendor_ID»
Case Type..... «case_type»

6. When were you asked to countersign the WIC food instrument?

   After the purchase price was entered on the food instrument 01
   After the cashier rang up the WIC food items, but before the price was entered on the food instrument 02
   Before the cashier rang up the WIC food items 03
   I was not asked to countersign the WIC food instrument 04

7. Were you asked to pay cash in addition to the food instrument purchase price for WIC food?

   Yes .....01 ➔ *Go to 7a*
   No.....02

   7a. Enter amount paid in cash: ..... $_____._____

8. Were you offered cash for the food instrument you were using, or did the cashier offer credit or cash for any additional WIC food instruments you had?

   Yes .....01 ➔ *Go to 8a*
   No.....02

   8a. Enter amount of cash or credit offered:.... $_____._____

9. Were you asked to take your purchase to a register specifically for WIC participants?

   Yes 01
   No.....02

10. Were you given incorrect information from a store employee regarding the brands of food you could buy with your WIC food instrument?

    Yes .....01 ➔ *Go to 10a*
    No.....02

    10a. What information were you given?

    _____
    _____
    _____
    _____
    _____

Partial Buy 02
Vendor ID # ..... «vendor_ID»
Case Type..... «case_type»

11. How many registers did this store have? ☐☐

12. Did the store have scanning equipment?

Yes .....01➔ *Go to 12a*
No 02

12a. Were your items scanned?

Yes.....01
No 02

13. Did the cashier indicate that he/she was unfamiliar with how to conduct a WIC transaction?

Yes .....01 ➔ *Go to 13a*
No.....02 ➔ *Go to 14*

13a. How was this communicated? *(Circle all that apply.)*

1. Cashier indicated that he/she was a new employee.....01
2. Cashier indicated that he/she had never completed a WIC transaction.....02
3. Cashier received assistance from a co-worker or supervisor in completing the WIC transaction 03
4. Other.....04 ➔ *Explain:*

_____

_____

_____

_____

_____

14. Please describe the reaction of the cashier to your (attempted) partial buy:

_____

_____

_____

_____

_____

Partial Buy .....02 Vendor ID # ..... «vendor_ID» Case Type..... «case_type»

15. Were any incentives offered to encourage initial or continued use of this store?

Yes .....01➔ *Go to 15a*
No 02

15a. What type of incentive was offered/provided?

_____

_____

_____

_____

_____

PLEASE PROCEED TO PART III

PART III: WIC PURCHASE INFORMATION

(Complete Immediately After Leaving the Store.)

Partial Buy 02
Vendor ID # .....«vendor_ID»
Case Type ..... «case_type»

FI Serial No. «FI_serial_» **Value of FI: $«value_of_FI»**

Food Package on FI:

«Food_from_FI1», «Qty_from_FI1» «Size_from_FI1»
«Food_from_FI2», «Qty_from_FI2» «Size_from_FI2»
«Food_from_FI3», «Qty_from_FI3» «Size_from_FI3»
«Food_from_FI4», «Qty_from_FI4» «Size_from_FI4»
«Food_from_FI5», «Qty_from_FI5» «Size_from_FI5»
«Food_from_FI6», «Qty_from_FI6» «Size_from_FI6»
«Food_from_FI7», «Qty_from_FI7» «Size_from_FI7»
«Food_from_FI8», «Qty_from_FI8» «Size_from_FI8»
«Food_from_FI9», «Qty_from_FI9» «Size_from_FI9»
«Food_from_FI10», «Qty_from_FI10» «Size_from_FI10»
«Food_from_FI11», «Qty_from_FI11» «Size_from_FI11»
«Food_from_FI12», «Qty_from_FI12» «Size_from_FI12»

1. Were you able to complete a partial buy?

Yes .....01 ➔ *Complete columns A-F for all items purchased.*
Complete columns A-B for items intentionally omitted as part of partial buy.

