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WIC Vendor Management Study, 1998

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Table of Contents

List of Figures

Demographics of the Study Population

Administrative Errors

Vendor Overcharge and Undercharge

Vendor Acceptance of Substitutions

List of Tables

Chapter II

Study Methodology

Chapter III

Demographics of the Study Population

Appendix A

Demographics of the Study Population

Appendix B

Administrative Errors

Appendix C

Vendor Overcharges and Undercharges

Appendix D

Vendor Acceptance of Substitutions

Appendix E

Administrative Errors for the Safe Buy

Appendix F

Vendor Overcharges for the Safe Buy

Executive Summary

A. Overview

The purpose of the study was to learn the extent to which retail grocers, defined as "vendors" in the WIC Program, authorized to provide food to WIC participants, were violating program rules and procedures, and to determine which programmatic and/or demographic variables could be associated with vendor violations. The study examines three critical research questions in the area of WIC vendor management:

- To what extent do WIC vendors commit vendor violations and administrative errors when conducting a WIC transaction at the point of sale?
- To what extent do WIC vendors overcharge or undercharge the WIC Program?
- To what extent do WIC vendors allow participants to substitute unauthorized items for their WIC-authorized food items?

These questions were answered through a national data collection effort involving data collectors posing as WIC participants and conducting compliance buys at a nationally representative sample of 1,565 WIC retail vendors. Data collected and analyzed for this study can be useful to Federal and State officials in evaluating the extent to which vendors comply with program rules. Key areas in which these data may be useful are described below:

- Quantifying the Level of Vendor Errors;
- Identifying Administrative Practices on Which Vendor Training Should be Focused; and
- Identifying Vendor Demographics Associated with WIC Program Compliance.

B. Methodology

The population of interest for the study was defined as all vendors operating in States with retail food delivery systems. Excluded from the study were States with direct food delivery systems (Mississippi), home food delivery systems (all of Vermont and part of Ohio), State-run WIC vendors (parts of Illinois), military commissaries, and pharmacies which only provided WIC participants with exempt infant formula and/or WIC-eligible medical foods. Vendors operating in Alaska, Hawaii, Puerto Rico, and the U.S. territories, as well as vendors authorized by Indian Tribal Organization State agencies were also excluded from the study population.

The study sample was designed to meet the precision constraints of estimating national proportions within 3 percentage points and estimating subgroup proportions within 5 percentage points, with 95 percent confidence. A total sample of at least 1,500 vendors was needed to meet the study's precision requirements. Vendors were oversampled to ensure the study had a sufficient number of vendors.

To successfully perform the required compliance buys, it was essential that the data collectors embody the physical characteristics of women who receive WIC benefits. This meant, for example, that all data collectors had to be females of childbearing age. In addition, if data collectors were to perform their assignments without creating suspicion among vendors, it was also necessary for the data collectors to belong to one of the racial or ethnic groups of customers who regularly shop at those vendors.

Each data collector was responsible for completion of three compliance buys at each assigned vendor. Data collectors were assigned an average of 18 vendors, although some had considerably more and a few had less. The assigned buys at each vendor were performed as follows:

Buy #1:	Safe Buy	Buyer purchased all food items listed on the food instrument in the quantities and types listed.
Buy #2:	Partial Buy	Buyer attempted to purchase some, but not all, of the food items listed on the food instrument.
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.

Three buys were attempted at each vendor. The third buy was either a "Buy 3A" or a "Buy 3B," as preprinted on the compliance buy form. To avoid arousing suspicion among vendor staff, data collectors were instructed to allow five or more days between buys at each sampled vendor. The primary tasks associated with a compliance buy entailed selecting the correct foods for the buy type being undertaken, obtaining the shelf price of each item, presenting the food instrument (FI) at the checkout counter, and observing any administrative violations of WIC procedures.

Data were collected and reviewed for accuracy. Once a complete database was developed, weights were assigned to each vendor, and data were prepared for analysis using SAS and SUDDAN software. Statistical analysis was preformed on the database using a combination of descriptive analysis and mulitvariate analysis. Results were then organized into four categories: descriptions of the study population, administrative errors, overcharge/undercharge, and substitutions.

C. Description of the Study Population

Vendor demographics were divided into two categories: descriptions of the physical location of the vendor, and descriptions of the vendors' ability to conduct a WIC transaction. With regard to location, 70 percent of the study vendors were located in metropolitan areas as compared to non-metropolitan areas. Almost 80 percent of the vendors were located in States with open FI systems and slightly over 20 percent were located in States with vendor-specific FI systems.

With regard to descriptive information about the vendors' ability to conduct a WIC transaction, two areas were examined. First, vendors were grouped by physical size using the number of cash registers as a proxy. Thirty-one percent of the vendors were classified as small vendors, 35 percent were classified as medium-sized and 33 percent were classified as large. Use of scanning equipment was also examined, with 69.1 percent of study vendors using scanners, 27.4 percent lacking scanning equipment, and 3.6 percent having scanning equipment, but choosing not to scan.

D. Findings Related to Administrative Errors

This study examined some universal factors related to conducting a WIC transaction to determine the extent to which vendors were not following proper WIC transaction procedures and the extent to which such administrative errors were associated with overcharging, undercharging, and allowing substitutions. For the purpose of this study, not following proper WIC transaction procedures was considered an administrative error. The following categories of administrative errors were examined:

- Requiring the data collector to sign the WIC FI prior to the cashier entering the purchase price;
- Having insufficient stock thereby preventing the data collector from obtaining her authorized foods;
- Offering rain checks for foods not available; and
- Asking the data collector to pay cash in addition to the FI for WIC food items.

In addition, while not considered an administrative error in all States, the study examined the percentage of all WIC vendors that provided a receipt to the data collector.

The most common error noted in the study was the failure of the cashier to have the data collector sign the WIC FI after the cashier entered the purchase price. A total of 35.4 percent of all WIC vendors failed to follow the proper countersignature procedures. To a lesser extent, vendors being out of particular WIC foods was a problem. A total of 5.5 percent of the vendors were not able to fill the food prescription because they did not carry at least one of the WIC food items on the data collector's FI. Other variables examined were far less significant. Less than 0.5 percent of the vendors issued rain checks or asked the data collector to pay cash in addition to the FI.

E. Findings Related to Overcharges and Undercharges

As was true in past vendor studies, vendors in this study both overcharged and undercharged the buyers for items purchased. Vendor overcharges and undercharges were examined in total and as a function of several variables. Significant findings include:

- Across all three buy types, an *average* of 8.7 percent of all vendors overcharged. When vendors were examined for frequency of overcharge, 81.9 percent never overcharged, 12.4 percent overcharged only once, 4.2 percent overcharged twice, and 1.5 percent overcharged three times.

- Vendors were most likely to overcharge on a partial buy. In addition, vendors who overcharged on the partial buy overcharged a larger dollar amount than on other types of buys. The average amount of overcharge was $0.19 for safe buys, and $0.47 for partial buys.

- When logistic regression models were run for overcharge as a function of variables, results indicated that vendors who failed to provide a receipt were ten times more likely to overcharge than those providing a receipt. Other variables that seem associated with overcharge include vendor size, with small vendors being three times as likely to overcharge than middle-sized or large vendors; and countersignature timing with those vendors that failed to have the data collector sign the FI prior to entering the purchase price, being four to six times more likely to overcharge than those who had the data collector sign the FI after the purchase price was written in.

As noted above, vendors also undercharged. An *average* of almost seven percent of all vendors undercharged over the three buys. Of the vendors where three buys were completed, 83.7 percent never undercharged, 13.4 percent undercharged only once, 2.3 percent undercharged twice, and less than 1 percent undercharged all three times.

Approximations of national estimates of total vendor overcharge and undercharge were also developed. The estimates are approximations because data were analyzed over all three buy types, but it is unknown how often WIC participants make partial purchases or attempt to substitute foods. When the amount of overcharge is calculated based on all three buys, it is estimated that 1.6 percent of the total 1998 WIC redemptions nationally are attributed to overcharge. When only the safe buy is used to calculate the estimate, the percent drops to 0.9 percent of the national WIC redemptions being attributable to overcharge.

An approximation of national estimates for vendor undercharges was also developed. When examined across all three buys, 0.6 percent of the 1998 WIC redemptions nationally were attributable to vendors undercharging. When only the safe buy was used to calculate the undercharges, the rate dropped to 0.4 percent of 1998 national WIC redemptions.

F. Findings Related to Substitutions

The vendors' willingness to accept substitution of unauthorized foods for the WIC prescription was also examined. Data collectors were asked to conduct a substitution buy on the third and final buy in the series. Half the vendors were selected for a minor substitution buy, that is a substitution of unauthorized foods within a WIC food category (e.g., unauthorized cereals and juices); while the other half of the vendors were selected for a major substitution buy, which is an attempt to purchase an item outside of the WIC food category (e.g., soda instead of juice). Findings were as follows:

- A large number (34.7 percent) of vendors allowed minor substitutions. It is interesting to note that most vendors who allowed minor substitutions also scanned the items. Because scanning equipment can be programmed to screen out unauthorized purchases, this problem may be best addressed through stricter requirements for vendors who have scanners to do such screening.

- Just under four percent of the vendors allowed major substitutions. Vendor size, cashier familiarity with WIC transactions, and use of scanning equipment were all associated with major substitutions.

CHAPTER I

Introduction and Overview

In the fall of 1997 the Food and Nutrition Service (FNS) of the United States Department of Agriculture commissioned a study to examine the practices of grocers providing supplemental foods to participants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). The purpose of the study was to learn the extent to which retail grocers (called "vendors" in the WIC Program) were violating program rules and regulations, and to determine if program management or demographic variables could be associated with vendor violations. The study was a follow-up to the 1991 Vendor Issues Study, published by FNS, and examines three critical research questions in the area of WIC vendor management:

- To what extent do WIC vendors commit procedural and administrative errors when conducting a WIC transaction at the point of sale?
- To what extent do WIC vendors overcharge or for that matter undercharge the WIC Program?
- To what extent do WIC vendors allow participants to substitute unauthorized items for their WIC purchases?

This study examined these questions through a national data collection effort involving data collectors posing as WIC participants conducting compliance buys at a nationally representative sample of 1,565 WIC retail vendors. This chapter provides an overview of the WIC Program, issues related to vendor compliance, and potential uses for the data collected. Subsequent chapters will detail the methodology, statistical analysis, and findings of the 1998 study.

A. Background

The WIC Program was established in 1972 through an amendment to the Federal Child Nutrition Act. Its purpose is to provide low-income pregnant, breastfeeding, and postpartum women, infants, and children up to age five with supplemental foods, nutrition education, and health care referrals to counteract the adverse effects of poverty on their nutrition and health status.

WIC Program regulations require that each State agency develop a food delivery system to provide authorized supplemental foods to WIC participants. Three food delivery systems are used by State agencies: retail purchase, home delivery, and direct distribution. In the home food delivery system, supplemental foods are delivered directly to the participant's home. In the direct food delivery system, supplemental foods are purchased by the State agency or a entity acting on its behalf, and distributed to participants at a warehouse or other facility. The focus of this study is the retail food delivery system, in which participants obtain supplemental foods at authorized vendors, e.g., grocery stores, pharmacies, and WIC-only stores (stores serving WIC participants only). The vast majority of WIC State agencies use the retail food delivery system to provide supplemental foods to WIC participants. Exceptions include Mississippi which distributes food directly to participants from State-operated warehouses, Vermont which uses a home food delivery service to provide WIC participants with foods, and Ohio which provides home food delivery to participants in some counties. Alaska uses direct distribution of foods when participants live in areas without access to retail vendors.

In the retail food delivery system food instruments (FIs) are issued to participants in the form of a check or a voucher.[1] These FIs must be used within 30 days of issuance. Local WIC clinics issue the FIs to participants. FIs may combine a variety of food categories; for example, a participant may be issued certain FIs that authorize the purchase of milk, eggs, cereal, and juice, and other checks that allow the purchase of peanut butter and cheese. Within each food category, participants are given a

[1] Some States use a check system in which food instruments are processed like a check through the private banking system; other State agencies use a voucher system in which food instruments are processed by the State, which acts as its own bank. In Wyoming their check system is being replaced with an electronic benefits transfer (EBT) system that requires participants to use a "smart card" (a card containing a computer chip) to purchase WIC foods.

choice of food products. For example, participants can select different types of cheese, such as Colby, Cheddar, or Swiss, or various brands of WIC-approved cereals. Participants must redeem their FIs at vendors that are authorized by the State or local WIC Program. Some States operate a "vendor-specific" retail food delivery system, in which participants are required to select a single vendor and to transact their FIs at that vendor. Other States operate an "open" system, in which participants may use their FIs at any authorized vendor. Among geographic State agencies with retail food delivery systems, 11 are vendor-specific and 35 operate open systems.

The following section provides an overview of the characteristics of WIC vendors operating in States with retail food delivery systems and the requirements under which they operate.

B. Overview of WIC Retail Vendors

State agencies use vendor selection criteria to determine which vendor applicants to select for program authorization. Selection criteria may include competitive prices, shelf stocking requirements for a minimum variety and quantity of supplemental foods, and no history of compliance problems. If a vendor applicant meets or exceeds the State agency's selection criteria, it will likely be offered a vendor agreement. By signing the vendor agreement, the vendor agrees to comply with State rules and regulations.

States face the ongoing challenge of ensuring effective management, oversight, and review of their vendor population and ensuring adequate participant access to program benefits. State agencies monitor their vendors for compliance with their vendor agreements. To accomplish this, States have developed sophisticated vendor management systems designed to ensure that vendors comply with the Program's rules and regulations and to prevent or detect vendor fraud and abuse.

In some cases, WIC vendors and participants may jointly be involved in violating the Program's rules, such as exchanging FIs for unauthorized food items, non-food items or cash. In other cases, the vendor is solely responsible for violating program rules, such as overcharging the WIC Program and not following proper transaction or redemption procedures.

Some of the approaches used by States to manage vendors include strict vendor selection criteria, comprehensive vendor training, routine monitoring, high-risk vendor identification systems, and compliance investigations including compliance buys and inventory audits**.**

C. Potential Uses of the Data from the Vendor Management Study

Data collected and analyzed during the Vendor Management Study can be useful to Federal and State officials in evaluating the extent to which vendors are complying with WIC transaction and redemption procedures. Key areas in which these data may be useful are described below:

1. Quantifying the Level of Vendor Administrative Errors

States are required to ensure that proper procedures are followed when a participant transacts a FI to obtain authorized WIC foods. Because a WIC transaction is a somewhat complicated process, a number of errors can occur. Reliable estimates of the frequency of errors may assist FNS and States to determine priorities for targeting limited vendor management resources. Data from this study will provide estimates of the types of administrative errors being committed, as well as the extent to which these errors can be associated with vendor overcharges and vendor acceptance of participant-initiated substitutions.

2. Identifying Administrative Practices on Which Vendor Training Should be Focused

The data from this study will enable FNS and State officials to identify the administrative errors that occur most frequently. In addition, data collectors were asked to report whether there was any indication as to the cashiers' lack of familiarity with conducting a WIC transaction, such as asking a

co-worker or manager for assistance, or making a statement that they were not sure how to conduct the transaction. These data were collected to determine the extent to which cashier familiarity with the WIC transaction affected administrative errors or other program violations. Officials may review this information and use it to determine how best to strengthen or revise vendor training objectives and programs.

3. Identifying Vendor Demographics Associated with WIC Program Compliance

States have implemented a number of strategies to maintain integrity in the WIC Program. By having solid data on which vendor demographic profiles are most associated with vendor errors, FNS may encourage States to review their own vendor selection criteria and replace any ineffective criteria with ones that are more likely predictors of fraud and abuse. This may also assist States with prioritizing their compliance efforts. Reliable information may assist State directors in better managing the WIC Program and allow them to develop better methods to detect and prevent vendor fraud and abuse.

D. Overview of the Study Methodology

Data for this study was collected at WIC-authorized retail vendors selected from a nationally representative, probability sample of WIC retail vendors. Data collectors were females of childbearing age and belonged to one of the racial or ethnic groups of customers that regularly shop at the vendors. An intensive training session was held for data collectors and comprehensive training materials were distributed. A data collection form, called a compliance buy form (CBF), was used to record data. A copy of this form can be found in Appendix H.

Data collectors conducted compliance buys that consisted of obtaining WIC authorized and unauthorized foods using a WIC food instrument at WIC retail vendors. Three buys were typically conducted at each vendor over a period of one month. The first buy was a safe buy during which the data collector obtained only WIC-authorized items and attempted to obtain all food items listed on the food instrument. During the second buy, the partial buy, the data collector purchased only a portion of the foods listed on the food instrument. The third buy was a substitution buy, during which the data

collector attempted to obtain an unauthorized food product or item with the FI. During all three buys the data collectors attempted to capture the actual shelf price of the food being obtained. After conducting a buy, the data collector completed the CBF and donated the items obtained with the FI to a charitable organization, as designated by each WIC State agency.

The CBFs were reviewed by staff and entered into a dataset. The amount for which each FI was redeemed was entered into the dataset and linked to a buy according to FI number. The dataset was thoroughly reviewed, cleaned, and analyzed.

E. Organization of this Report

Chapter II describes the study methodology in greater detail and describes the statistical analysis methods employed in the data analysis. Chapter III outlines the demographic characteristics of the vendors selected in the sample. Chapters IV, V, and VI, discuss the study findings. The final chapter summarizes the report and describes issues that may require further research.

This report is designed to highlight the findings of the WIC Vendor Management Study. Thus, graphics and tables are designed to best describe a finding, and often contain only information relevant to the particular finding being presented. Detailed data tables, including distributions, frequencies, standard errors and t tests, supporting the findings of this study are contained in the appendices.

CHAPTER II

Study Methodology

This chapter describes the methods and procedures employed to identify a nationally representative sample of WIC-approved food vendors; to prepare for and execute the data collection activities; to process the collected data and develop an electronic data file; and to establish statistical weights for each sampled vendor. In addition, the methods by which data were analyzed are described. The detailed sampling plan is provided in Appendix G.

The 1998 WIC Vendor Management Study employed a nationally representative probability sample of WIC vendors. The sampling frame was constructed from complete lists of vendors provided by the WIC State agencies. A cluster sample of 1,800 vendors in 100 primary sampling units (PSUs) was selected. The response goal was to obtain complete study data from three compliance buys with at least 1,500 vendors. After sample loss for vendors that were under State investigation, out of business, or no longer authorized, 1,625 eligible vendors from the original cluster sample were selected for the study. Complete study data for three compliance buys was obtained from 1,565 of these eligible vendors.

A. Defining the Survey Population

The population of interest for the study was defined as all vendors operating in States with retail food delivery systems. Excluded from the study were States with direct delivery systems (Mississippi), home delivery systems (all of Vermont and part of Ohio), State-run WIC vendors (parts of Illinois), military commissaries, and pharmacies which only provided WIC participants with exempt infant formula or WIC-eligible medical foods. Vendors in Alaska, Hawaii, Puerto Rico, and the U.S. territories, as well as vendors authorized by Indian Tribal Organization State agencies were also

excluded from the study population. This decision was made because of the high cost of collecting data from these areas and alternative food delivery systems, which only provide food benefits to a small fraction of program participants.

The study sample was designed to meet the precision constraints of estimating national proportions within 3 percentage points and estimating subgroup proportions within 5 percentage points, with 95 percent confidence. A total sample of 1,500 vendors was expected to meet the study's precision requirements at the most reasonable data collection cost. Clustering the sample of vendors within 100 primary sampling units, which were counties or groups of counties, limited the number of data collectors who had to be recruited and trained to conduct the survey, and reduced their travel costs.

B. Constructing the Sampling Frame

1. Obtaining Lists of WIC Vendors

In January 1998, current lists of authorized retail vendors were requested from 46 States and the District of Columbia. In addition to vendor name and address, information about WIC monetary redemption amounts was also obtained for use in stratification. States were asked to identify any home food delivery contractors, State-run vendors, military commissaries, and pharmacies that only provide exempt infant formula or WIC-eligible medical foods. The vendor lists were received from the States during the period from February through April 1998. Virtually all lists obtained were in machine-readable formats.

The vendor lists were standardized to adjust for formatting differences across States. Edit checks included comparing the number of vendors per State and the reported average monthly redemption dollars for each State with similar past information for reasonableness. Questions and problems noted in editing the frame information were raised with the States. Clarifications obtained were used to update the frame file.

It was necessary to determine the county in which each vendor was located to complete the sampling

frame. Since most of the States did not identify the counties on the vendor lists provided, county location was imputed based upon the zip codes in the vendor mailing addresses. A small number of vendors with addresses outside the State were attached to nearby in-State counties. Vendors identified as home food delivery contractors, State-run vendors, military commissaries, and pharmacies providing only exempt infant formula or WIC-eligible medical foods were not included in the vendor frame. Reported redemption dollars covering more than one month were converted to one-month equivalent amounts. The final vendor list contained a total of 41,007 WIC vendors.

2. Constructing Primary Sampling Units

Primary sampling units (PSUs) were defined as either individual counties or as groups of geographically contiguous counties. Since comparisons were planned for different State vendor management practices, PSUs also had to be defined so that each one included vendors only from a single State. The number of WIC retail vendors was determined for each county and used to assure that each PSU in the sampling frame contained at least the target number of 70 vendors. The District of Columbia and each county within the 46 study States were included in one, and only one, WIC PSU. Counties with fewer than 70 WIC retail vendors were combined with geographically adjacent counties to form PSUs that met or exceeded this minimum requirement.

A computer program using geographic information system (GIS) data was used to form PSUs. The program allowed the user to group adjacent counties into PSUs within a State until each PSU contained at least the minimum number of vendors. The program displayed the number of WIC vendors in each county on a State-level county outline map. In order to form practical PSUs for field visits, major highway routes were also shown on the computer screen. A highway atlas was used to identify major mountain ranges, lakes, and other map features.

There were only a few cases where all of the PSU construction objectives could not be met. The list from the District of Columbia contained only 21 WIC vendors; it was combined with two adjacent Maryland counties to form a PSU with 89 total vendors.

This PSU was included in the stratum for vendor-specific States with high participant-to-vendor ratios. Delaware had only 67 vendors; in this case, the entire State was defined as a single PSU. In total, only seven of the 366 PSUs in the sampling frame contained fewer than 70 vendors each. Thus, the final WIC PSU sampling frame contained 366 PSUs that were contiguous geographic areas; which in most cases contained at least 70 WIC retail vendors; which did not cross FNS region boundaries; and that, with one exception, did not cross State boundaries. Each WIC retail vendor was associated with only one PSU in the WIC sampling frame.

C. Selecting the Sample

A nationally representative sample of 1,800 WIC retail vendors was initially selected to complete the study. The study team first selected 100 sample PSUs from the total of 366 available PSUs. Within each of the 100 PSUs identified, a total of 18 sample vendors were selected for inclusion in the study, for a total of 1,800 vendors. Because there were likely to be vendors selected in the sample that either were no longer in business or were no longer authorized by the State to accept WIC FIs, a backup sample of two vendors per PSU was also identified.