No.....02 ➔ *Complete columns A-F for all items purchased*

ITEM CODES
*(*In column B, enter **all codes that apply**.)*
01 – Not in stock
02 – Total quantity/Required size not in stock
03 – Purchased alternate item at vendor suggestion
04 – Purchased additional item at vendor suggestion
05 – Accepted rain check at vendor suggestion
06 – Purchased partial quantity/omitted this item for partial buy
07 – Vendor refused to allow partial buy

PRICE CODES
(In Column F, enter all codes that apply.)
01 – Price marked on item
02 – Price observed in store
03 – Price obtained through other method *(explain in notes section)*
04 – Item was on sale/special offer *(explain in notes section)*

NOTES:

Partial Buy 02
Vendor ID # .....«vendor_ID»
Case Type ..... «case_type»

A			B	C	D SHELF PRICE	E[2] RECEIPT PRICE	F
Item Type	Qty	Size	Item Code	Brand/Flavor	Unit Price		Price Code
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
					$	$	
				Total Receipt Price		$	

[2] If receipt was provided, enter amount of each item from receipt, and enter total from receipt. If no receipt provided, do not enter any amount in Column E.
Refer to Item Codes and Price Codes on previous page to complete columns B & F.

Partial Buy	02
Vendor ID #	«vendor_ID»
Case Type	«case_type»

PART IV: CERTIFICATION AND APPROVAL

A. I certify that I have completed and reviewed this form and the information contained in this report is accurate.

_____ _____

Compliance Buyer's Signature *Date*

_____

Compliance Buyer's ID #

B. For Office Use Only:	Date Received	Date Reviewed	Result Code
1. Field Supervisor _____ *Initials*			
2. RTI _____ *Initials*			

Result Codes:	NOTES:
01 - Approved for processing 02 - Not approved for processing *(explain in notes)* 03 - Other *(explain in notes)*	

ATTACH

WIC

PURCHASE RECEIPT HERE.

Appendix J: Training Agenda

WIC Vendor Management Study
Compliance Buyer Training Agenda
Embassy Suites Hotel Raleigh- Crabtree
Raleigh, NC
October 1-3, 2004

DAY 1
Friday, October 1st
Renaissance AB Ballroom

7:30-8:30	Registration	*Headway and Field Services Unit*
8:30-10:30	Welcome and Introductions Project Organization Overview of Training Overview of the Study	*Donn Smith, RTI*
	Importance of the Study	*Sheku G. Kamara, USDA/FNS*
	Background of the Study WIC Program Vendor Management Purpose of the Study	*Loren Bell, HSR*
	Importance of Confidentiality (Data Collection Agreement)	*Donn Smith*
	Sample Selection	*Donn Smith*
	State WIC Program Cooperation	*Laura Sternesky, HSR*
	Data Collection Schedule	*Leslie McLean, RTI*
10:30-10:45	BREAK	
10:45-12:00	Terminology Overview of Data Collection Activities Summary of Compliance Buyer Responsibilities List of Materials Assignment Materials WIC Food Instruments Compliance Buy Form Shopping List Pre-Buy Checklist Cooler/Ice Chest	*Sean Bilsborrow-Koo, RTI*

	Preparation for Field Work Planning an Efficient Route Arranging for Donations Before, During and After the Buy	*Leslie McLean*
12:00-1:15	Headway Presentation *Michelle Sigmon and Carl Farmer, Headway Corporate Resources* *(Lunch will be provided)*	
1:15-3:30	Overview of Compliance Buys Understanding the Food Instrument	*Loren Bell*
	Correct Procedures for WIC Purchases Conducting the Buys Safe Buys Partial Buys Minor Substitution Buys Major Substitution Buys	*LeslieMcLean/Videos*
3:30-3:45	BREAK	
3:45-4:30	Introduction to Compliance Buy Form Donating Purchased Items	*Gina Kilpatrick, RTI*
4:30-5:00	Review and Q&A Homework Assignments Schedule for Day 2 End of Day Training Evaluations	*Donn Smith/Leslie McLean*
5:00-5:30	Field Supervisors will be available to answer questions	