1. Stratification Variables

PSUs in the sampling frame were stratified to reduce sampling variability and to ensure adequate sample sizes for key analysis comparisons. The PSUs in the sampling frame were stratified based on the following three variables:

- Vendor-specific vs. open-food instrument systems;
- States with high, medium, and low vendor-to-participant ratios based on FY 1996 Vendor Activity and Monitoring Profile (VAMP) data; and
- Metropolitan location – within a metropolitan statistical area (MSA) or not within a MSA (based on the largest population county within the PSU).

FNS was interested in comparing groups of States by their vendor management practices, which included contrasting States with large and small numbers of WIC vendors (based on the proxy of vendor-to-participant ratios). State-level vendor and participant counts from the fiscal year 1996 VAMP report were used to divide the population of WIC vendors into three approximately equal sized strata, based on the average number of participants per vendor for each State.

To determine whether fewer violations typically occur in States with vendor-specific FI systems, there was interest in comparing States using vendor-specific and open-food delivery FI systems. Crossing these two State-level stratification variables defined six primary strata. Appendix G displays the States that were assigned to each of the six primary strata, the number of vendors in the sampling frame, and the average State-level vendor-to-participant ratio. Also displayed in Appendix G is the distribution of the vendors in the sampling frame by the same six strata.

In addition, it was also important to control the sample of PSUs by whether or not they were located in a metropolitan area. PSUs in the sampling frame were classified as metropolitan if the largest population county of the PSU was part of a metropolitan statistical area (MSA). PSUs that were entirely composed of non-MSA counties were classified as non-metropolitan.

2. Selecting the Sample PSUs

Vendor-specific States included only about 20 percent of the vendors in the sampling frame. Equal overall selection probabilities would have led to selecting about 20 PSUs in these States and obtaining complete study data for only about 300 vendors from vendor-specific States. To meet the precision constraint for this analysis domain, sample PSUs in the vendor-specific States were sampled at twice the rate used for the States with open-food-instrument systems. This oversampling was implemented by adjusting the PSU size measures (number of WIC retail vendors) prior to selecting the sample PSUs.

The sample of 100 PSUs was selected using probability non-replacement sampling with probabilities proportional to size of the PSU. The size of the PSU was proportional to the number of WIC vendors in the PSUs, except for the 2:1 over-sampling in those States using vendor-specific WIC food instruments.

The PSUs within each stratum were sorted by their metropolitan status prior to selecting the sample PSUs, effecting an implicit stratification by metropolitan status. A probability minimum replacement selection procedure developed by Chromy (1979) was used to select 100 sample PSUs. The method allows multiple hits for those units whose expected sample size exceeds unity and restricts the realized number of hits for each unit.

3. Selecting the Sample Vendors

Following the selection of 100 sample PSUs, a probability sample of 1,800 vendors and a 200-vendor reserve sample was selected. First, a total sample of 20 vendors was selected from the vendor list within each of the 100 PSU sample selections. New York City, Los Angeles County, and San Diego County were multiple-hit PSUs, meaning more than one PSU was selected within their boundaries. Prior to the selection, vendors within each PSU were sorted by their monthly WIC redemption dollar amounts.

The 20 vendors were selected within each PSU using systematic sampling with equal probabilities and without replacement, effecting an implicit size stratification of the vendors. Then 18 of the 20 selected vendors within each PSU were randomly selected for the study sample, yielding a main study sample of 1,800 vendors and a 200 vendor reserve sample. The names and addresses of the 1,800 sample vendors, except those identified by States as out-of-business, no longer authorized, or under State investigation, were sent to the field for compliance buys.

D. Developing the Data Collection Instrument

A draft data collection instrument, called a compliance buy form (CBF), was developed which contained individual data elements to be collected at the vendor. The CBF was pretested in the Raleigh-Durham area of North Carolina on April 21-22, 1998. Sixteen WIC vendors were selected for one compliance buy each. Selections were made to ensure a cross-section of vendor types, including inner-city, suburban, rural, large, small, chain, and independent. Four data collectors were assigned to complete four different kinds of buys each. These included:

- A safe buy, where the buyer obtained all of the food items listed on the FI;
- A partial buy, where the buyer omitted some of the food items listed on the FI;
- A minor substitution, where the buyer attempted to obtain an unauthorized food item within a WIC food category (e.g., unauthorized cereals or juices); and
- A major substitution, where the buyer attempted to obtain an unauthorized item not within the WIC food categories (e.g., pasta instead of cereal).

After the data collectors finished their assigned compliance buys, donated the items purchased, and completed the CBF, they participated in a pretest debriefing on April 22. Several recommendations for improving the wording of certain questions and for facilitating accurate form completion were obtained at the debriefing. These recommendations were incorporated into a revised CBF that was submitted for final approval. Following several iterations to enhance the content and appearance of the CBF, it was finalized in July 1998 (see Appendix H).

E. Assembling the Data Collection Staff

Several unique challenges were presented in assembling a national staff of "compliance buyers," the title assigned to data collectors for the 1998 WIC Vendor Management Study. To successfully perform the required compliance buys, it was essential that the buyers reflect the physical characteristics of women who receive WIC benefits. This meant, for example, that all buyers had to be females of childbearing age. In addition, if data collectors were to perform their assignments without creating suspicion among vendors, it was also necessary for them to belong to one of the racial or ethnic groups of customers who regularly shop at those vendors. A total of 103 data collectors and six field supervisors were recruited during July and August 1998.

F. Training the Field Staff

During June, July, and August 1998, draft 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;
- Field Supervisor Training Agenda; and
- Compliance Buyer Training Agenda.

All field supervisors (6) and data collectors (103) were required to attend and complete a three-day training program in Raleigh, NC. To reduce the trainer/trainee ratio to an effective level, two training sessions were conducted during successive weekends in late August 1998. Half the field staff attended the first session; the other half attended the second.

One noteworthy component required each trainee to complete a "practice buy" at an authorized WIC vendor in the Raleigh area. On the final training day, trainees were required to locate and travel to the specified vendor, correctly conduct the compliance buy, properly complete the CBF, and report back to their field supervisor, who in turn reported to a data collection manager. Following successful completion of the practice buy and all other training requirements, trainees were certified as "compliance buyers" and declared ready to begin their field assignments.

G. Equipping the Field Staff

Each WIC State agency included in the sample was contacted to determine the appropriate food package to be included on a series of three food instruments for each sampled vendor and also to inform the State of data collector names to be imprinted on the FI. WIC State agencies issued the FI in the quantities required. Food instrument serial numbers were entered into a database. Food instruments were designated for use at a specific vendor and for the exact compliance buy for which it was to be used. For example, "Compliance Buyer #88335 will use FI # 987654321 at vendor #1234 for compliance buy #3A (minor substitution)." This information, along with the food instruments, was sent to the subcontractor on a flow basis, as food instruments were received from States.

Six thousand CBFs were printed, three each for the 1,800 sampled vendors and 200 reserve vendors. To simplify the data collector's role to the maximum degree possible, each form was pre-printed with the following identifying information:

- Vendor name, address, and zip code;
- Four digit vendor number (first two digits identified the PSU number; last two digits identified the vendor number within the PSU);
- Food Package (woman, infant, or child);
- Type of Buy (safe, partial, minor substitution, or major substitution); and
- FI serial number.

In addition to the above information, the foods listed on the FIs assigned for each compliance buy were manually pre-entered, along with their quantities and sizes (e.g., "Similac With Iron: 15, 13-ounce cans"). The correct FI to be used was also attached to each CBF. Each CBF was prepared through a process designed to eliminate decision-making by the field staff, which substantially enhanced data accuracy, and facilitated standardized buying procedures at all sampled vendors.

Data collectors were equipped with other WIC materials that enabled them to complete their purchases without arousing suspicion by vendor staff. States issued valid WIC identification cards for buyers, provided official copies of approved food lists, and identified charitable organizations to which data collectors could donate the items purchased.

A monetary advance was given to each compliance buyer for a cash purchase of $5 or less of non-WIC items. This procedure was implemented to replicate the normal buying patterns of WIC participants. Items purchased with cash were also donated to charitable organizations.

Each compliance buyer was responsible for the completion of three compliance buys at each assigned vendor. Data collectors, on average, were assigned 16-18 vendors, although some had considerably more and a few had less. Three buys were attempted at each vendor. The third buy was either a "Buy 3A" or a "Buy 3B," as preprinted on the CBF. The three assigned buys at each vendor were performed as follows:

Buy #1:	Safe Buy	Buyer purchased all foods listed on the food instrument in the quantities and types listed.
Buy #2:	Partial Buy	Buyer attempted to purchase some, but not all of the items listed on the food instrument.
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.

WIC FIs could be used only during a specified 30- or 31-day period. Data collectors were required to complete all three buys within the transaction period printed on the food instruments. To avoid arousing suspicion among vendor staff, buyers were instructed to allow five or more days between buys at each sampled vendor.

The primary tasks associated with a compliance buy entailed selecting the correct food items for the type of buy being undertaken, obtaining the shelf price of each item, presenting the FI at the checkout counter, and observing any violations of WIC program procedures. In addition, buyers purchased less than $5 of non-WIC items with cash. Immediately after the compliance buy, and away from vendor premises, buyers completed the CBF on which they recorded all pertinent details associated with the WIC transaction. All items purchased, WIC and non-WIC, were donated to charitable organizations, with one exception: in several States, buyers delivered their purchased infant formula to local WIC clinics.

Data collectors sent completed CBFs to their field supervisors twice a week. Field supervisors reviewed and approved the CBFs and shipped them via overnight freight for processing. In addition to sending CBFs, buyers reported progress to their field supervisors on a weekly basis, and supervisors, in turn, reported weekly to the data collection manager.

Data were collected during the Fall of 1998. The 30- or 31-day purchasing period varied, depending upon when States issued their food instruments. More than 90 percent of all compliance buys were completed during September and October, and all data collection was completed by mid-December.

H. Quality Control

Early in the data collection period, quality control teams made visits, some announced and some unannounced, to several data collectors to verify that the standardized buying procedures were being implemented and to debrief the buyers to determine whether any adjustments were in order.

Prior to conversion of handwritten information contained on the CBFs to an electronic data file, each CBF received three levels of review. Field supervisors reviewed and approved each of their data collectors' CBFs before sending them for processing. The data collection managers then reviewed and approved each CBF received from their field supervisors. Finally, data receipt staff edited each CBF for consistency and legibility before sending it on for keying. Any CBF failing approval at any of the three levels was returned to the data collector to be corrected.

Data entry was performed with 100 percent verification; that is, each CBF was independently keyed by two keyers. If both entered identical data, the system accepted the CBF as complete. If any differences arose between keyers, the system required successful resolution of the problem before the CBF was accepted into the data file.

FI redemption data were received electronically from some States, while others sent the processed FIs, which then needed to be read by a contract bank. Some States produced several files as FIs were processed periodically. Eventually, all files were merged to create a combined redemption file, which contained the serial number and amount of each FI, as well as date of redemption and the State-assigned WIC vendor number, if provided by the State.

After the CBF data were keyed, a computer program checked for errors and inconsistencies and calculated numerous variables from the data on the CBF (e.g., the product of the quantity and shelf price for each food item purchased, sum of the cost of all items in the purchase table). All CBFs with inconsistencies were pulled and manually reviewed. Following resolution of data inconsistencies, the file was corrected.

I. Survey Weights

The initial sampling weights for the 1,800 selected vendors were calculated based on the expected PSU sample sizes and the conditional vendor selection probabilities. If complete study data were obtained for all of the sampled vendors, these unadjusted weights would be 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 (see Table II-1).

Table II-1.
Vendor Eligibility Categories for All Vendors Included in the Sample

Eligibility Categories	Vendors	Percent
1. Out of business at first buy attempt	20	1.1%
2. Not authorized to accept WIC at first buy attempt	27	1.5%
3. Dropped - under State Investigation or Sanction	127	7.1%
4. Other non-eligible	1	0.1%
5. Eligible for inclusion in the study	1,625	90.2%
6. Total Sample Vendors	1,800	100.0%

The response rate for the 1,625 eligible vendors was determined for each of three buys (see Table II-2).

Table II-2.

Study Response Rates for All Vendors Included in the Study

Study Response	Vendors	Percent
1. Completed buy 1 (safe buy)	1,600	98.5%
2. Completed buy 2 (partial buy)	1,594	98.1%
3. Completed buy 3A or 3B (substitution)	1,580	97.2%
4. Completed all 3 buys	1,565	96.3%

Ineligible vendors were identified at the time of the first buy attempt, and their adjusted sampling weights were set to zero. The eligible in-sample vendors were partitioned into eight weighting classes (see Table II-3) so that those within each weighting class were as similar as possible. The weighting classes were defined using the State-level stratification variables of metropolitan classification, type of FI system, and ratio of WIC Vendors to WIC participants.

Table II-3.

Weighting Class Categories for All Vendors Included in the Study

Class	Metro	Food Instrument System	Vendor/Participant Ratio
1	Metro	Open	Low
2	Non-metro	Open	Low
3	Metro	Open	Medium
4	Non-metro	Open	Medium
5	All	Open	High
6	All	Vendor-specific	Low
7	All	Vendor-specific	Medium
8	All	Vendor-specific	High

The metropolitan classification variable was not used to subdivide classes 5 - 8 into separate weighting classes because the number of non-metropolitan vendors responding would have been too small, which could possibly lead to unstable adjustments for non-response.

The weights for the eligible in-sample vendors were adjusted by multiplying the initial weights for each vendor in weighting class-k (where k = 1, 2, ..., 8) by the ratio R(k) where:

> R(k) = [sum of initial weights for eligible vendors in weighting class k]/[sum of initial weights for all completed eligible vendors in weighting class k].

This weighting class procedure adjusts the sum of the survey weights, to compensate for those eligible vendors for which complete survey data were not obtained (i.e., those in which the compliance buys were not completed).

To the extent that the responses of respondents and non-respondents within the same weighting class tend to be similar, the adjustment procedure reduces missing data biases.

Several weights were computed to facilitate the planned analysis. The weighting class methodology was applied separately to compute adjusted survey weights (see Table II-4). A detailed description of the weighting procedures used in this study may be found in Appendix G.

Table II-4.

Adjusted Survey Weight Categories

Weight	Used for Analysis of:
WTBUY1	Data from buy 1 (safe)
WTBUY2	Data from buy 2 (partial)
WTBUY3A	Data from buy 3A (minor substitution)
WTBUY3B	Data from buy 3B (major substitution)
WTBUYS	Data from all 3 buys

J. Overview of Statistical Analysis Methods

The primary purpose of the WIC Vendor Management Study was to describe program violations committed by WIC vendors. In order to examine each of the areas described in Chapter I, two approaches to a quantitative description were used:

- **An examination of how WIC vendors conducted the transaction in response to the compliance buys**. The response of the vendors as it relates to properly conducting a WIC transaction were examined, particularly in regard to the vendors' disposition to overcharge or undercharge, commit administrative errors, and allow buyers to make minor or major substitutions. These statistics take the form of frequencies and distributions, showing the vendors' actions over a wide variety of demographic variables.

- **The relationship, if any, between a WIC vendor's improper conduct of a WIC transaction and variables associated with State vendor management systems**. Multivariate analysis was conducted to examine whether store demographics (e.g., store size, locale) or State vendor system demographics (e.g., vendor-to-participant ratio, open versus vendor-specific) had any statistically significant relationship to vendor practices.

A total of 36,754 vendors are represented in the analysis. These vendors represent the survey population: all WIC retail vendors in the 48 contiguous States and the District of Columbia excluding States with direct distribution food delivery systems (Mississippi) and home food delivery systems (Vermont and parts of Ohio).

In addition, after the sample was drawn, it became apparent that one additional State needed to be excluded. The North Dakota State Agency utilizes a system by which all of the milk issued to a participant is placed on a single FI. If participants choose not to purchase all of the milk at one time, they are given a special "raincheck" by the store which allows them to return at a later date to pick up their remaining milk. Because the methodology used for this study required that different types of buys must be conducted at each visit, and because the approach used by North Dakota was determined to be unique, vendors in a single PSU located in North Dakota were excluded from the study.

As previously described, weights were calculated for vendors where each type of buy occurred and for vendors where all three buys were completed. When results are described as computed *across all buys* this indicates that calculated weights are describing vendors where all three buys were completed. Since this type of analysis essentially multiplies the number of vendors by three (since there were three buys made at each vendor), results for each vendor were averaged (divided by three) in order to generate an estimate that for each vendor reflects the actual number of vendors who participated in this study. For example, if a vendor had insufficient stock during one of three buys that result (i.e., insufficient stock) was divided by three.

Totals generated in this context are labeled as "average totals" to refer to this process. In the instances for which totals were generated for each buy type, these totals are simply labeled as totals.

1. Descriptive Analysis

Descriptive analysis used for this study entailed use of common summary statistics, mostly estimated frequencies, standard errors associated with weighted estimates, percentages and the standard error of percentages. The focus of attention in this analytic context is restricted to a description of the proportion of vendors that can be categorized as problematic (i.e., the percentage of vendors committing errors or violations of WIC program procedures). The statistics reflecting compliant actions on the part of the vendor are often omitted but can easily be determined by subtracting the non-compliant responses from the total number of responses.

In this study the descriptive analysis addressed the frequency of occurrence and percentage of vendors who overcharged, undercharged, and committed various administrative errors and other recognized violations of WIC program procedures. The violations were further examined as a function of demographics, other types of errors, and other types of common practices. For example, after describing the distribution of overcharges, the frequency of an overcharge as a function of vendor size or location is described. Similarly, the distribution of an overcharge as a function of administrative errors (e.g., insufficient stock and violation of the FI countersignature procedures) was addressed.

Finally, differences in the frequency of a violation as a function of common vendor demographics, such as use of scanning equipment and provision of receipts, were examined.

Differences in WIC vendor responses to the aforementioned factors were also subjected to statistical testing, most often *t* statistics derived from contrast analysis. A significant *t* statistic indicates that the difference in proportions between various variable categories were probably *not* due to chance or random fluctuations. Levels of significance for this study are set at 0.05 and 0.01. Throughout this report * and ** denote 0.05 and 0.01 levels of significance, respectively.

Essentially, these *t* statistics, like the more commonly used chi square statistic, effectively describe a difference of proportions test. For variables that have more than two categories, contrast analysis was especially advantageous (compared to the chi square analysis) since it permitted comparison of specific variable values or categories. For example, in the comparison of overcharge as a function of food package (FI type), a contrast analysis permitted the specific comparison of infant food packages to the woman food packages, and/or each of those to the child food packages, while the chi square simply indicates that there is a significant difference in overcharge as a function of food package. Although it is always possible to simply describe the distribution of overcharge as a function of specific food package categories, a contrast analysis enables ready identification of which differences are statistically significant. For a simple two-by-two comparison, results obtained by contrast analysis and chi square were essentially equivalent.

2. Multivariate Analysis

Multivariate statistical techniques facilitate identification of relevant associations between variables. For example, when examining a variable such as vendor overcharge, it is of interest to analyze whether or not there is a relationship between the size of a vendor and their proclivity to overcharge. Through the use of multivariate statistical techniques, it is possible to estimate both the relationship between one variable and another, such as the raw number of vendors of different sizes who

overcharge, as well as the extent to which a variable such as vendor size contributes to overcharging (statistical significance).

It is also possible to develop multivariate models. For example, State agency vendor managers may be interested in predicting the likelihood that a vendor will overcharge on a WIC transaction. The State might predict whether a vendor will overcharge with one variable (e.g., vendor location), but a more accurate prediction may be made if more than one variable is analyzed (e.g., vendor location, vendor history of overcharging WIC, and vendor's use of scanners). Therefore, multivariate models examine the extent to which a number of variables combine to predict an outcome. In the above example, it may be found that the presence of three variables (e.g. rural vendors of small size who do not use scanners) may be highly predictive of whether a vendor will overcharge.

In this study, multivariate statistical techniques were used to derive estimates of the relative contribution of assorted independent variables (e.g., vendor demographics such as locale, size, and vendor-to-participant ratio) to some dependent variable (e.g., overcharge, undercharge, administrative error, or other program violation). The model building approach used entails comparison of single variable models developed in accordance either with past performance in similar studies, or hypothesized performance in this context. Selected variables were then concurrently entered into a new equation. Variables were eliminated from consideration in multivariate models when it was determined that they lacked predictive power, had no conceptual justification for retention, or appeared methodologically problematic for some other reason (e.g., questionable reliability and/or validity).

Several criteria were used to evaluate model performance. First, consideration was given to parsimony. The simplest models (with the fewest number of variables), explaining substantial amounts of variation in the dependent variable of interest, were preferred. Consideration was also given to the dynamic interplay between component variables. Identification and discussion of various interactive processes that affected the interplay between variables also constituted a focus of attention.

Multivariate results are presented after the discussion of a descriptive analysis of overcharge by vendors. Discussion of single variable models is introduced as a preamble to more complicated model building. These analyses can facilitate discussion of measurement problems that may be inherent to a given variable. In other words, some variables may have proven to be ambiguous or unreliable as valid measures. As previously discussed, such variables could be eliminated from further consideration or continue to receive *qualified* consideration in subsequent model development. In addition, ancillary analysis, designed to elucidate the significance of variable interactions, is introduced as necessary.

Results of the data analysis are detailed in the subsequent chapters. To facilitate displaying of the findings, each chapter contains text descriptions and graphic representations. Detailed data tables supporting the findings are included in the appendices.

CHAPTER III

Demographics of the Study Population

This chapter describes the demographic variables of the vendors selected for inclusion in the study. Data to support each of the variables described were collected through a variety of means. For example, data used to determine the location of the vendor (i.e., metropolitan/non-metropolitan) were collected when developing the sampling plan through use of zip codes. Data regarding whether the vendor operated in a State using a vendor-specific or open system were obtained from the States. Finally, much of the data describing the vendor were collected in the field by the data collector at the time of the compliance buy. Table III-1 below displays the major variable categories and the data sources for each.

Table III-1.

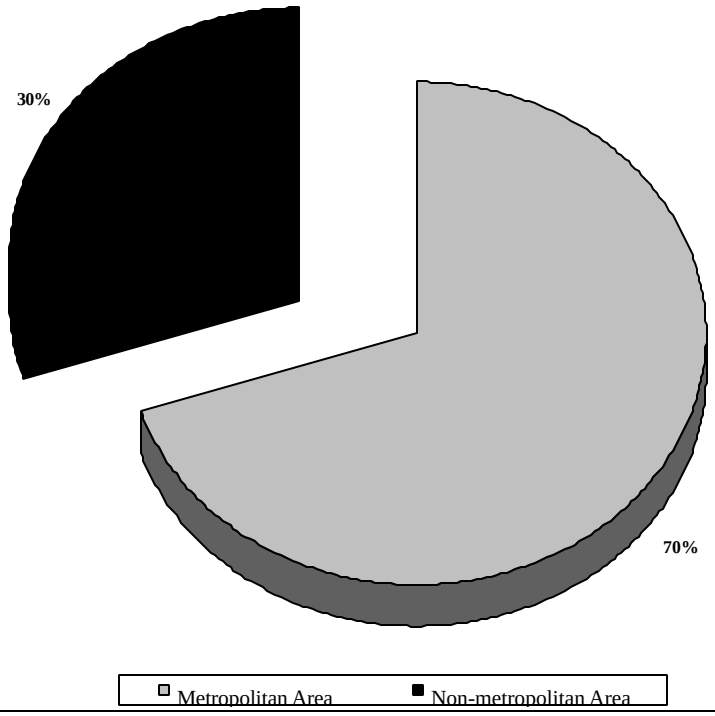
Source of Demographic Variables Included in the Study

Variable	Source
Open vs. vendor-specific FI system	State Plans
Vendor location (Urban/Rural) Vendor redemption volume (Vendor size)	Vendor Lists and Activity Reports From State
Number of cash registers Vendor use of scanning equipment Cashier familiarity with WIC transactions Vendor stock levels Provision of receipt	Field Data Collection

A. Metropolitan and Non-metropolitan Areas

The sampling plan was designed to ensure vendor representation from both metropolitan and non-metropolitan geographic areas. Figure III-1 displays the distribution of the study vendors with regard to their locale. As can be seen from the figure, 70 percent of the WIC vendors surveyed were located in metropolitan locations (see Table A-1 in Appendix A).

Figure III-1.
Distribution of WIC Vendors Included in the Study by Locale



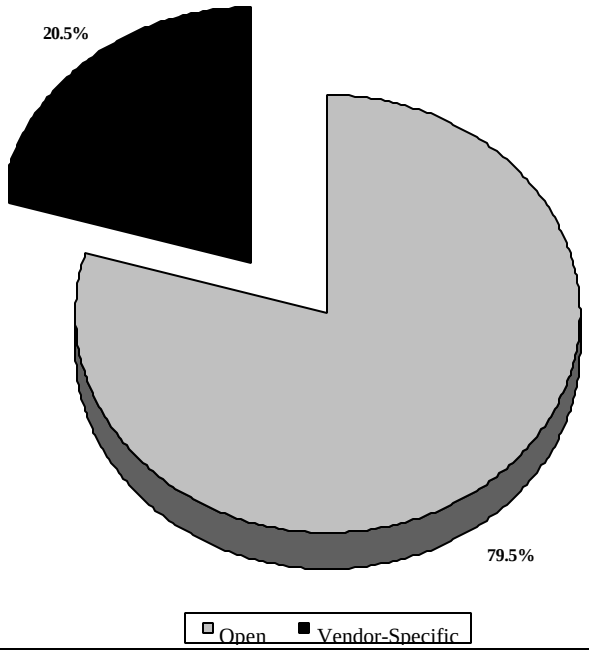
B. Vendor Classifications

Of the vendors selected for the study, 97.8 percent were classified by States as "grocery stores" while 2.2 percent were classified as "pharmacies" (see Table A-3 in Appendix A). Pharmacies were included in the study as most States permit pharmacies to provide infant formula to participants. For purposes of analysis and weighting, pharmacies were treated the same as any other WIC vendor visited by a data collector.

C. Vendor-Specific Versus Open Food Instrument Systems

One of the key variables examined in the study was the relationship between the type of food instrument system selected by the State and the extent to which it might contribute to vendor violations. As indicated in Chapter II, vendors located in vendor-specific States were oversampled to ensure adequate representation. Figure III-2 shows the distribution between vendor-specific and open system States selected in the study sample (see Table A-2 in Appendix A).

Figure III-2.
Distribution of WIC Vendors Included in the Study by Type of Food Instrument System

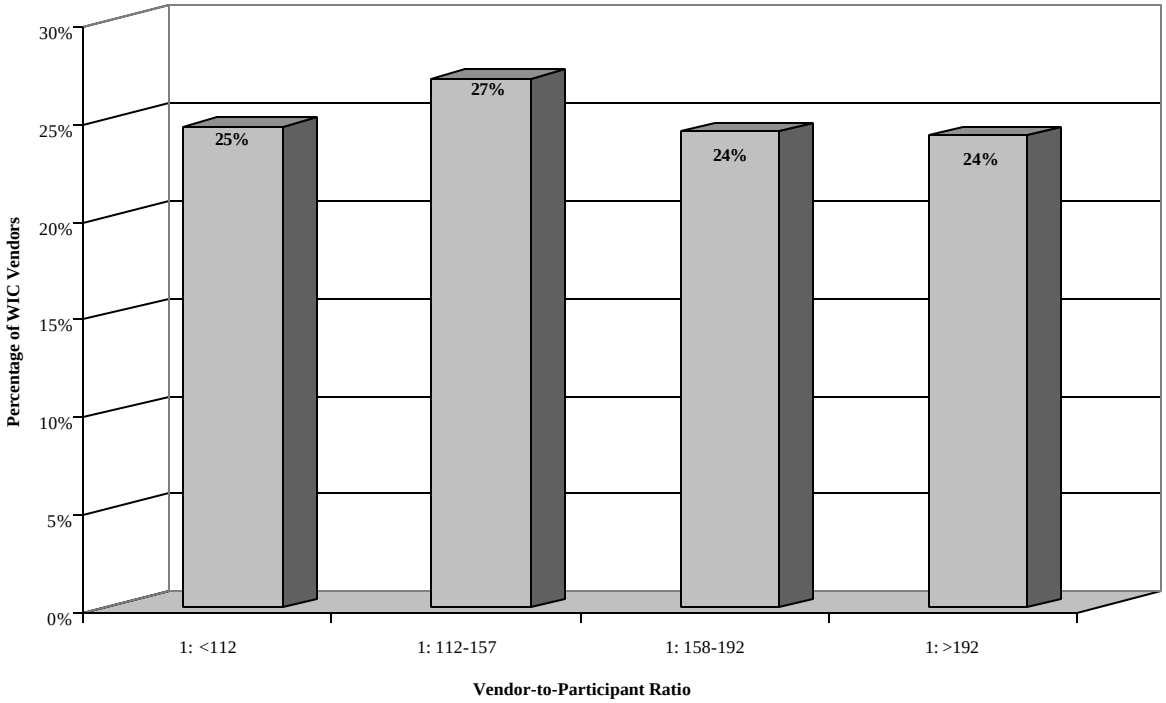


D. Vendor-to-Participant Ratio

One of the important factors that some States consider when authorizing vendors is the overall ratio of vendors to participants. FNS has traditionally believed that having fewer vendors to manage is a key factor in improving State vendor management systems. To examine whether or not the vendor-to-participant ratio has an impact on vendor practices, data was collected from the 1996 VAMP report to establish vendor-to-participant ratios for all of the study States. Vendor-to-participant ratios were

then divided into four categories, each with approximately 25 percent of the study population (see Table A-4 in Appendix A). Figure III-3 displays the distribution of vendors by the four categories of vendor-to-participant ratio.

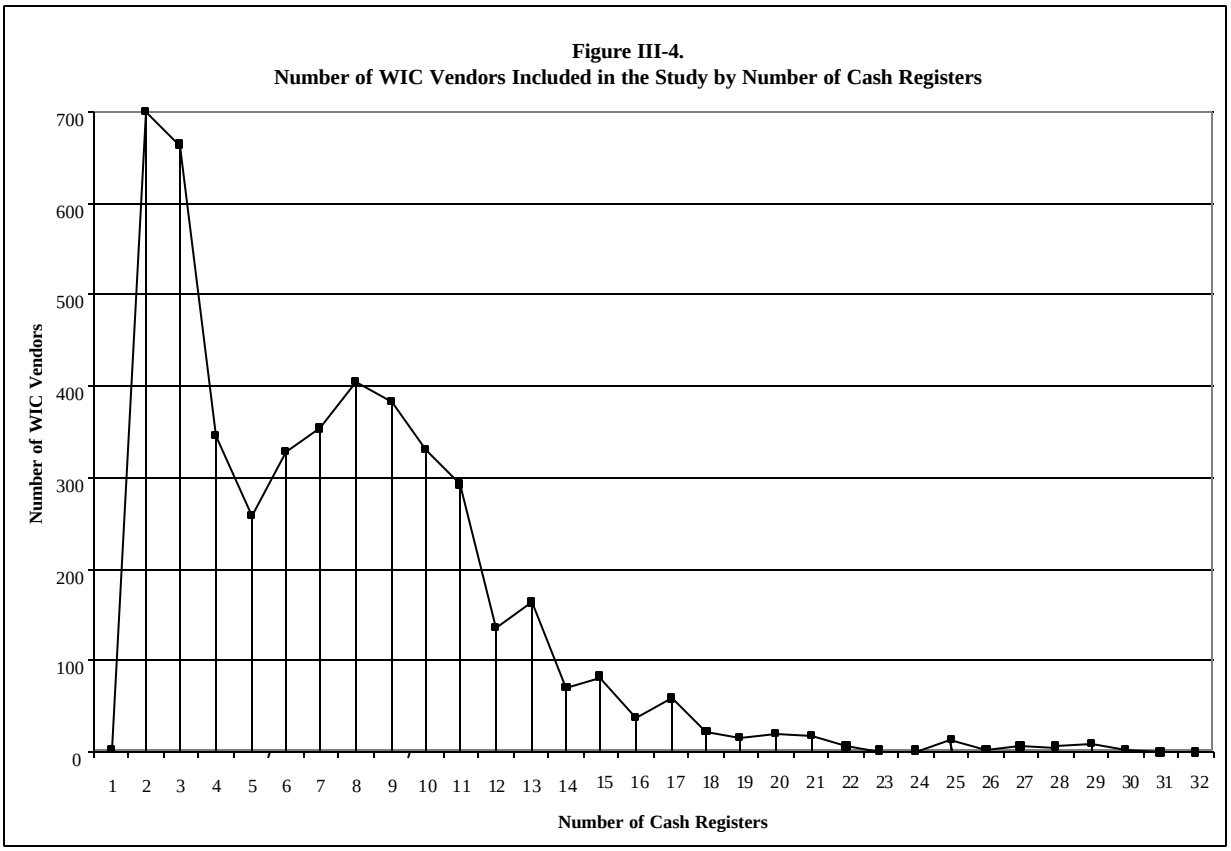
Figure III-3.
Distribution of WIC Vendors Included in the Study by Vendor-to-Participant Ratio Categories



E. Vendor Size

The number of cash registers in the store was used as a proxy for the physical size of the WIC vendor. A frequency polygon was developed to display the range of vendors with different numbers of cash registers. This polygon is displayed in Figure III-4, showing the number of cash registers ranged from 0 to 32 with a mean of 6.0 registers.

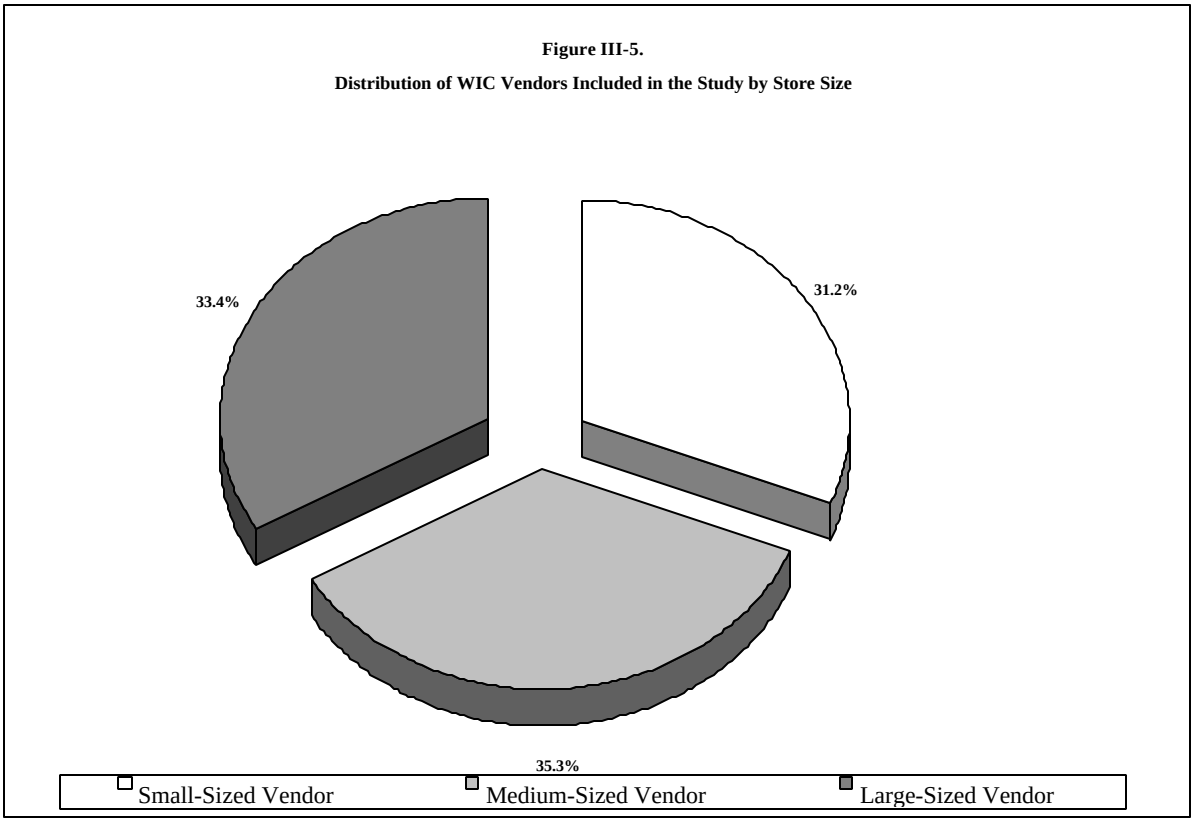
Figure III-4.
Number of WIC Vendors Included in the Study by Number of Cash Registers



The number of cash registers was categorized into three levels to create small (0-2 registers), medium (3-7 registers) and large-sized vendors (more than 8 registers). These size levels were determined early in the analysis and based on information contained in WIC State Plans, which described categorization of WIC vendors by size for vendor monitoring purposes. Figure III-5 displays the distribution of vendors by size categories, each of which accounted for about one-third of the vendors surveyed (see Table A-5 in Appendix A).

Figure III-5.

Distribution of WIC Vendors Included in the Study by Store Size



F. Vendor Use of Scanning Equipment

The vendors' use of scanning equipment when conducting a WIC transaction was also examined to determine how the use of scanning equipment is related to program compliance. Of the total vendors surveyed, 27.4 percent of vendors did not have the equipment to scan the WIC transactions. Another 3.6 percent of WIC vendors had scanning equipment but chose not to use it during the compliance buys. The remaining 69.1 percent of the WIC vendors used scanning equipment during all three compliance buys (see Table A-6 in Appendix A). Figure III-6 displays the distribution of all WIC vendors in the study based upon their use of scanning equipment. As shown in Figure III-7, among vendors with no scanning equipment, 86.4 percent were small sized vendors, and 0.2 percent were large vendors. The number of vendors with scanning systems programmed to flag WIC–approved foods was not examined in this study.

Figure III-6.

Distribution of WIC Vendors Included in the Study by Use of Scanning Equipment

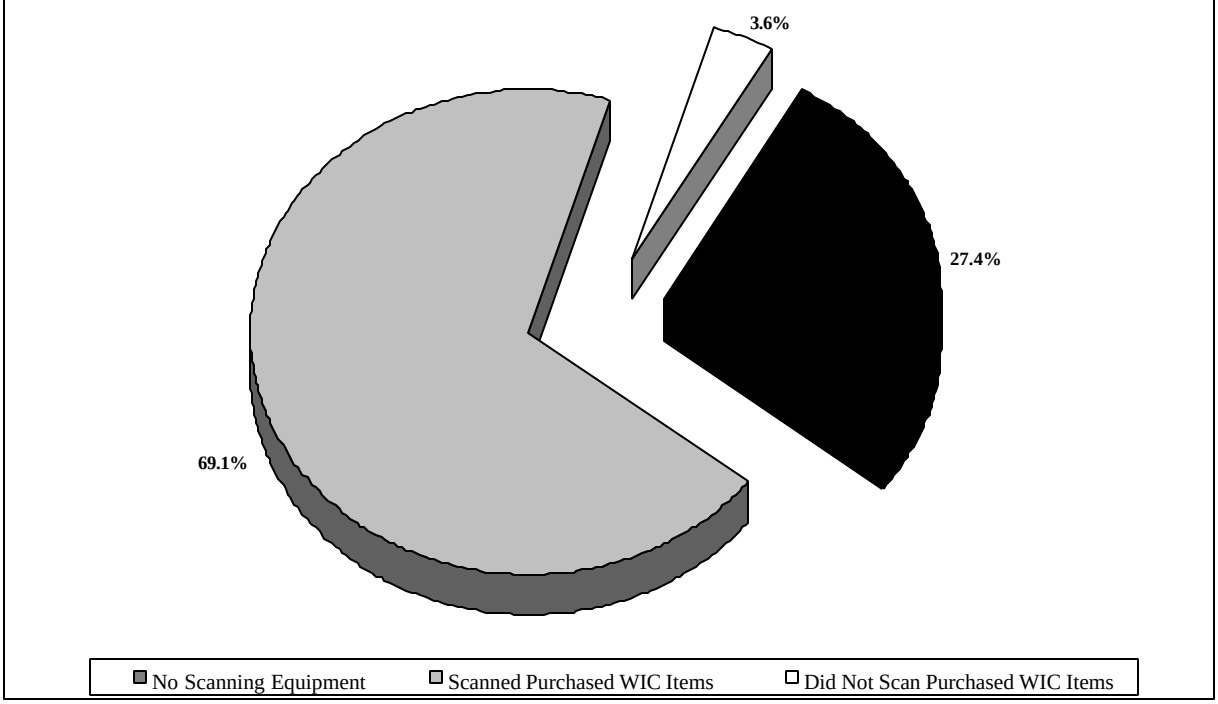
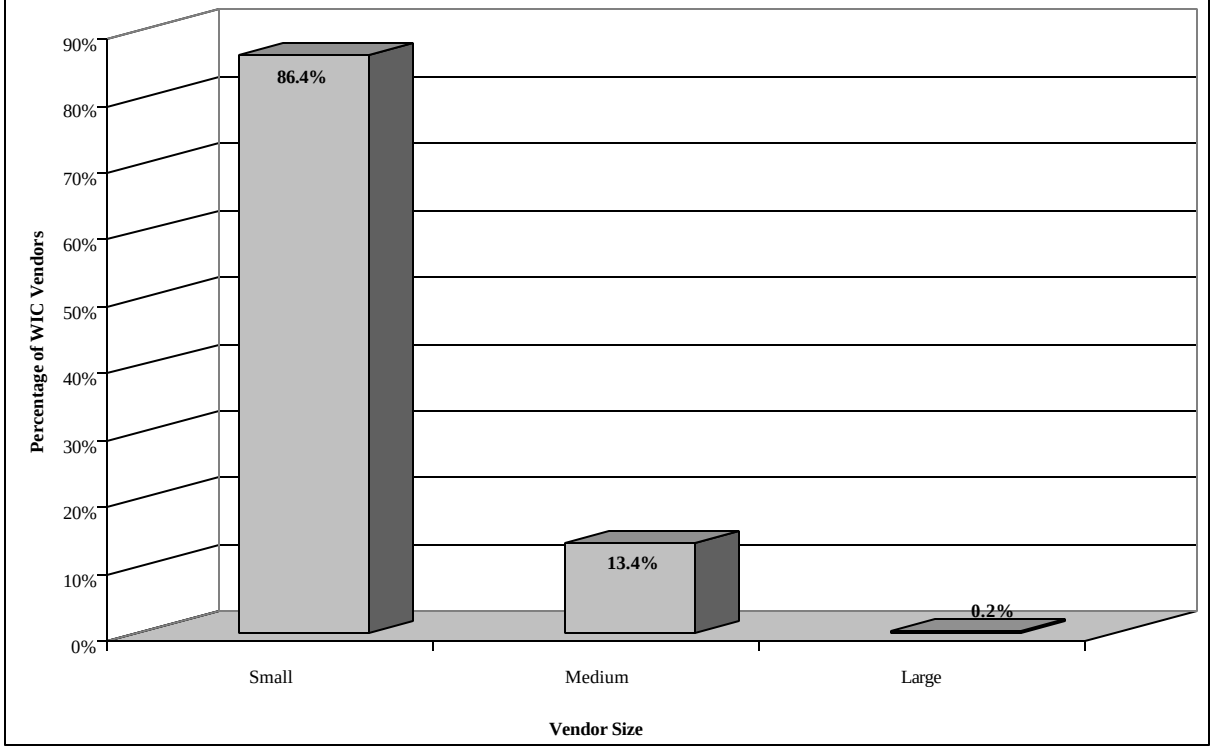


Figure III-7.

Distribution of WIC Vendors Included in the Study with No Scanning Equipment by Vendor Size



G. Cashier Familiarity with WIC Transactions

The cashier's familiarity with WIC transactions was also examined. While it was not possible to determine actual cashier experience, the study identified situations that might lead one to conclude that the cashier may not be familiar with WIC transactions. These situations follow:

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

Using the above criteria for determining cashier inexperience or unfamiliarity, Figure III-8 shows that 8.0 percent of the vendors had cashiers providing some indication they were unfamiliar with the conduct of a WIC transaction (see Table A-7 in Appendix A). Of interest also was how the data collector determined that the cashier was not familiar with a WIC transaction. Figure III-9 displays the percentage of vendors with a cashier indicating a lack of familiarity with a WIC transaction, by the type of indicator identified by the data collector (see Table A-8 in Appendix A).

Figure III-8.