DAY 2
Saturday, October 2nd
Renaissance AB Ballroom

8:30-10:00	Quality Control Procedures	*Donn Smith*
	Field Visits by HSR & RTI	*Loren Bell*
	Review of Compliance Buys	*Leslie McLean*
	Compliance Buy Form	*Gina Kilpatrick*
10:00-10:15	BREAK	
10:15-11:15	More on the Compliance Buy Form	*Gina Kilpatrick*
11:15-11:45	Discussion of 1998 Study Results Plans for 2004-2005 Study Results	*Rebecca Ledsky, HSR*
11:45-1:00	LUNCH	
1:00-4:30	Break into small groups *(CBs will rotate through each room with their FS)*	

Room	Topic	Trainers
Romanesque	Mock Compliance Buys – Practice with CBFs	Gina Kilpatrick and Sean Bilsborrow-Koo
Baroque	Mock Compliance Buys – Practice with Procedures	Leslie McLean and Laura Sternesky
Gothic	CB assignments	Donn Smith and Debbie Capps

Reconvene in Romanesque Room

4:30-5:00	Review and Q&A Preparations for Practice Compliance Buys Practice Compliance Buy Assignments Homework Assignments Schedule for Day 3 End of Day Training Evaluations	*Donn Smith/Leslie McLean*
5:00-5:30	Completing the PT&E Weekly Reports to FS Disposition of Completed Forms	*Sean Bilsborrow-Koo/Field Supervisors*
5:30-6:00	Field Supervisors will schedule weekly report times with their staff	

DAY 3
Sunday, October 3rd
Renaissance AB Ballroom

8:00-8:30	Check-in for Practice Compliance Buys	
8:30-11:30	Practice Compliance Buys	
11:30-12:00	Small Group Discussion of Practice Buys *(CBs should meet in groups with their Field Supervisors)*	
12:00-12:30	LUNCH	
12:30-1:30	Discussion of Practice Buy Experiences Q&A about CBF	*Leslie McLean/All*
1:30-2:30	Exit Exam	
2:30-3:00	Administrative Procedures Assignments/Work Schedules Production/Efficiency/Costs/Performance Monitoring Quality Control Measures Safety Issues/Use of Escorts	*Donn Smith/Field Supervisors*
3:00-3:30	Final Q&A	*All*
3:30-4:00	Closure/Certificates of Completion End of Day/End of Training Evaluations	*Donn Smith/Loren Bell*

Appendix K: Cumulative Field Status by State

WIC Vendor Management Study
Cumulative Field Status by State

State	***# vendors***[1]	***#w buy 1***[2]	***# w buy 2***[3]	***# w buy 3A***[4]	***# w buy 3B***[5]
AL	16	16	16	12	4
AR	15	15	15	9	6
AZ	32	32	32	23	9
CA	297	298	298	257	40
CO	17	19	18	16	1
CT	15	15	15	14	1
DC	4	5	4	2	2
FL	77	77	77	57	20
GA	55	57	57	37	18
IA	34	34	34	22	12
ID	16	18	16	11	5
IL	49	49	49	35	14
IN	33	33	33	16	17
KS	16	16	16	10	6
KY	31	33	33	25	6
LA	16	16	16	9	7
MA	31	32	32	25	6
MD	12	13	12	8	4
ME	16	16	16	7	9
MI	67	68	67	39	28
MN	16	16	16	11	5
MO	17	17	17	11	6
MT	16	17	16	10	6
NC	64	64	64	44	20
NE	16	16	16	11	5
NH	16	16	16	12	4
NJ	32	32	32	23	9
NY	127	129	128	75	53

State	***# vendors***	***#w buy 1***	***# w buy 2***	***# w buy 3A***	***# with buy 3B***
OH	46	46	46	29	17
OK	16	16	16	11	5
OR	32	33	33	24	8
PA	49	49	49	36	13
RI	16	16	16	10	6
SC	17	17	17	11	6
TN	32	32	32	22	10
TX	112	112	112	87	25
UT	16	16	16	9	7
VA	32	32	32	21	11
WA	17	17	17	12	5
WI	33	33	33	20	13
WV	16	16	16	9	7
WY	16	16	16	13	3
Grand Total	***1603***	***1620***	***1612***	***1145***	***459***

[1]*eligible for all three compliance buys*

[2]*safe buys*

[3]*partial buys*

[4]*minor substitution buys*

[5]*major substitution buys*