Distribution of Vendors Included in the Study by Cashier's Indication of Inexperience with WIC Transaction Procedures

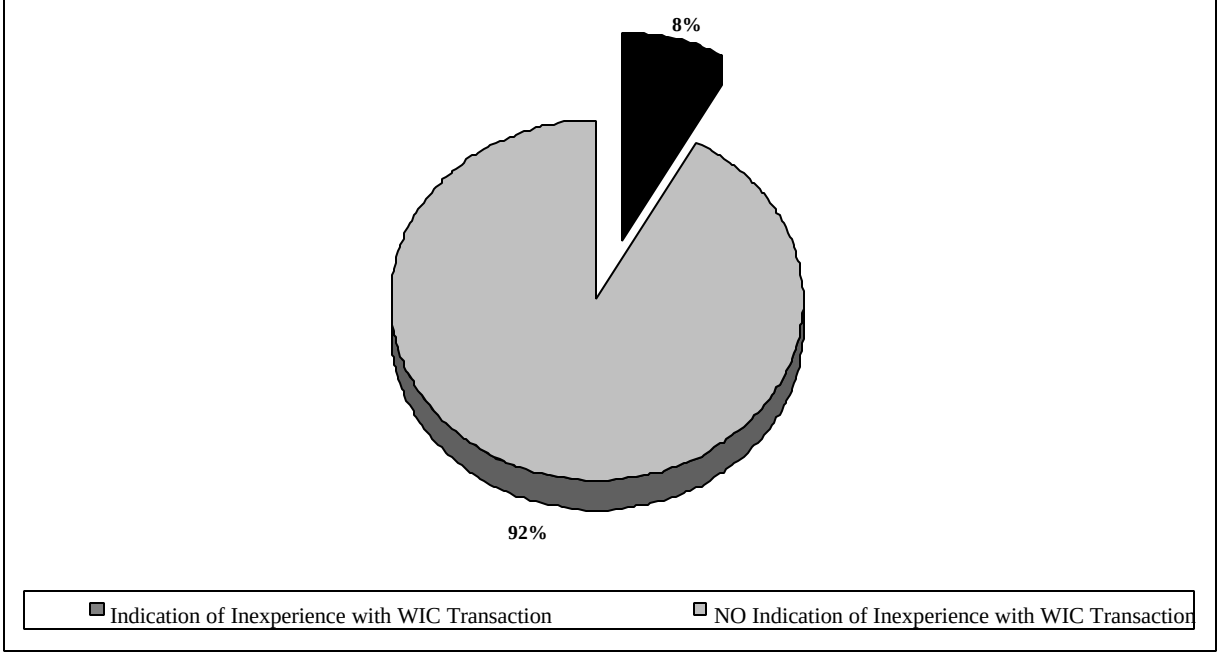
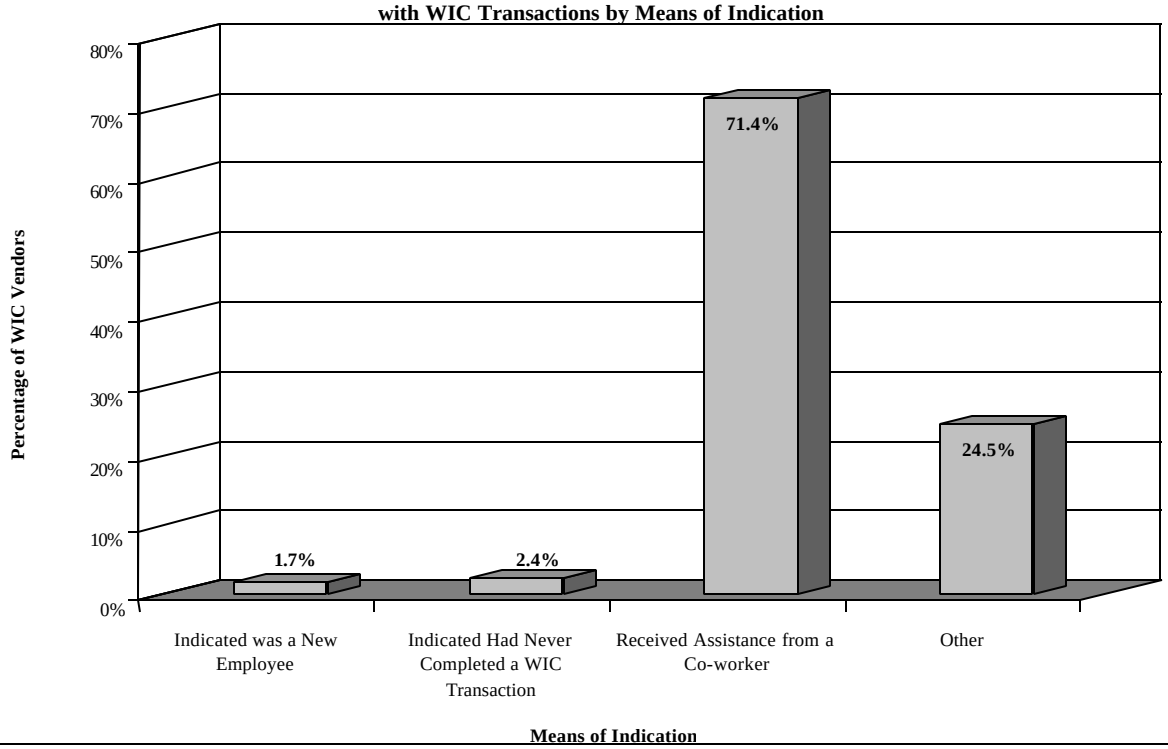


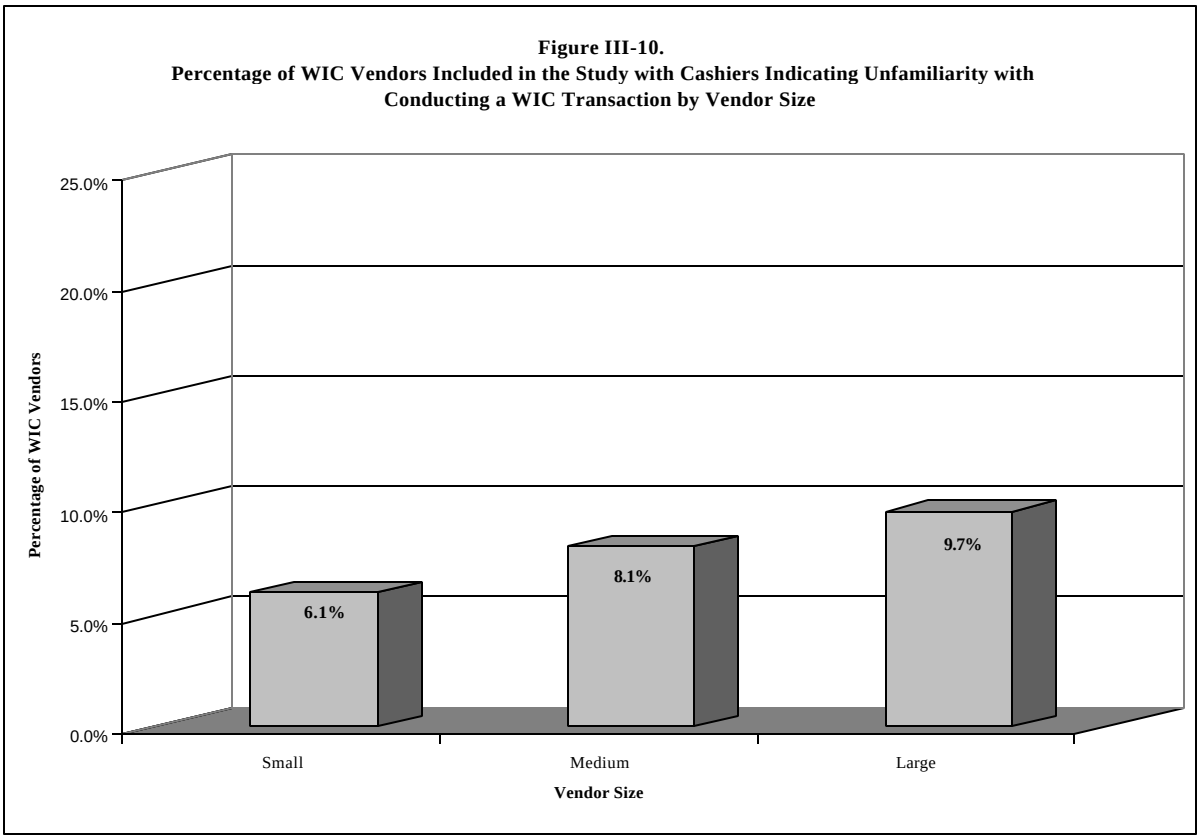
Figure III-9.

Distribution of WIC Vendors Included in the Study with a Cashier Indicating a Lack of Familiarity with WIC Transactions by Means of Indication



Also examined was the relationship of vendor size to cashier inexperience with WIC transactions. As shown in Figure III-10, the relationship between size of vendor and indication of inexperience with conducting a WIC transaction was examined. For each of the levels of vendor size less than 10 percent of the vendors had cashiers indicating inexperience with WIC transactions.

Figure III-10.
Percentage of WIC Vendors Included in the Study with Cashiers Indicating Unfamiliarity with Conducting a WIC Transaction by Vendor Size



This chapter has presented the demographic profiles of the WIC vendors included in the study. Additional information can be found in Appendix A. In the next three chapters, the relationships between these demographic variables and the findings related to vendor administrative errors, vendor overcharges, and vendors allowing substitutions of ineligible foods are examined.

CHAPTER IV

Findings Related to Vendor Administrative Errors

In an attempt to curb vendor fraud and abuse, all States establish administrative procedures that the vendor must follow in order to complete a WIC transaction. While some of these administrative procedures vary slightly from State to State, a limited number of program rules and administrative procedures are common to all States included in the study. In this chapter, an identified set of program rules were examined to determine the extent to which vendors were following proper WIC transaction procedures.

For the purpose of this study, the improper conduct of a WIC transaction was considered an administrative error. The following categories of administrative errors were examined:

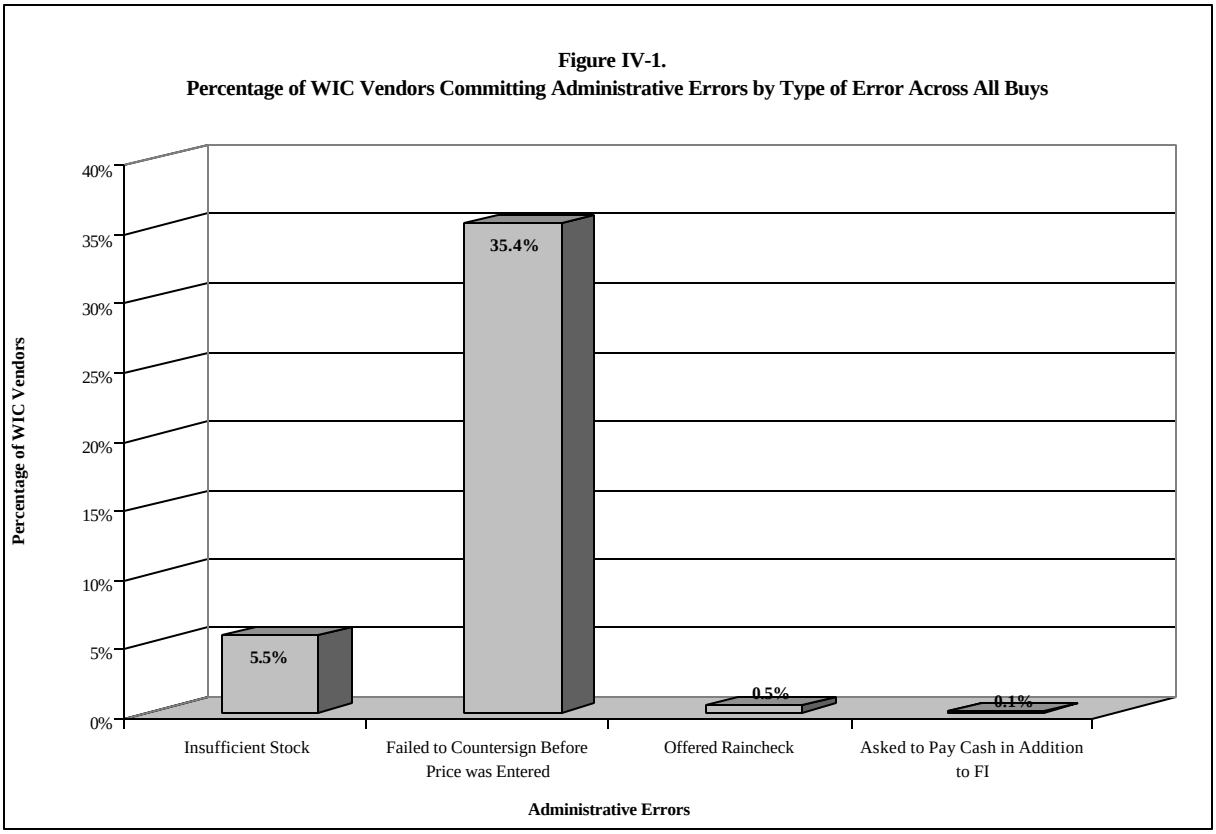
- Having insufficient stock to allow the buyer to purchase the food items listed on the FI;
- Requiring the participant to sign the FI prior to entering the purchase price;
- Offering rain checks for foods not available; and
- Asking the buyer to pay cash in addition to the FI for obtaining the WIC food items listed on the FI

In addition, while not considered an administrative error in all States, the study examined the provision of a receipt to the buyer.

Administrative errors were examined over three buys at each vendor. Figure IV-1 displays the overall results for each of the four administrative errors examined. Overall, the percentage of vendors committing administrative errors over the three buys was relatively low with the exception of following

proper FI countersignature procedures (Table B-2 in Appendix B), which occurred among 35.4 percent of the vendors.

Figure IV-1.
Percentage of WIC Vendors Committing Administrative Errors by Type of Error Across All Buys



As no significant differences in the level of administrative errors were found as a function of the type of buy conducted, analysis for variables by individual buy type was not included. The extent to which vendors committed each of the above categories of administrative errors are discussed in the remaining sections of this chapter.

A. Requiring the Participant to Sign the Food Instrument Prior to the Cashier Entering the Purchase Price

During the compliance buys, the buyers were asked to observe at what point during the WIC transaction the cashier asked the buyer to sign the FI. Failure to follow proper transaction procedures was noted if the cashier had the buyer sign the FI prior to ringing up the WIC purchase; had the buyer

sign the FI after the WIC purchase was rung up, but prior to entering the purchase price; or if the buyer was not asked to sign the FI. This is important because the failure of the WIC participant to sign the FI after the purchase price was entered was found to be a significant predictor of vendor overcharge in prior studies.

When estimating the percentage of vendors who failed to follow proper FI countersignature procedures, two different aspects of this problem were examined. These two methods are described below:

- **First, the *rate* of vendor errors was examined**. The term "*rate*" was defined as the percentage of vendors who were likely to violate the FI countersignature procedures on any single round of buys, over a three-buy period. Because some vendors violate the procedures only on one round of buys, while other vendors violate twice or all three times, it is necessary to average the number of violations that occurred each of the three rounds. This "*rate*" of violation predicts the percentage of vendors who are likely to violate during any single round of buys. The rate of vendor violations of proper FI countersignature procedures was 35.4 percent. This means that if a single round of compliance buys were to be conducted on 1000 WIC vendors, 354 would be likely to violate proper FI countersignature procedures.

- **Second, the *frequency* of vendor errors was examined**. *Frequency* was defined as the likelihood that a vendor would violate the FI countersignature procedures one or more times over a three-buy period. To measure the *frequency* of vendor violations, vendors were grouped into the four categories displayed in Figure IV-2. A total of 47.6 percent of the vendors never violated the FI countersignature procedures, while 24.5 percent violated once, 18.7 percent violated on two of the three buys, and 9.2 percent violated the procedures during each of the three buys (Table B-2 in Appendix B).

The difference between the rate and frequency is explained by viewing the rate as the likelihood of a vendor violating the FI countersignature procedures on a single round of buys, and the frequency is the likelihood of a vendor violating the FI countersignature procedures one or more times over three compliance buys. If one wishes to predict the likelihood of a vendor violating the FI countersignature procedures on any given set of buys, the best method is to use the *rate*.

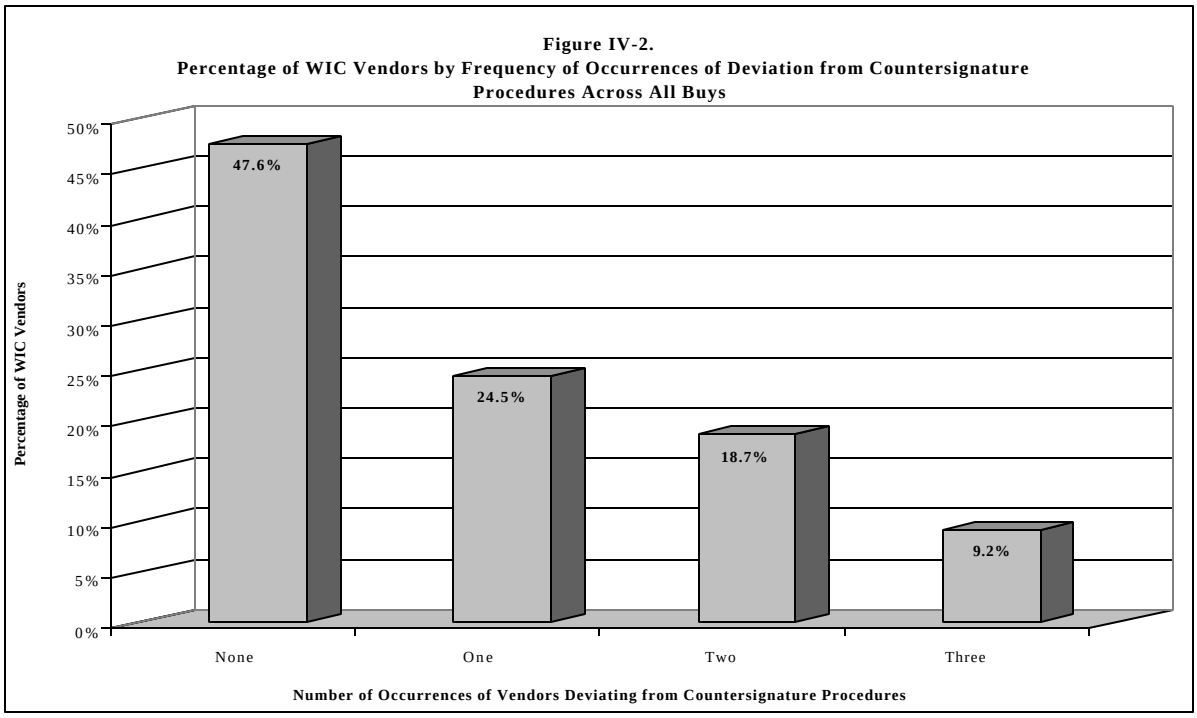
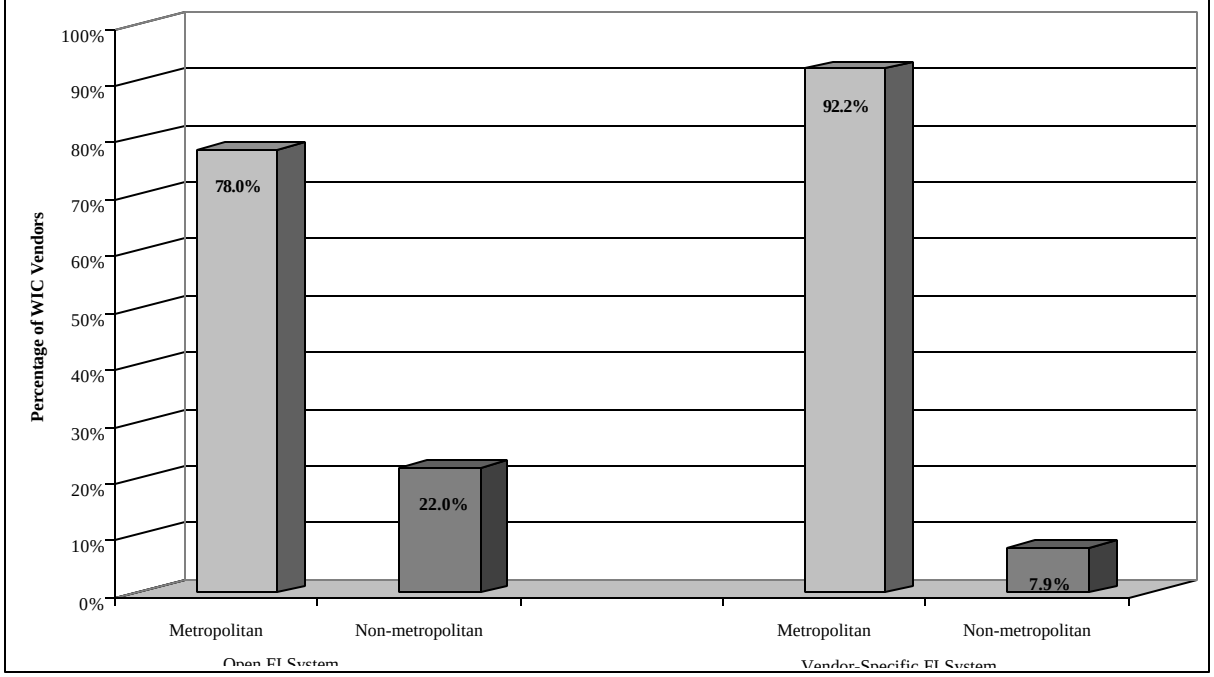


Figure IV-3 displays the percentage of vendors not following proper FI countersignature procedures by locale and by type of food instrument system. For open-FI systems, 78 percent of the vendors who failed to follow proper FI countersignature procedures were located in a metropolitan locale while 22 percent were located in a non-metropolitan locale. For vendor-specific FI systems, 92.2 percent of the vendors who failed to follow proper FI countersignature procedures were located in a metropolitan locale while only 7.9 percent were located in a non-metropolitan locale.

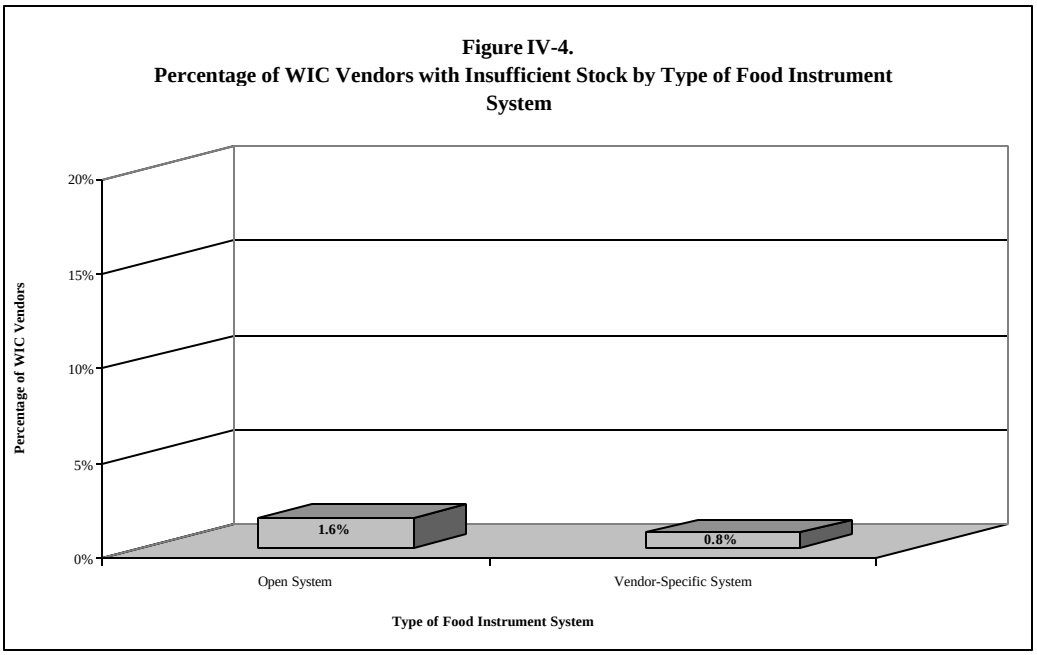
Figure IV-3.
Percentage of WIC Vendors Deviating from Countersignature Procedures by Food Instrument System and Locale Across All Buys



B. Insufficient Stock of WIC-Authorized Foods

Most States require that WIC vendors maintain a sufficient stock of WIC-authorized foods in order to ensure that participants can purchase all of their prescribed foods without having to repeatedly return to the vendor or visit multiple vendors. Insufficient stock violations include not having sufficient stock of a particular food item (e.g., milk, cereal) to fill the participant's FI or not having the correct brand or proper size as prescribed on the FI. As noted previously in Figure IV-1, 5.5 percent of all WIC vendors did not have sufficient stock to allow the buyer to purchase all of the WIC-authorized foods prescribed on the FI.

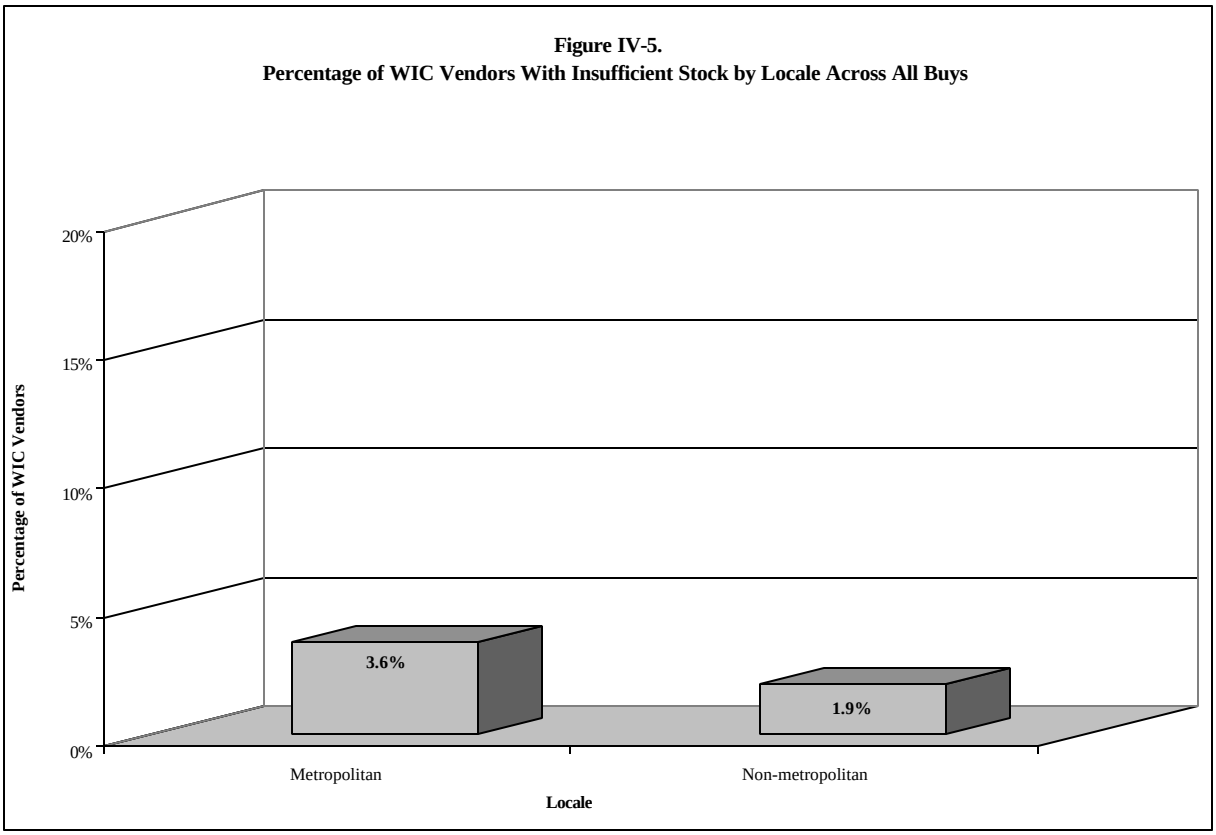
Figure IV-4.
Percentage of WIC Vendors with Insufficient Stock by Type of Food Instrument System



Because participants in vendor-specific FI systems must use their FIs only at a single specified vendor, it was of interest to examine the percentage of vendors with insufficient stock by the type of FI system in which they operated. As can be seen by Figure IV-4, vendors operating in open FI system States (1.6 percent) were more likely to have insufficient stock during at least one of the buys than those in vendor-specific FI system States (0.8 percent) (Table B-4 in Appendix B).

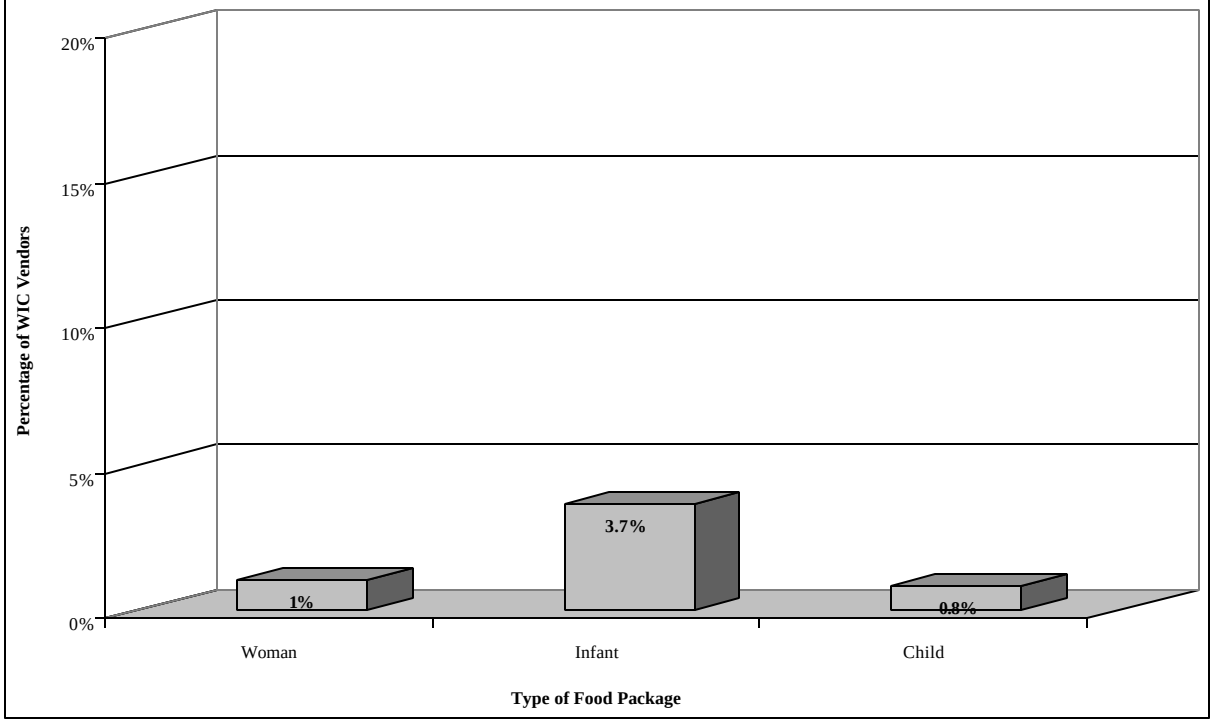
The study also compared the percentage of WIC vendors with insufficient stock by vendor locale. Figure IV-5 shows that vendors located in metropolitan areas (3.6 percent) were more likely to have insufficient stock during at least one of the buys than vendors located in non-metropolitan areas (1.9 percent) (Table B-3 in Appendix B).

Figure IV-5.
Percentage of WIC Vendors With Insufficient Stock by Locale Across All Buys



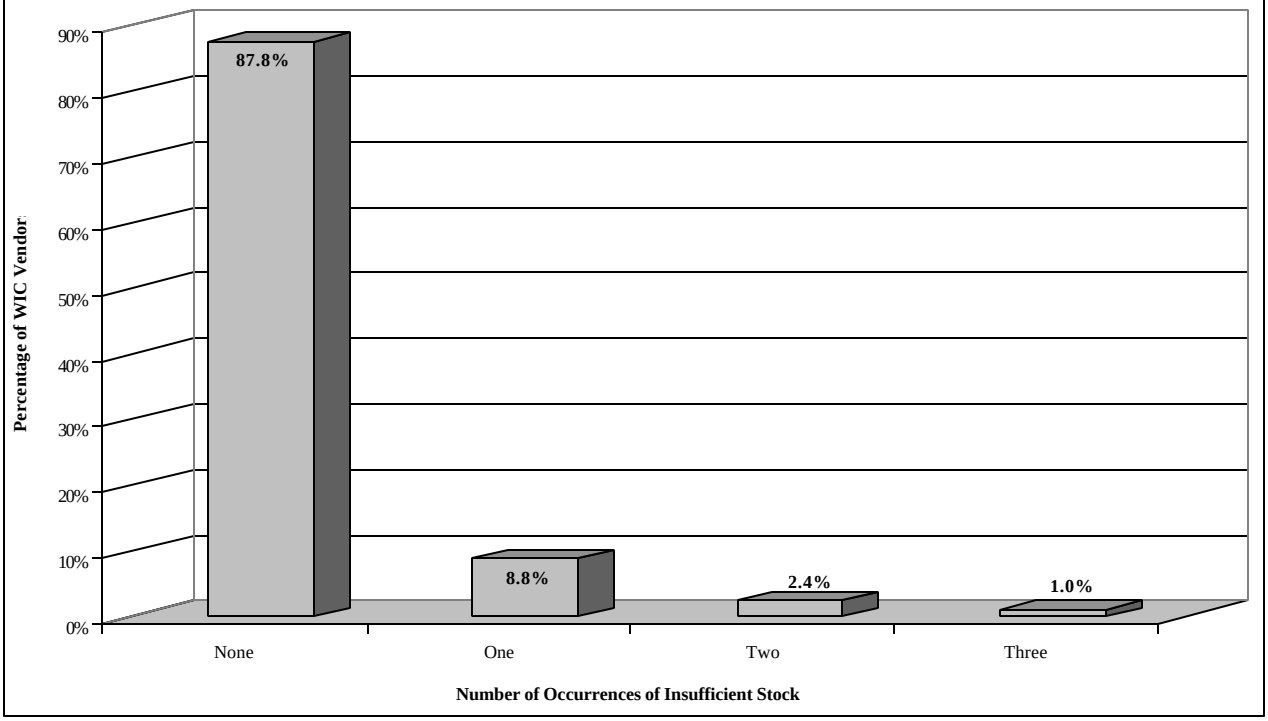
Analysis was also conducted to determine the type of food package for which the vendor was most likely to be out of stock. Figure IV-6 displays the percentage of vendors who were out of stock for each of the three WIC food packages. WIC vendors were more likely to be out of stock for items in the infant food package (3.7 percent) as compared to items in the woman food package (1.0 percent) or the child food package (0.8 percent) (see Table B-5 in Appendix B).

Figure IV-6.
Percentage of WIC Vendors With Insufficient Stock by Type of Food Package Across All Buys



This study also examined how well WIC vendors maintained sufficient stock over all three of the compliance buys. Figure IV-7 displays the percentage of these vendors who either always had sufficient stock during all three buys, or had insufficient stock during one or more of the three buys. As shown, 87.8 percent of these vendors always had sufficient stock while 1.0 percent violated the requirement during each of the three buys (Table B-2 in Appendix B).

Figure IV-7.
Percentage of WIC Vendors by Frequency of Insufficient Stock Across All Buys



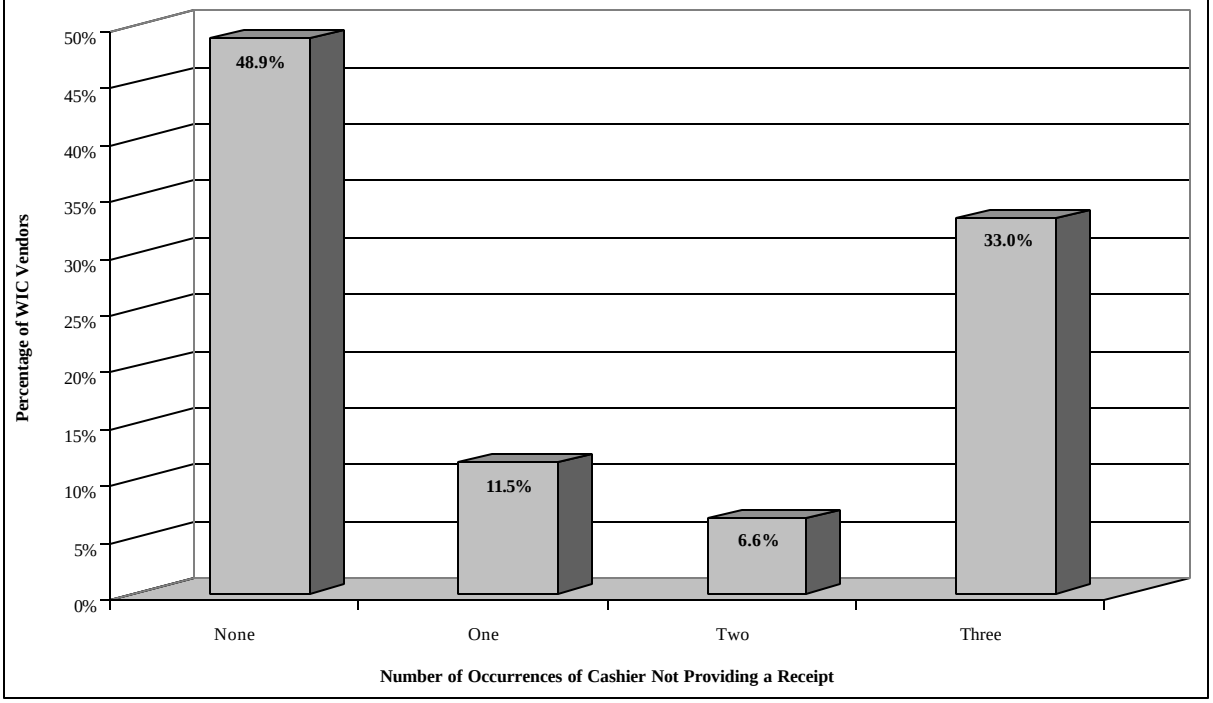
C. Vendors Offering Rain Checks and Requiring Buyers to Pay Additional Cash

As previously noted in Figure IV-1, WIC vendors offering rain checks to buyers or asking buyers to pay additional cash had occurred infrequently. As this resulted in a small unit of comparison, limited analysis was conducted. However, there was an interest in examining the types of WIC food items for which vendors were most likely to offer rain checks. The percentage of all vendors offering rain checks by the type of food package was also examined. WIC vendors were more likely to offer a rain check for items in the infant food package (0.4 percent) as compared to items in the woman food package (0.1 percent) or the child food package (0.01 percent).

D. Provision of Receipts to Buyers

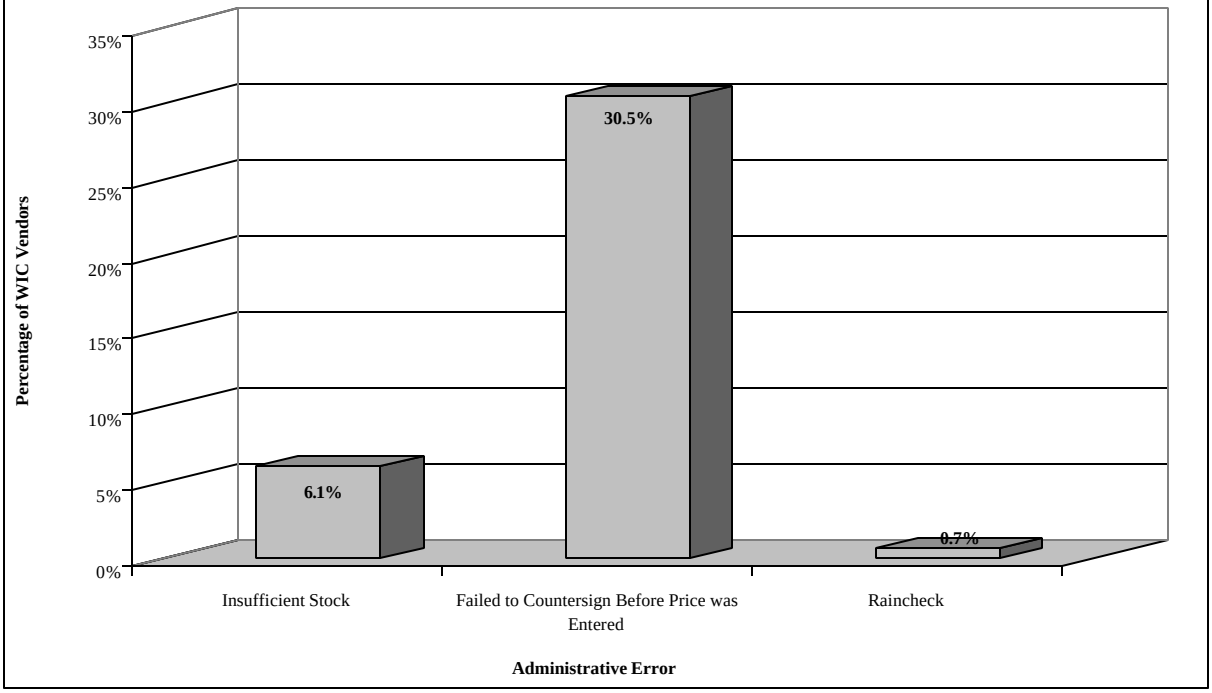
The percentage of WIC vendors providing a receipt at the time of transaction was also examined for WIC vendors where all three buys were completed. This variable was examined to determine if the lack of providing a receipt might be a contributing factor to overcharges and substitutions. Figure IV-8 displays the percentage of vendors who did not provide a receipt for each of the three buys. As shown, 48.9 percent of these vendors always provided a receipt, while 33.0 percent of the vendors never provided a receipt.

Figure IV-8.
Percentage of WIC Vendors by Frequency of Occurrences of Cashier Not Providing a Receipt Across Three Buys



It was interesting to note that there were a number of vendors who committed administrative errors, but did not commit one of the major violations examined in this study. Figure IV-9 displays the percentage of all WIC vendors who committed an administrative error but did not overcharge, undercharge, or allow a substitution.

Figure IV-9.
Distribution of Administrative Errors Committed by WIC Vendors
Who Did Not Overcharge, Undercharge, or Substitute WIC Food Items Across All Buys



This chapter has presented the findings related to WIC vendor administrative errors. Additional information can be found in the tables located in Appendix B. The next two chapters examine findings related to overcharging/undercharging and substitution of unauthorized items.

CHAPTER V

Findings Related to Vendor Overcharge and Undercharge

This chapter discusses the study findings related to whether the vendor correctly charged the WIC Program for the actual cost of WIC foods provided to participants. Overcharge or undercharge was calculated as the difference between the dollar amount redeemed by the vendor as reported to the WIC State agency and the actual retail price of the foods provided to participants. The retail price was determined through a combination of data collecting efforts at the time of the compliance buy. First, if the buyer received a receipt, the receipt amount was entered as the retail price. If a receipt was not received, the shelf price was used as the retail price. The data collectors collected information on the shelf price of the foods they purchased, either by recording a posted shelf price or by recording the amount rung up on the cash register. If no information was available through either of these two means, the data collector returned later and purchased the same food items with cash. The price from the cash purchase was used to determine the actual retail price. Where scanning was used, the scanned price was used as the retail price, even if there was a difference between the shelf price and the amount scanned.

The results obtained with regard to the percentage of vendors who overcharged and undercharged are based upon an average across all three types of buys. This allows for an examination of the number of vendors who overcharge or undercharge for each of the individual types of buys conducted (safe, partial, minor substitution, major substitution) as well as the overall rate of vendor overcharge regardless of the type of buy.

Since it is not known how often a WIC participant will attempt and actually make a partial buy or attempt to substitute unauthorized items, only the safe buy was used to derive a national estimate of the rate of vendor overcharge. It is important to note that the safe buy is not necessarily a control condition that approximates the true state of WIC vendor transactions. Results obtained across all three buys closely parallel results obtained from the safe buy alone. When results diverge, those

derived from the safe buy typically appear to represent a lower limit while results obtained from the combination of all three buys appear to represent an upper limit.

A. Vendor Overcharges

As was true with examining proper FI countersignature procedures, vendor overcharges can be explained both in terms of a rate and a frequency. The rate of vendor overcharging is expressed in terms of the likely percentage of vendors who would overcharge on a single round of buys. The frequency of vendor overcharge is the likelihood that a vendor will overcharge one or more times over a series of three buys. When examining the probability of a vendor overcharging on any given buy, the rate is the proper percentage to use.

When the rate of overcharging was examined, 8.7 percent of all WIC vendors overcharged at least once during the three buys (see Table C-1 in Appendix C; Figure V-1). The frequency of overcharge is best examined by measuring the percentage of vendors who overcharged only once, and those that repeatedly overcharged. To examine this issue, analysis was conducted to determine the number of vendors that had never overcharged, the number that overcharged only once, and the number that overcharged more than once. This analysis revealed that 81.9 percent of the vendors never overcharged, while 18.1 percent of the vendors overcharged one or more times, including 12.4 percent that overcharged once, 4.2 percent that overcharged twice, and 1.5 percent that overcharged for all three buys (see Table C-6 in Appendix C). Figure V-2 displays the frequency of repeat vendor overcharges.

Figure V-1.
Percentage of WIC Vendors Overcharging Across All Buys

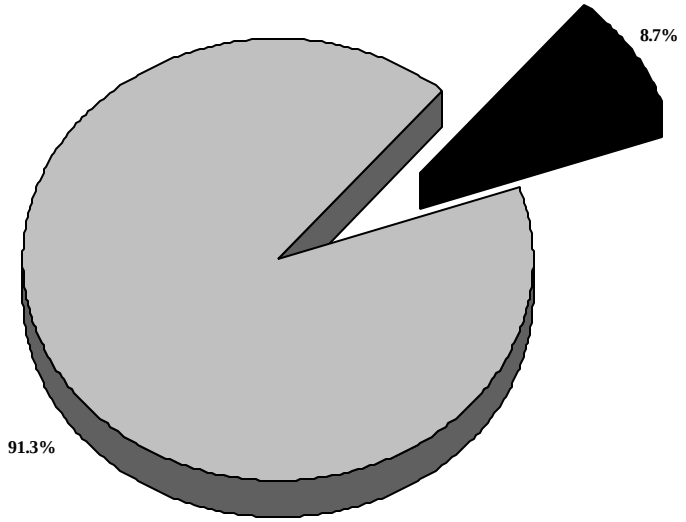
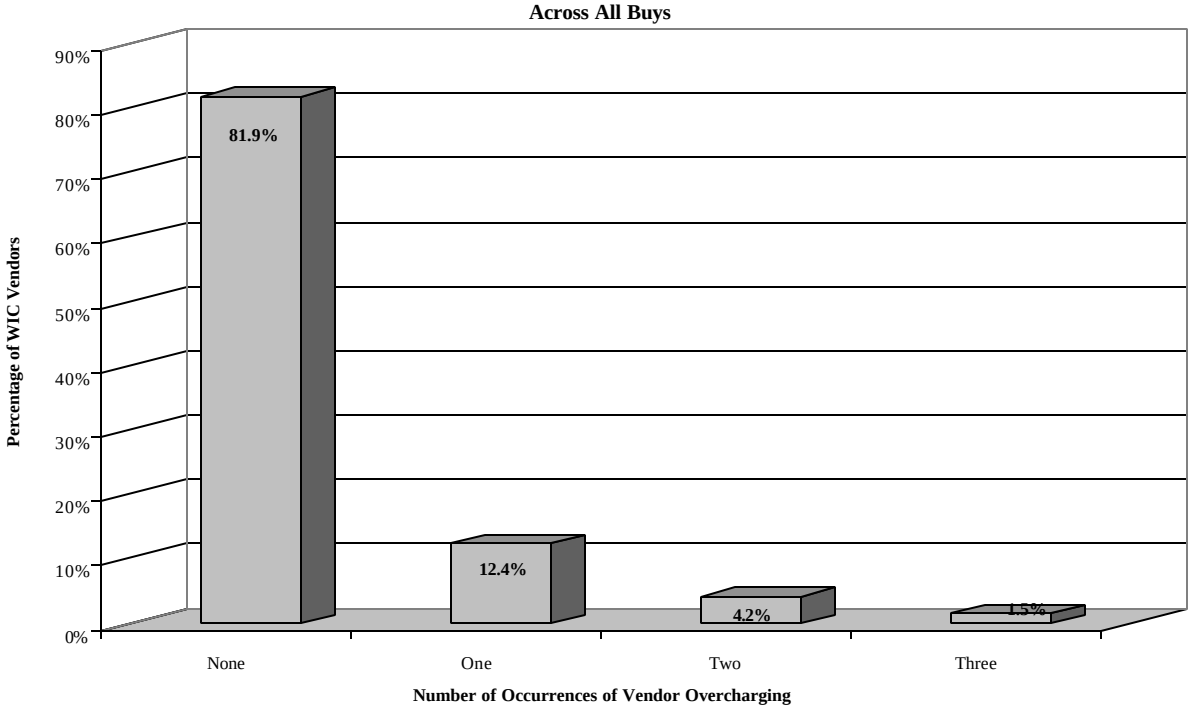


Figure V-2.
Percentage of WIC Vendors by Frequency of Occurrences of Vendor Overcharging Across All Buys



An analysis was conducted examining vendor overcharge for each type of buy. For the safe buy, only 7.0 percent of all WIC vendors appeared to have overcharged.[2] In contrast, for the partial buy condition, 9.5 percent of WIC vendors appeared to have overcharged. For the minor substitution buys, 9.7 percent of WIC vendors overcharged, and for the major substitution buys, 10.4 percent of WIC vendors overcharged (see Tables C-2-5, Appendix C). In both types of substitution buys, the vendors overcharged whether they allowed the substitution or not.

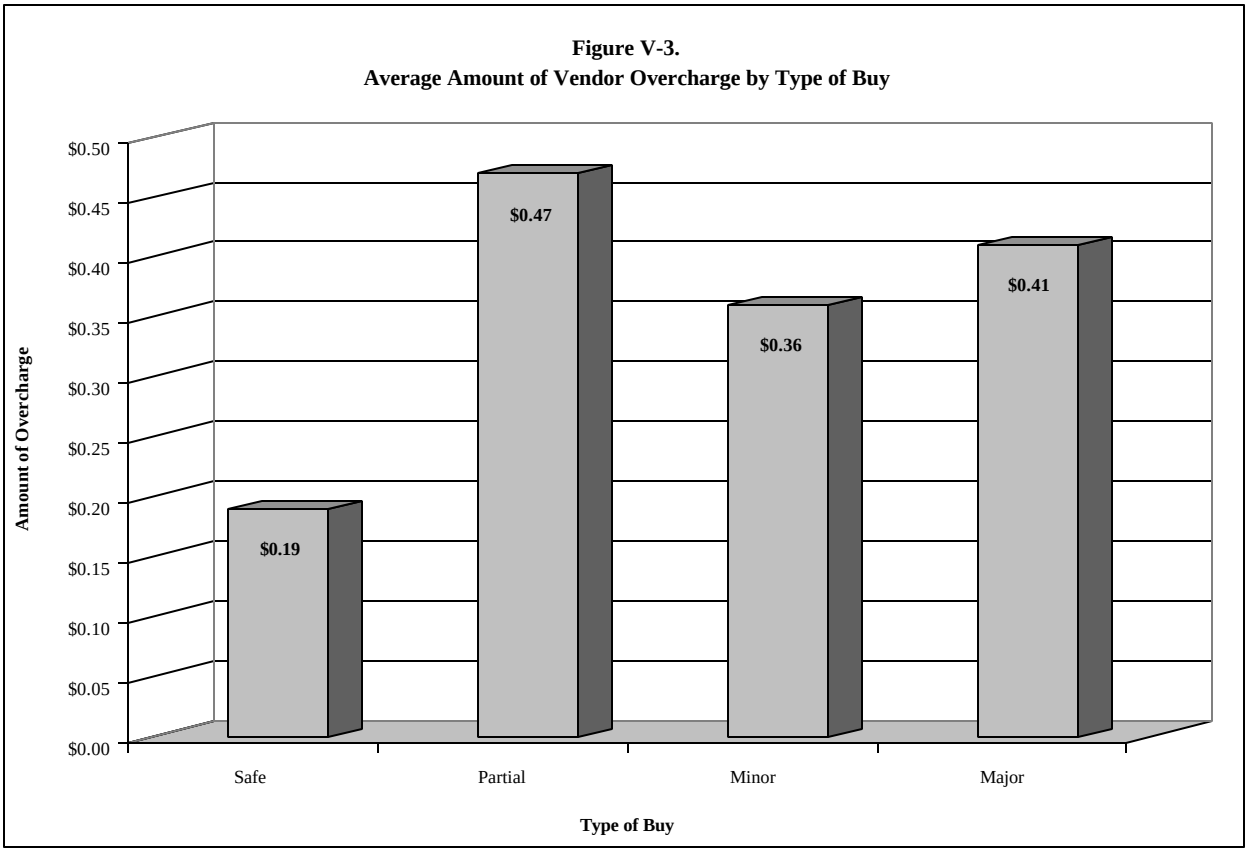
When differences in overcharge as a function of the type of buy were evaluated across WIC vendors where all buys were completed, differences in overcharge were observed in comparing the four different types of buys. Vendors appeared more inclined to overcharge during partial and substitution buys than for safe buys. The differences were statistically significant between partial and safe buys and between major substitution and safe buys. The difference between minor substitution and safe buys was not statistically significant (see Table C-23 in Appendix C).

The actual net dollar amount of vendor overcharges was also examined by taking the total dollar amount of vendor overcharges and subtracting vendor undercharges. The overall difference between total dollar amount of FIs redeemed and the actual retail price of the foods purchased was $22,156.75, or an average of $0.21 per vendor. More specifically, 6.8 percent of vendors undercharged compliance buyers for a total of $14,674.59; an average of $0.14; while 8.7 percent of vendors (9,287) overcharged compliance buyers $36,831.35, an average of $0.35 per buy (see Table C-8 in Appendix C).

[2] This entailed calculation of vendor overcharge rates using weights that were developed to approximate the national estimate of WIC vendors using the sample of WIC vendors that participated in the safe buy only, or partial buy only, or minor/major substitutions buy only.

When undercharge information is removed and data re-analyzed, true overcharge differences were higher for partial buys compared to all other buys. In addition, minor substitution and major substitution overcharge amounts exceeded safe buy overcharge amounts. Figure V-3 displays the average overcharge amount for each of the four buys.

Figure V-3.
Average Amount of Vendor Overcharge by Type of Buy



The impact of demographic and administrative variables on whether or not a vendor overcharged was also examined. Those variables that seemed to have a statistically significant relationship to vendor overcharge are discussed on the following pages.

1. Overcharge as a Function of Type of WIC Food Package

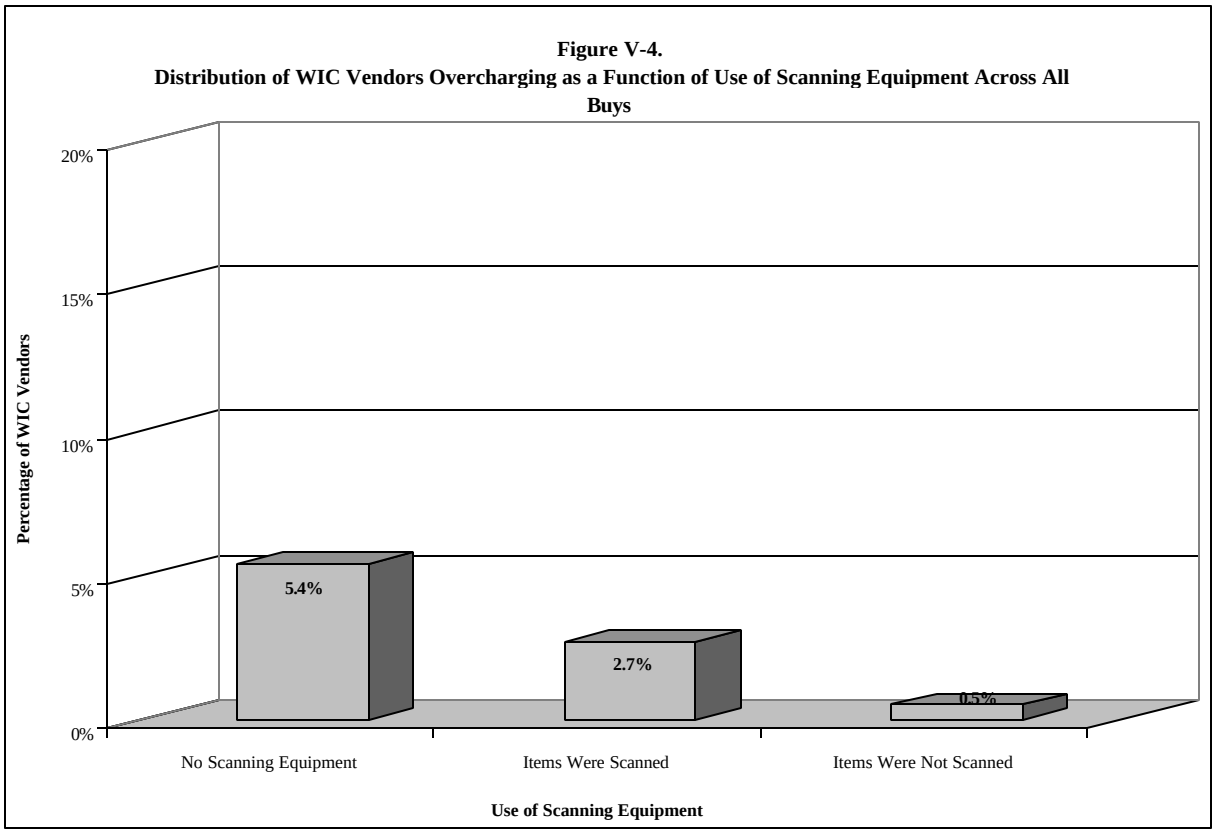
When differences in vendor overcharge as a function of type of WIC food package were examined, vendors appeared more inclined to overcharge for food packages for women and children than for infants. More specifically, infant food packages accounted for 27 percent of overcharges compared to 37 percent for women and 36 percent for children.

When this estimation process was replicated for the safe, partial, and minor or major substitution buys, no statistically significant differences in overcharge as a function of food package type could be identified except for minor substitutions, where the difference between woman and infant food packages was statistically significant across all buys (see Tables C-23–C-27 in Appendix C).

2. Overcharge as a Function of the Use of Scanning Equipment

When vendor overcharge as a function of the use of scanning equipment was examined, fewer overcharges occurred if a vendor had scanning equipment, even if the cashier chose not to scan the WIC food items. Figure V-4 displays the comparison of vendors' use of scanning equipment across all four buy types (see Table C-10 in Appendix C). Statistically significant differences were found in the safe buy for vendors who scanned WIC items compared to vendors who chose not to scan WIC items or who did not have scanning equipment. The differences were also statistically significant in the partial buy for vendors who lacked scanning equipment compared to vendors who scanned the WIC items. Examining the minor substitution buy, vendors who lacked scanning equipment appeared more likely to overcharge than vendors who scanned. Also in the minor substitution buy, vendors who chose not to use their scanning equipment were more likely to overcharge than vendors who scanned. The major substitution buy displayed statistically significant differences between vendors who lacked scanning equipment compared to vendors who scanned WIC items (see Tale C-28–C-32 in Appendix C).

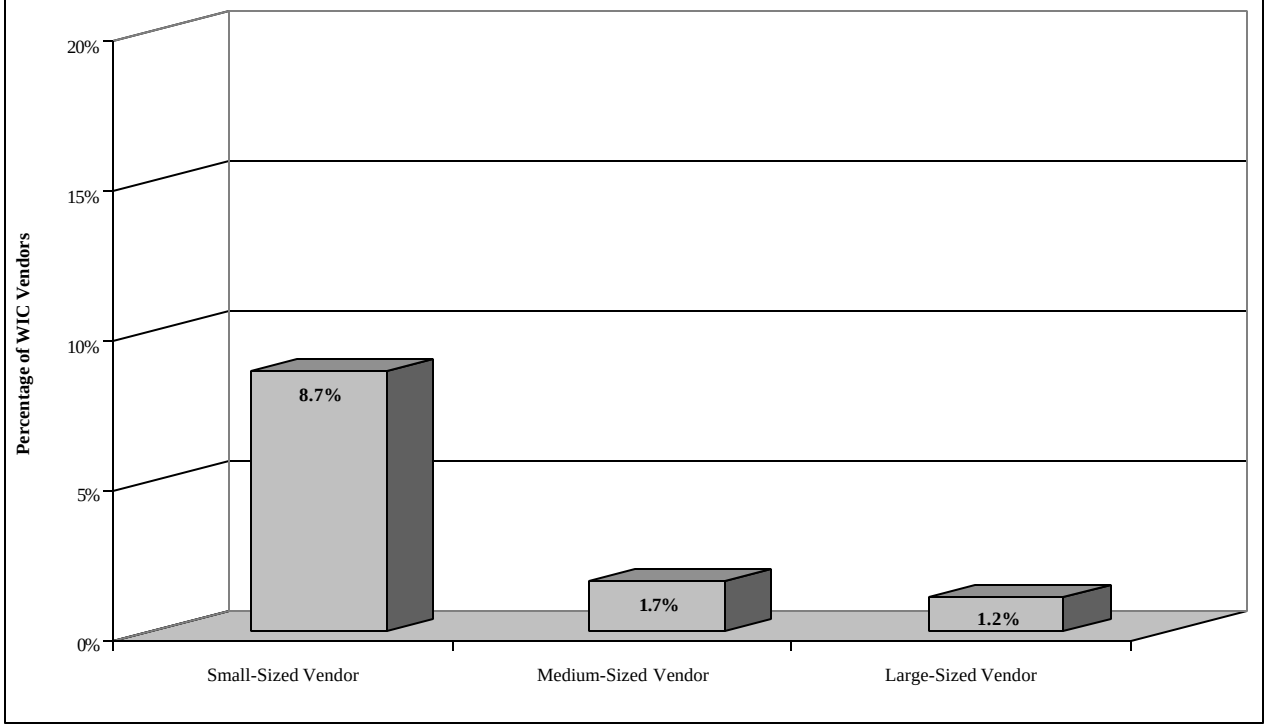
Figure V-4.
Distribution of WIC Vendors Overcharging as a Function of Use of Scanning Equipment Across All Buys



3. Overcharge as a Function of Vendor Size

More overcharges occurred for small-sized vendors compared to medium-sized or large vendors (see Table C-11 and C-28 in Appendix C; Figure V-5). The same pattern of results was also observed when the estimates were derived on the basis of the type of buy (see Table C-28–C-32 in Appendix C).

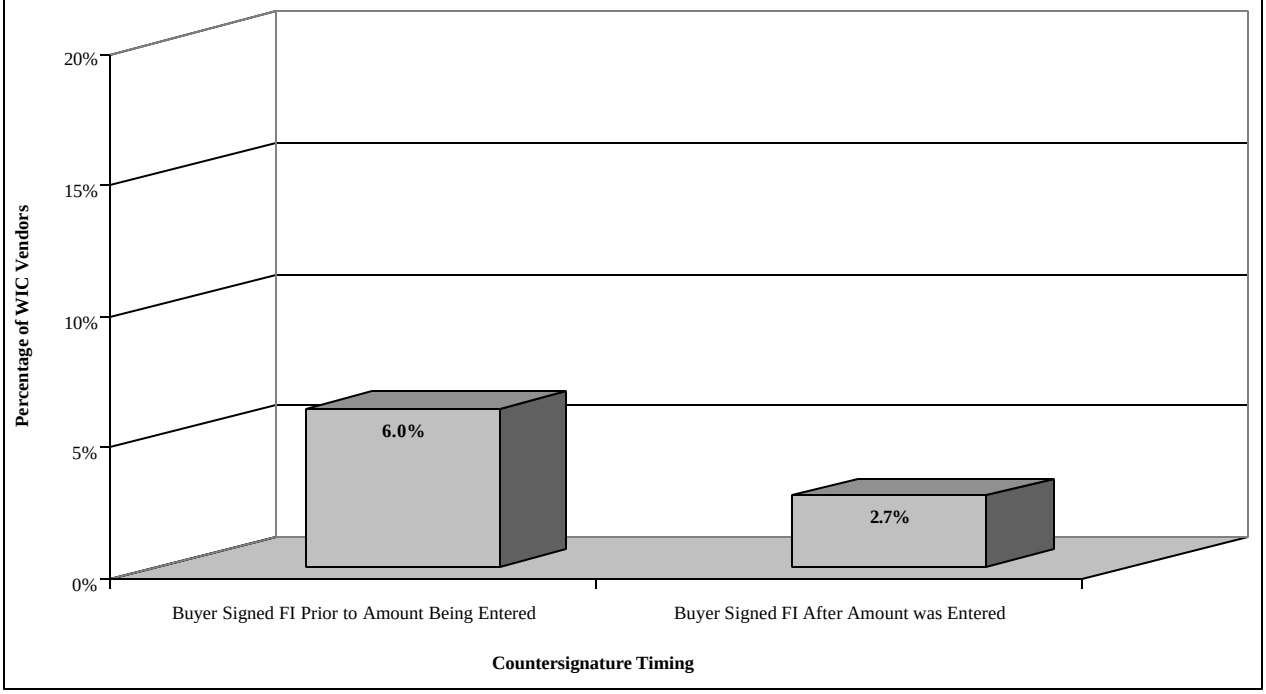
Figure V-5.
Distribution of WIC Vendors Overcharging as a Function of Vendor Size Across All Buys



4. Overcharge as a Function of Proper FI Countersignature Procedures

One of the key elements examined was the relationship between following proper FI countersignature procedures and the rate of vendor overcharge. Vendors who improperly asked the buyer to sign the FI prior to entering the purchase price were more likely to overcharge than those who followed the proper procedures. Again, the same pattern of results is observed when estimates were derived for each buy type and separately analyzed (see Tables C-28–C-32 in Appendix C). Figure V-6 displays the distribution of WIC vendors overcharging by timing of countersignature (see Table C-12 in Appendix C).

Figure V-6.
Distribution on WIC Vendors Overcharging as a Function of Countersignature Timing Across All Buys



5. Overcharge as a Function of Providing the Buyer with a Receipt

Failure of the vendor to provide a receipt for the WIC transaction was identified as a predictor of overcharge in the 1991 WIC Vendor Issues Study. To test this hypothesis, all vendors who overcharged (8.7 percent of the total number of vendors) were grouped into two categories, those that provided a receipt, and those that did not provide a receipt. The study found that of all vendors, 7.5 percent both overcharged and failed to provide a receipt, while only 1.3 percent of all vendors overcharged and provided a receipt (see Table C-13 in Appendix C). Almost identical results were obtained for the safe buy alone as compared to the results across all three buys. The same pattern of results also characterized partial and substitution buys (see Table C-28–C-32 in Appendix C).

6. Overcharge as a Function of Other Demographic and Administrative Variables

The type of FI system and locale were examined as they relate to vendor overcharges. When examining the type of FI system in which the vendors operated, no differences in overcharge were observed either across all three buys or with just the safe buy. When locale was examined, a trend for vendors from metropolitan areas to overcharge more frequently than non-metropolitan vendors failed to reach significance.

B. Models Describing Factors Contributing to Overcharge

Additional analysis was conducted in an effort to develop a model describing factors contributing to the frequency of overcharge. As an initial step in this direction, a series of logistic regression equations were generated. Subsequently, the data were reorganized to distinguish between vendors where errors occurred occasionally from vendors where errors occurred more frequently. Finally, a series of multilog analyses were generated in order to better account for repetition in overcharge across the three compliance buys.

The multilog results appeared to yield few additional insights, other than to confirm results previously obtained. Results of the multilog analysis are discussed below, with statistically significant findings detailed in Tables C-16–C-22 in Appendix C. Models were developed both on the basis of the variables detailed earlier in this chapter and in accordance with models previously developed in the 1991 WIC Vendor Issues Study. However, some of the variables used in previous studies (e.g., the extent to which a vendor might have been "busy") were not collected in this study. At the same time, new variables were also introduced in this study, such as indication of cashier inexperience. The following discussion addresses the dynamics of variable interaction and, where appropriate, the methodological limitations of results obtained.

1. Logistic Regression Models

Logistic regression is used to generate model parameter estimates, their standard errors, tests of the null hypothesis in which individual regression coefficients associated with each variable in the model are equal to zero, as well as tests of overall model and individual parameters' significance. This technique can also be used to generate odds ratios describing the ratio of odds for a one-unit change in the independent variable. The odds ratio for a single regression coefficient ? is the quantity $exp(?)$. In addition, an R-square statistic based on Cox and Snell (1989) describes the proportion of the log-likelihood that is explained by the model. This statistic will be frequently detailed as a summary statistic to describe models that were tested.

Logistic regression is particularly useful in evaluating dichotomous outcome variables in its use of maximum likelihood techniques. The logistic model can be described mathematically as:

$$\log(p/1-p) = X?$$
$$p = prob(Y=1|X)$$

where Y is the response outcome (1= presence of overcharge; 0=absence), X is the covariant design matrix, and ? is the vector of the parameters to be estimated. Essentially, overcharge was defined as the dependent binary variable where "1" signified overcharge, and "0" signified the absence of overcharge. Generalized estimating equations (GEE) were used to develop models (Zeger and Liang, 1986; Liang and Zeger, 1986).

Consideration was given to examining the individual variable contributions to overcharge. In Appendix C, Tables C-16–C-22 list variables which appear to account for some of the variation in overcharge. More specifically, these tables detail relevant variables, R^2, odds ratios, overall model statistics and p-values, and relevant statistics on parameter values.

Failure to provide a receipt, use of scanning equipment, vendor size and not following proper FI countersignature procedures all appear to contribute to overcharge. Over all buys, WIC vendors

who did not provide a receipt were about 10.5 times more likely to overcharge than vendors who provided a receipt. In terms of the use of scanning equipment, vendors who had no scanning equipment were about 6.0 times more likely to overcharge than vendors who used scanning equipment, while vendors who simply chose not to scan (but had equipment) were 4.7 times more likely to overcharge compared to vendors who used scanning equipment. With regard to the contribution of vendor size, small-sized vendors were 4.6 times more likely to overcharge than medium-sized vendors, and 6.5 times more likely to overcharge than large vendors. Vendors who did *not* require the buyer to countersign after the purchase price was entered were 4.9 times more likely to overcharge than vendors who had the buyer sign the FI after the purchase price was entered (see Table C-16 in Appendix C).

In general, the relationships described above appeared somewhat attenuated for the safe buys compared to other buy types, and somewhat stronger for the partial buy. However, receipt provision appeared particularly important in the minor substitution (see Tables C-17–C-20 in Appendix C). Other single variable models analyzed included vendor-to-participant ratio, indication of cashier inexperience, food package type, and cashiers providing the buyer with incorrect information related to authorized foods. These models either accounted for only minuscule portions of the variance or failed to meet all criteria for statistical significance.

Multiple variable model analyses were conducted for each variable across all buy types. The two strongest three-variable models predicting variance were the model including error in countersignature timing, failure to provide a receipt, and failure to use scanning equipment (R^2=0.212); and the model containing error in countersignature timing, failure to provide a receipt, and small vendor size (R^2=0.209). Both models satisfied criteria for a statistically significant model across all buy types.[3] When a four-variable model describing overcharge as a function of countersignature errors, failure to provide a receipt, small vendor size and failure to use scanning equipment when conducting a WIC transaction was simplified from a 10 parameter model (where scanning was defined as no scanning

[3] In this context, Betas for medium-sized vendors did not appear to differ from 0: when smaller vendors constituted the reference level (p=0.06)

equipment, scanning, or chose not to scan) to a 9 parameter model (where scanning was defined as no scanning versus scanning), it appeared to meet all criteria for a successful model (R^2=0.213) across all buy types (see Table C-21 in Appendix C).

Vendors who overcharged on all three buys are the most likely to be intentionally overcharging the WIC Program. For each of the three aforementioned models, odds ratios were calculated to examine the contribution of each individual model variable when applied to vendors who overcharged on all of the three buys (see Table C-22 in Appendix C). Each of these models is discussed below.

- **Three-Variable Model: Vendors who did not scan, failed to provide a receipt, and violated FI countersignature procedures.** When the contribution of individual variables contained in the above three-variable model (R^2=0.212) were examined, vendors who did not scan were about three times more likely than their scanning counterparts to overcharge; vendors who failed to provide a receipt were about seven times more likely to overcharge; and vendors who violated FI countersignature procedures were over five times more likely to overcharge;

- **Three-Variable Model: Small vendors, vendors who failed to provide a receipt, and vendors who violated FI countersignature procedures**. When the contribution of individual variables contained in the above three-variable model (R^2=0.209) were examined, small vendors appeared about three times more likely to overcharge than medium or large size vendors; vendors who failed to provide a receipt were about 7.5 times more likely to overcharge; and vendors who violated FI countersignature procedures were about 5.6 times more likely to overcharge; and

- **Four-Variable Model: Vendors who violated FI countersignature procedures, failed to provide a receipt, small-sized vendors, and vendors who did not scan**. When the contribution of individual variables contained in the above four-variable model (R^2=0.213) were examined, vendors who violated FI countersignature procedures were over five times more likely to overcharge; vendors who did not provide a receipt were 6.7 times more likely to overcharge; small-sized vendors were approximately 1.5 times more likely to overcharge than medium or large-sized vendors; and vendors who did not scan were over two times more likely to overcharge.

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, vendor size is assumed to effect overcharging. Often, the effect of vendor size on overcharging is mediated by the use of scanning equipment by the vendor. Vendor size is often an indicator of the availability of scanning equipment. Once the mediator variable, use of scanning equipment, enters the equation vendor size no longer affects overcharging. This would be regarded as an instance of complete mediation. Partial mediation is the case in which the association from vendor size to overcharge is reduced in absolute size but is still different from zero when the use of scanning is controlled.

Baron and Kenny (1986) and Judd and Kenny (1981) have discussed four steps in establishing mediation:

> **Step 1**: Show the initial variable (X) is correlated with the outcome (Y). Use Y (overcharge) as the criterion variable in a regression equation and X (vendor size) as a predictor. This step establishes that there is an effect that may be mediated.
>
> **Step 2:** Show the initial variable (vendor size) is correlated with the mediator (scanning). Use M (scanning) as the criterion variable in the regression equation and X (vendor size) as a predictor. This step essentially involves treating the mediator as if it were an outcome variable.
>
> **Step 3:** Show the mediator M (scanning) affects the outcome variable Y (overcharge). Use Y as the criterion variable in a regression equation and X (vendor size) and M (scanning) as predictors. Essentially, the initial variable X (vendor size) must be controlled to establish the effect of the mediator M (scanning) on the outcome Y (overcharge).
>
> **Step 4:** Establish that M (scanning) completely mediates the X-Y (vendor size-overcharge) relationship: the effect of X (vendor size) on Y (overcharge) controlling for M should be zero. The effects in both Steps 3 and 4 are estimated in the same regression equation.

The use of scanning equipment appears to mediate the contribution of vendor size. Vendor size does appear to constitute a viable predictor of scanning across all buy types. And as previously described, scanning is a factor that tends to reduce the frequency and amount of overcharge.

Similarly, providing a receipt may also, at least partially, mediate the influence of lack of scanning, and vendor size in overcharge. Both lack of scanning (R^2=0.172) and vendor size (R^2=0.165) may facilitate prediction of receipt provision. Vendors who lack scanning equipment are uniformly (across all buys) much more likely *not* to provide a receipt. On average, medium-sized vendors are five times less likely, and large vendors are almost eight times less likely, than small vendors *not* to provide a receipt (see Table C-21 in Appendix C).

From a practical standpoint, it is easy to understand how these factors influence one another. Vendors who lack scanning equipment or simply fail to scan are likely not to provide a receipt and may be more inclined to overcharge. Similarly, small vendors who may lack scanning equipment appear more inclined *not* to provide a receipt and, consequently, may also be inclined to overcharge. Again, it is not possible to determine the extent to which overcharge and receipt provision reflects an intentional trend to overcharge or simply reflect carelessness on the part of the cashier.

2. Repeat Offender Models

Data were organized to permit analysis of overcharge that could distinguish WIC vendors who repeatedly violate proper FI countersignature procedures, fail to provide a receipt, or do not use scanning equipment from vendors who only occasionally engage in such behaviors (see Table C-21–C-22 in Appendix C).[4]

When examining overcharges in terms of repeated failure to provide receipts, it was interesting to note that while the single-variable model describing WIC vendor's failure to provide a receipt accounted

[4] It should be noted that a substantial attrition in N (18%) was observed in this context since missing data in any one of the three completed buys effectively warranted elimination of that observation.

for the most variance (R^2=.14); WIC vendors who failed to provide a receipt only once could not be distinguished from vendors who always provided a receipt. More specifically, vendors who failed to provide a receipt once were only about 1.2 times more likely to overcharge than vendors who always provided a receipt, while those who did not provide a receipt twice were 2.5 times more likely to overcharge than vendors who always provided a receipt. Those that failed to provide a receipt all three times were 12.8 times more likely to overcharge than vendors who always provided a receipt.

In terms of WIC vendors who had scanning equipment but repeatedly did not use the equipment (R^2 =.10)[5] those who used scanning equipment once were 2.8 times more likely to overcharge than vendors who always used scanning equipment, those who failed to use scanning equipment twice were 4.7 times more likely to overcharge, and those who never used scanning equipment were 6.4 times more likely to overcharge.

When examining the failure of cashiers to obtain the buyer's signature after the purchase price is entered on the FI, vendors failing once (R^2=.07) seemed to be 1.7 times more likely to be associated with overcharge, two failures to properly obtain a buyer's countersignature seemed to be 3.6 times more likely to be associated with overcharge, and three failures to properly obtain a buyers countersignature seemed to be 5.5 times more likely to be associated with overcharge.

When examining two-variable models, the results from combining the use of scanning with vendor size was again suggestive of a mediation effect; that is, the vendor not scanning invariably diminished the significance of the contribution of vendor size. The best three-variable model (R^2=.212) described overcharge as a function of violating FI countersignature procedures, failure to provide a receipt and small vendor size.

5 It was necessary to re-code this variable into two levels – vendor scanned and vendor did not scan.

The four-variable saturated model (R^2=.213) failed to meet requisite criteria for success, probably because of the mediation of the "no scanning" variable on vendor size and/or the mediation of failure to provide a receipt on scanning.

C. Vendor Proclivity to Overcharge

In previous studies, no attempt was made to distinguish vendors who overcharged as a function of deliberate intent from vendors who overcharged due to random error. One of the factors that can be examined in this study to determine the randomness of overcharge is to look at the vendors in the context of undercharging. It seems unlikely that a vendor would intentionally undercharge the WIC Program for foods obtained with FIs. 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 who consistently overcharged, vendors who may have both overcharged and undercharged, and vendors who did not overcharge or undercharge. Data were analyzed to facilitate examination of overcharging by vendors who consistently overcharged and those who occasionally overcharged. While we can not assume vendors who consistently overcharged are doing so intentionally, this group is more likely to intentionally overcharge than those who occasionally do so.

A little over 13 percent of the WIC vendors overcharged at least once but never undercharged, while a little over 11 percent of the WIC vendors undercharged at least once but never overcharged. In contrast, almost 5 percent of all vendors appeared to both undercharge as well as overcharge. Thus, the majority of WIC vendors who overcharged appear to do so consistently. Some of the logistic analysis previously conducted on overcharging was replicated on the sub-population of vendors who consistently overcharged. The same results were obtained for this sub-population as were found for the general vendor population who overcharged: failure to provide a receipt, violating FI countersignature procedures, small vendor size and failure to scan appear as statistically significant associated variables (see Table C-22 in Appendix C).

D. Findings Related to Undercharge

One of the more interesting findings of the 1991 WIC Vendor Issues Study was the amount of undercharging that occurred. As noted previously, it is likely that vendor undercharging is a function of carelessness on the part of the cashier entering the purchase price on the WIC FI. In this study, the phenomenon of vendor undercharge was also examined.

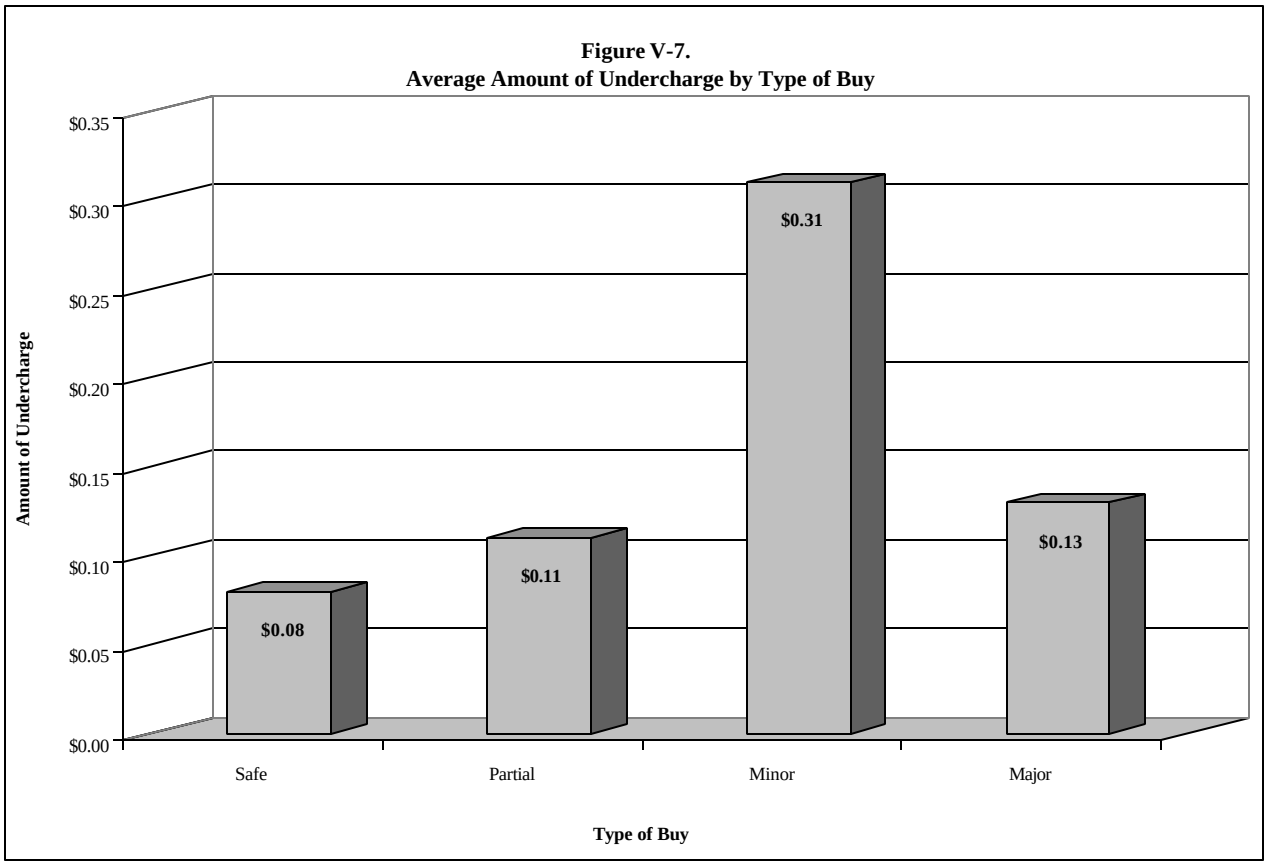
In terms of the vendors who undercharged, 6.8 percent of all vendors undercharged buyers across three completed buys (see Table C-1 in Appendix C). Of the vendors where three buys were completed, 83.7 percent never undercharged, 13.4 percent undercharged once, 2.3 percent undercharged twice, and 0.6 percent undercharged all three times (see Table C-6 in Appendix C).

When the three buy types were examined independently, 7.0 percent of vendors undercharged during the safe buy, 5.5 percent of the vendors undercharged during the partial buy, 7.8 percent of vendors undercharged during the minor substitution buy, and 8.2 percent of the vendors undercharged during a major substitution buy (see Tables C-2–C-5 in Appendix C).

When the amount of undercharge was examined by type of buy, the largest amount of undercharge was present in the minor substitution buy (see Table C-8 in Appendix C). Figure V-7 displays the average dollar amount of undercharge for each buy type.

When undercharging across the three completed buys as a function of type of buy was statistically evaluated, significantly less undercharge was observed for vendors during partial buys versus minor substitution buys (see Table C-32 in Appendix C).

Figure V-7.
Average Amount of Undercharge by Type of Buy



1. Vendor Undercharge as a Function of Demographic and Administrative Variables

Individual variables appeared to play a lesser role in whether vendors undercharged as compared to those who overcharged. For example, no statistically significant differences in undercharge were found as a function of food package type when examined over all three buys. However, when the safe buy condition alone was analyzed, vendors appeared to undercharge on the infant food package less often than they did on the child food package, and when the partial buy condition alone was analyzed, vendors appeared to undercharge on the child food package less often than they did on the woman food package. No statistically significant differences in undercharge by food package type emerged for vendors allowing minor or major substitutions (see Tables C-33–C-37 in Appendix C).

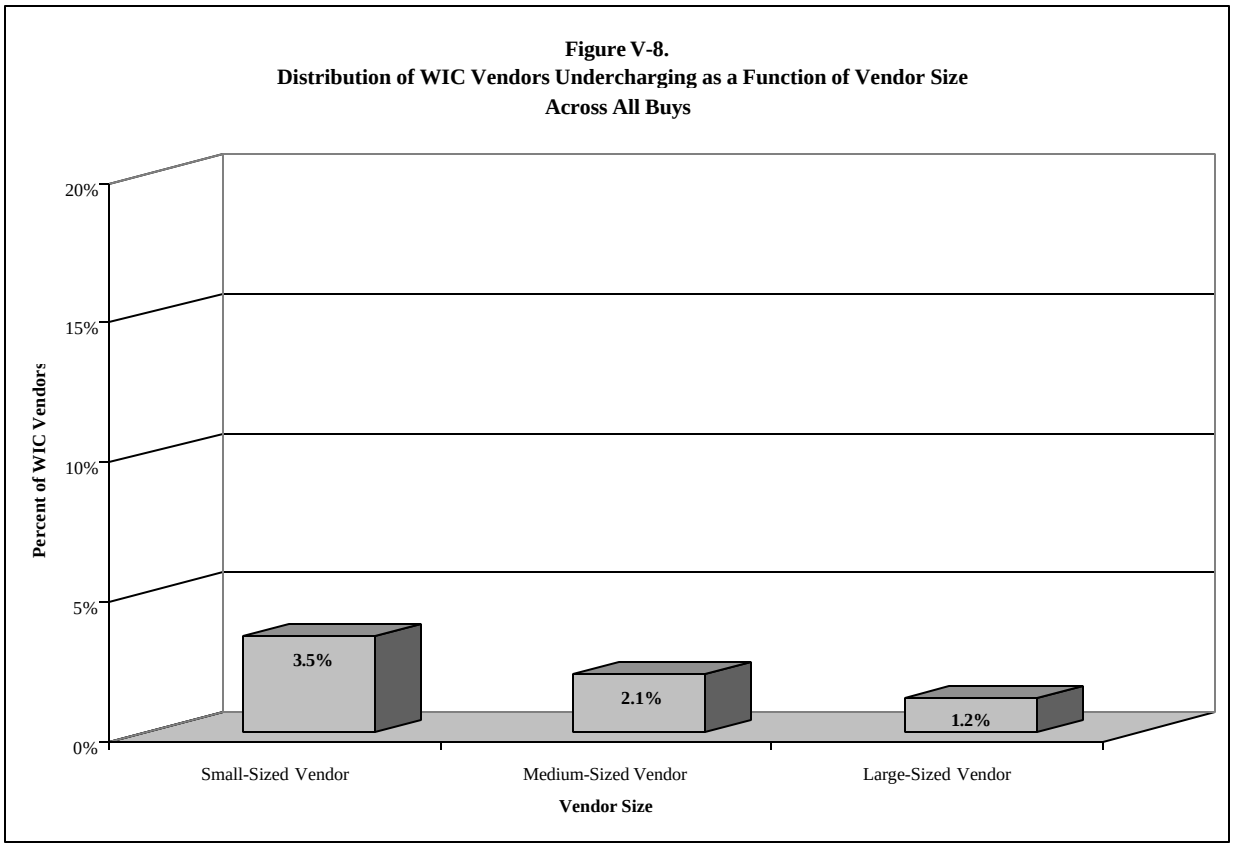
One of the areas of interest was to compare those vendors using scanning equipment with those not scanning. For analysis across all three completed buys, less undercharge was observed for vendors

who used scanning equipment compared to those who did not, either because they had no scanning equipment or because they chose not use scanning equipment. When each buy was separately analyzed, the use of scanning equipment appeared less likely to be associated with undercharge (see Table C-38 in Appendix C).

Additional analysis was conducted to examine undercharge as a function of using scanning equipment across each of the four types of buys. Statistically significant differences were found in the safe buy between vendors who used scanning equipment compared to vendors who either lacked scanning equipment or chose not to scan. The differences were also statistically significant in the partial buy for vendors who did not have scanning equipment compared to vendors who had this equipment and chose to scan or chose not to scan. Similarly, in the minor substitution buy, vendors who lacked scanning equipment appeared more likely to undercharge as compared to vendors who used scanning equipment. The major substitution buy displayed statistically significant differences between vendors who lacked scanning equipment and vendors who used scanning equipment (see Tables C-39–C-42 in Appendix C).

Across all three completed buys, the frequency of undercharge was greater among small vendors than medium- or large-sized vendors and greater among medium-sized vendors than large vendors. In safe, partial, and minor substitution buy conditions, the frequency of undercharge was greater among small vendors than medium- or large-sized vendors (see Tables C-38–C-42 in Appendix C). Figure V-8 displays the distribution of vendors who undercharged by size of the vendor.

Figure V-8.
Distribution of WIC Vendors Undercharging as a Function of Vendor Size Across All Buys



E. Approximating a National Estimate of Overcharge

Because of the cost implications associated with vendor overcharge abuse, analysis was conducted to derive estimates of overcharge as a proportion of total 1998 WIC redemptions.

The derivation of an overcharge rate for 1998 examined the effects of additional partial and minor substitution buys. While it was possible to determine how different types of buys affected vendor compliance with WIC Program requirements, it was not possible to determine the frequency with which these different types of buys naturally occur. In other words, while it is possible to determine that vendors appear more inclined or likely to overcharge during a partial rather than a safe buy, it is not possible to determine a national estimate for the frequency of partial buys. Because data were unavailable to determine the frequency of partial and substitution buys nationally, the methodology precluded the ability to estimate overcharge *optimally*. However, it was possible to develop an approximation of national estimates.

Estimates of overcharge were developed for several different conditions. First, when the rate of overcharge is calculated as the average across safe, partial, and substitution buys, it is 1.6 percent[6] across the country. This calculation is only advanced for comparative purposes since, in the absence of information describing the actual, real life rate of partial and substitution buys, it is not possible to accurately or adequately represent this activity. Estimates of overcharging as a percent of total redemptions were also derived using the safe buy alone. While information describing WIC vendor redemption activity was incorporated into the sampling plan, it was not possible to determine an individual vendor's annual WIC redemption rate. Therefore, the overcharge rate was initially calculated for the safe buy as the simple ratio of overcharge to redeemed amount multiplied by the weight for the safe buy. This was determined to be 0.9 percent[7] of the total national redemptions.

Because the safe buy condition was the first of three buys, and because some vendors ceased operations or were terminated from the Program during the study, a few vendors were eventually eliminated or excluded from remaining buys. Therefore, it seemed appropriate to give some consideration to the analysis of safe buys for the population of WIC vendors who actually were included in all three buys. Accordingly, 0.8 percent of the total 1998 WIC vendor redemptions could be attributed to overcharge.[8]

Another analysis was conducted which incorporated some information pertaining to a derived estimate of a monthly redemption rate that was associated with a given vendor. More specifically, information on monthly redemptions for all active vendors was collected from States in order to develop the sampling plan.

States reported vendor redemption data for various time periods, varying from one recent month for

6 For a sample of 4537 compliance buys equivalent to 35,584 WIC vendors, where the amount of overcharge was calculated to be $12,277.12, and the amount redeemed was calculated at $762,153.41 for one (average) buy presumed to be more or less representative of all vendors buy.

7 For a sample of 1545, equivalent to 35,527 WIC vendors, where the amount of overcharge was calculated to be $6738.02, and the amount redeemed was calculated as $782,548.69 for one buy presumed to be representative of any one given buy across the country

8 For a sample of 1513, equivalent to 35,586 WIC vendors, where the amount of overcharge was calculated to be $6,593.17, and the amount redeemed was calculated as $785,073.35 for one buy presumed to be representative of any one given buy across the country.

annual totals. All data was converted into one-month averages. Zero dollars or missing entries were reported for about 750 of the 41,000 vendors in the universe frame. Additionally, another 11 percent had total redemptions of $100 a month or less. Other WIC vendors had very large monthly redemptions. While the average monthly redemptions reported were a little over $7,000 per vendor, there were 34 vendors with reported average monthly redemptions of $100,000 or more. Although these data appeared fairly consistent within each State, data may be very inconsistent from one State to another. The sum of all the reported redemptions information was about $287 million per month; converting that gives an annual total of $3.44 billion.

This information was used initially only to control the selection of vendors within sample PSUs, but it was not used in PSU selection process. As the PSUs did not cross State boundaries, the information was adequate to control the sample vendor selections through an implicit stratification of vendors within sample PSUs.

In computation of a national estimate, a monthly redemption proportion was computed as the monthly redemptions associated with a given vendor divided by the total monthly redemptions across all vendors. This value was then multiplied by the rate of overcharge to yield an overcharge estimate adjusted by "monthly redemptions." An adjusted ratio describing (adjusted) overcharge as a percentage of total redemptions was then computed as 0.8 percent.[9]

Although calculations using the total monthly redemption proportion incorporates more auxiliary information, this information lacks precision. Therefore, results obtained should be regarded as another prospective estimate rather than an improvement upon other estimates described.

[9] For a sample of 1600, equivalent to 36,908 WIC vendors, where the amount of overcharge was calculated to be $6,341.70, and the amount redeemed was calculated at $770,088.78 for one buy presumed to be representative of any one given buy across the country.

Results described in preceding sections suggest that overcharge is more prevalent and is actually higher in partial buy and substitution buy conditions. Partial buys appeared to be the most costly, even when undercharge costs were included. Results obtained also suggest that the amount of undercharging was greatest when associated with minor substitution buys. True overcharge differences (which excluded undercharge) were also high for partial buys compared to safe buys. Minor substitution buy overcharge amounts also exceeded safe buy overcharge amounts.

In conclusion, when the overcharge rate is calculated solely on the basis of the safe buy, it appears to be between 0.82-0.86 percent. Results obtained suggest that the frequency and magnitude of overcharge associated with partial and substitution buys considerably exceeds estimates of overcharge among safe buys. When the rate of overcharge is calculated as the average across safe, partial, and substitution buys, it is 1.6 percent, twice the rate derived on the basis of overcharge for the safe buy among the population of vendors where all three buys were completed.

F. Approximating a National Estimate of Undercharge

While the loss associated with WIC overcharge has important implications for the WIC Program, the "gain" associated with undercharge can easily be overlooked. In order to examine the full extent of dollar loss to the WIC Program, an analysis was conducted to derive estimates of undercharge as a proportion of total 1998 redemption. As was true with the calculation of the overcharge rates, the data required to estimate total undercharging *optimally* was not available, but it was still possible to develop an approximation of a national estimate.

When the rate of undercharge is calculated as the average across safe, partial, and substitution buys, it is 0.6 percent.[10] As with overcharges, estimates of undercharging as a percent of total redemption were also derived from the safe buy. In addition, while information describing WIC retail redemption activity was incorporated into the sampling plan for the 1998 study, it was not possible to determine an individual vendor's annual WIC redemption rate. Therefore, the undercharge rate was initially

[10] For a sample of 4537, equivalent to 35,588 WIC vendors, where the amount of undercharge was calculated to be $4891.53, and the amount redeemed was calculated as $762,153.41 for one buy.

calculated for the safe buy as the simple ratio of undercharge to redeemed amount multiplied by the weight for the safe buy. This was determined to be 0.4 percent.[11] This is about one half the estimate across all three buys.

When the rate was examined for only those vendors for which all three buys were completed, the undercharge as a percent of total redemption was 0.4 percent of the 1998 total food grant budget.[12] When data were analyzed by incorporating some information regarding the estimated monthly redemption rate, the rate changed very little. In computation of a national estimate, a monthly redemption proportion was computed as the monthly redemption associated with a given vendor divided by the total monthly redemption across all vendors.[13]

In conclusion, when the undercharge rate is calculated solely on the basis of the safe buy, it appears to be about 0.4 percent. Results obtained suggest that the frequency and magnitude of undercharge associated with substitution buys considerably exceeds estimates of undercharge among safe and partial buys. When the rate of undercharge is calculated as the average across safe, partial, and substitution buys, it is 0.6 percent, twice the rate derived on the basis of undercharge for the safe buy sub-population of vendors for which all three buys were completed.

This chapter examined the rates of overcharge and undercharge. Additional information can be found in Appendix C. It also described models that were developed in this study to predict overcharge. The next chapter will describe the rate of minor and major substitutions accepted by WIC vendors in this study.

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11 For a sample of 1545, equivalent to 526 WIC vendors, where the amount of undercharge was calculated to be $2802.55, while the amount redeemed was calculated as $782,548.69 for one buy.

12 For a sample of 1531, equivalent to 35,576 WIC vendors, where the amount of undercharge was calculated as $2849.02, and the amount redeemed was calculated as $785,073.35 for one buy.

13 For a sample of 1527, equivalent to 35,123 WIC vendors, where the amount of overcharge was calculated to be $2802.55, and the amount redeemed was calculated as $770,088.78 for one buy.

CHAPTER VI

Findings Related to Vendor Acceptance of Substitutions

This chapter examines the results of buyers' attempts to substitute unauthorized food items for those designated on their WIC FIs. Unlike overcharges and administrative errors, substitutions require the involvement of both the participant and the vendor. This study did not attempt to determine the 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 this study was to determine how many WIC vendors would accept substitutions if they were initiated by the buyer.

As was noted in Chapter II, a minor or major substitution was attempted during the third compliance buy at each WIC vendor. A minor substitution was defined as an attempt by a buyer to obtain unauthorized foods that fall into the same food category as the WIC-authorized foods. For example, buyers were asked to purchase unauthorized cereals and juice in place of the WIC-authorized cereals and juices. A major substitution was defined as the buyer attempting to obtain a food or non-food item that falls outside of the food categories authorized by WIC. An example of a major substitution would be the buyer attempting to obtain soda instead of juice or canned pasta instead of peanut butter.

To ensure that vendors were given the benefit of the doubt with regard to substitutions and to avoid any confusion about whether an item being presented for purchase was actually an authorized food item, buyers followed standardized buying procedures when attempting a substitution. For minor substitutions, buyers were given a list of unauthorized cereals and juices (e.g., Coco Puffs® and Hi-C®) to obtain in place of the WIC authorized foods. These items were clearly not WIC-authorized foods, nor was it likely that a cashier would have been confused about the brand. For example, buyers did not attempt to purchase an unauthorized cereal with a name similar to that of an authorized cereal (e.g., Trix® as compared to Kix®). For major substitutions, buyers again were given a list of

unauthorized foods to substitute (e.g., soda, pretzels, cheese doodles, and canned pasta), none of which could be construed to be similar to the authorized WIC food item.

Once the unauthorized items were selected, buyers were told to present the items to the cashier and to indicate that they wished to purchase them using their WIC FIs. If the cashier questioned the purchase or stated that they could not obtain the items with the FI, the buyers were instructed to return the unauthorized food items without comment and obtain the correct authorized food item. Buyers were prohibited from giving any reasons for the substitution, such as "my child won't eat the WIC cereals", that might influence the cashier to allow the substitution. Half of the substitution buys were designated as minor substitutions, and half designated as major substitutions. Minor substitutions were examined separately from major substitutions, and appropriate weights for each of the two types of substitution buys were applied. For both minor and major substitution buys, the weighted WIC vendor count was 36,908.[14]

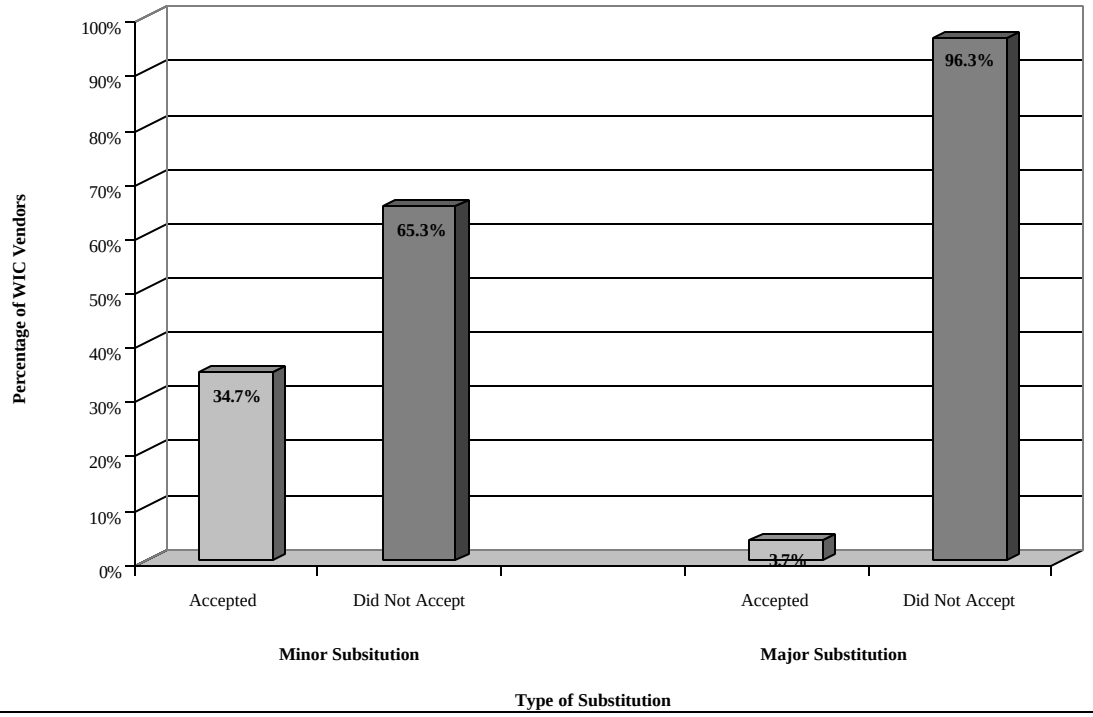
A. Overall Results Related to Substitution Buys

Data were analyzed to describe the percentage of substitutions allowed. As displayed in Figure VI-1, when each buy was examined,[15] 34.7 percent of vendors permitted minor substitutions. Where major substitutions were attempted, 3.7 percent of vendors permitted the substitution to occur.

[14] 842 observations in the sample of minor substitutions were read, while 733 observations in the sample of major buy observations were read.

[15] Using weights specific to that buy type (e.g., weights for buy type 3A or for buy type 3B).

Figure VI-1.
Outcome of WIC Vendors Accepting Buyer-Initiated Substitutions by Type of Substitution



B. Relationships Between Type of Substitution and Vendor and State Demographics and Administrative Errors

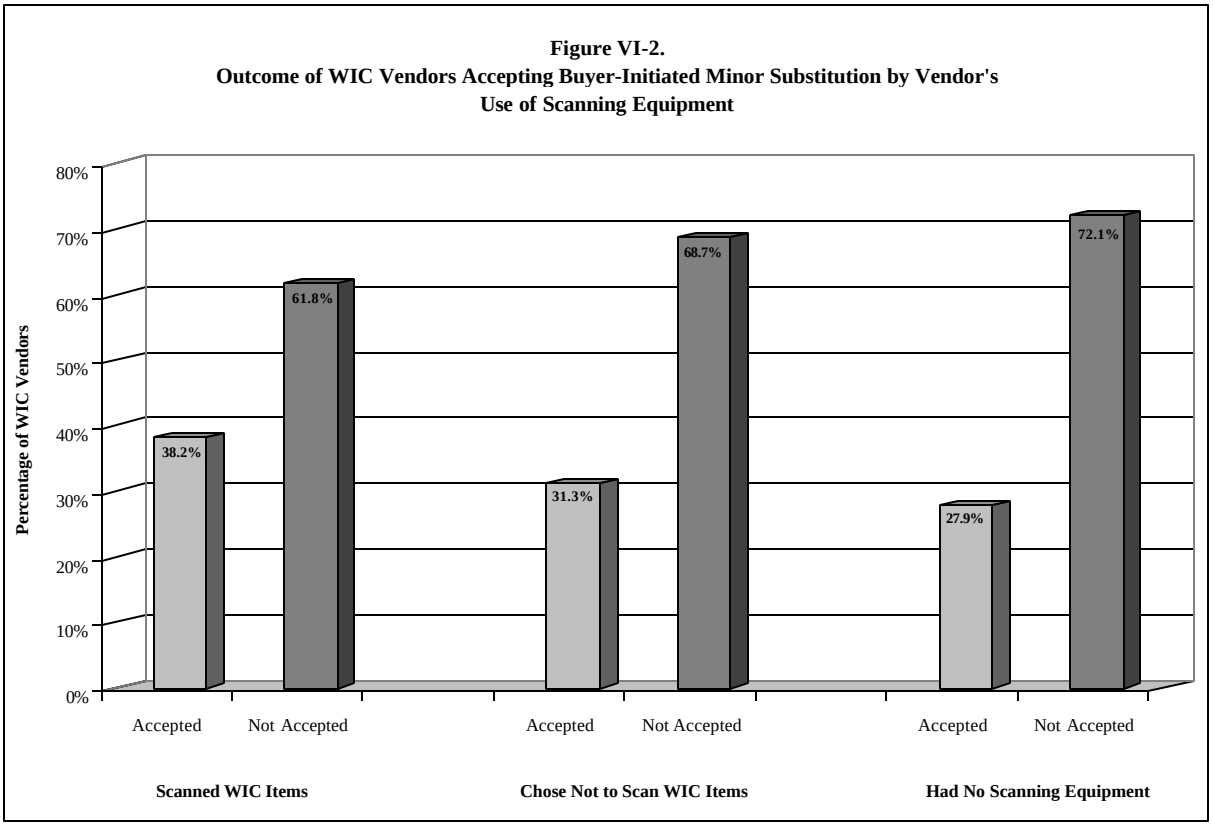
The study examined the relationship between vendor acceptance of substitutions and demographic profiles of the vendors and State food instrument systems. In addition, the relationship between vendors who committed administrative errors and vendor acceptance of substitutions was examined. Data were examined by type of substitution permitted and some significant differences were found. Below is a description of the relationships between type of substitution permitted and vendor and State demographics, as well as the relationship between type of substitution permitted and administrative errors.

1. Relationship between Use of Scanning Equipment and Type of Substitution

Data were analyzed to examine the relationship between the use of scanning equipment and the type of substitution. As noted above, among vendors where a minor substitution was attempted, 34.7

percent of the vendors allowed minor substitutions. However, it was surprising that among vendors where a minor substitution was attempted, those vendors with scanning equipment were the most likely to allow minor substitutions (see Figure VI-2). Of the vendors using scanning equipment, 38.2 percent allowed a minor substitution. Among the vendors that had scanning equipment, but chose not to scan WIC items, 31.3 percent allowed a minor substitution. Among those vendors that did not have scanning equipment, 27.9 percent allowed minor substitutions. When a contrast analysis was conducted, the difference in allowed substitutions between vendors who had no scanning equipment and vendors who used scanning equipment was significant (see Table D-6 in Appendix D).

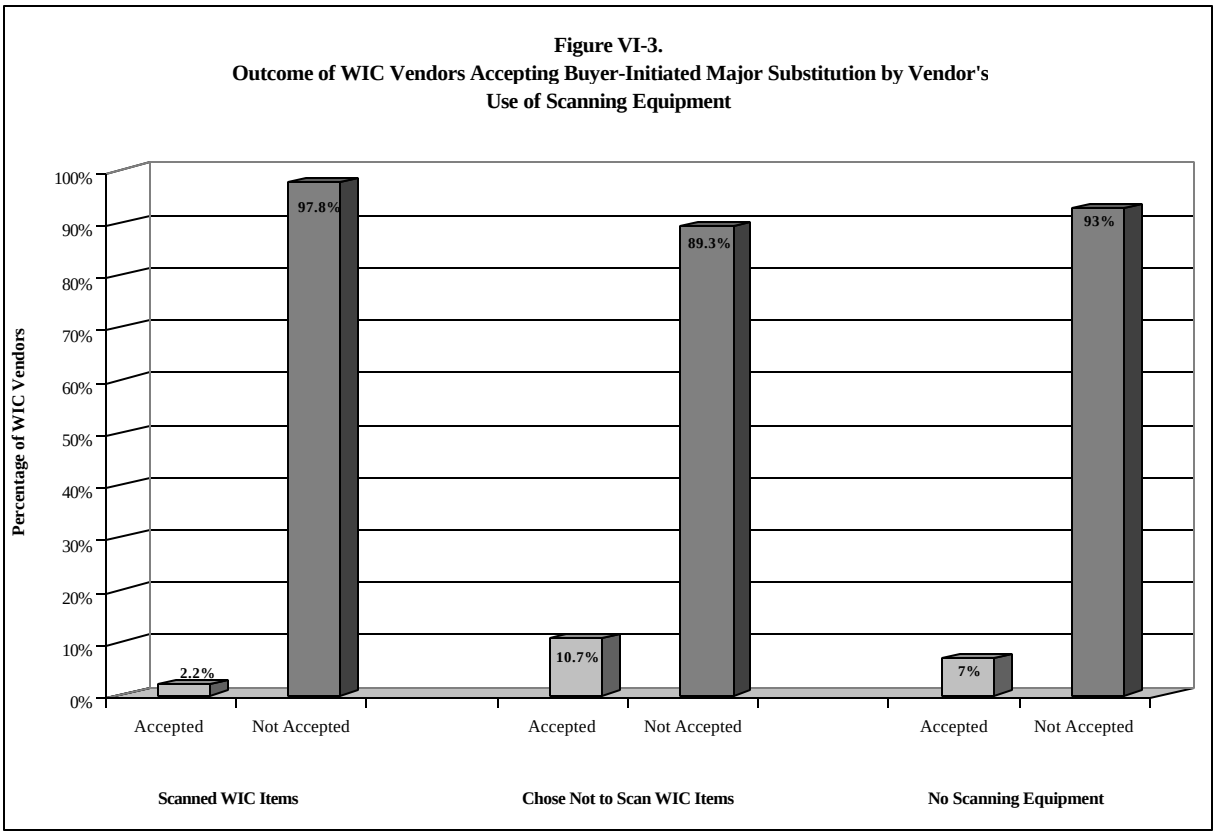
Figure VI-2.
Outcome of WIC Vendors Accepting Buyer-Initiated Minor Substitution by Vendor's Use of Scanning Equipment



WIC vendors allowing buyer-initiated major substitutions was also examined as a function of use of scanning equipment. Among vendors who used scanning equipment for WIC food items, only 2.2 percent allowed major substitutions. Among vendors who chose not to scan WIC items, 10.7 percent allowed major substitutions. Among vendors who had no scanning equipment 7.0 percent allowed major substitutions (see Figure VI-3). When a contrast analysis was conducted to determine

significance across specific cells, WIC vendors who had no scanning equipment allowed significantly more major substitutions than WIC vendors who used scanning equipment (see Table D-7 in Appendix D). It should be noted that this study did not examine the ability of scanning equipment to flag unauthorized food items.

Figure VI-3.
Outcome of WIC Vendors Accepting Buyer-Initiated Major Substitution by Vendor's Use of Scanning Equipment

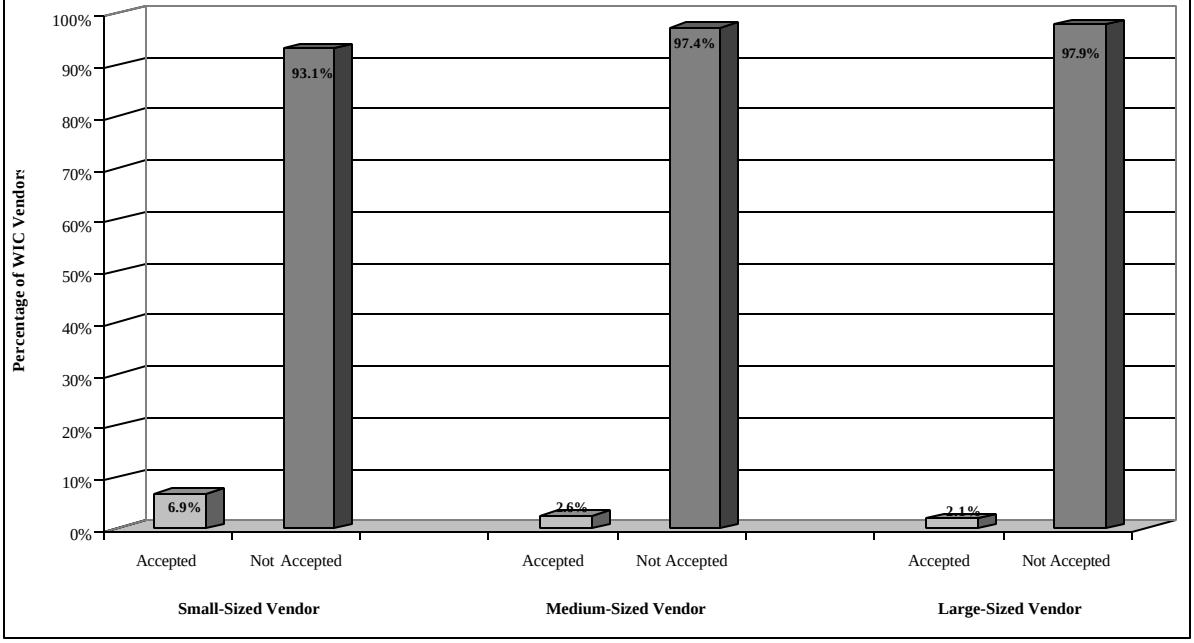


2. Relationship between Vendor Size and Type of Substitution

WIC vendors' allowance of buyer-initiated minor and major substitutions was examined as a function of vendor size. Significant differences were not found among minor substitutions and vendor size. However, vendor size was associated with major substitutions. Among WIC vendors where a major substitution was attempted, small-sized vendors appeared most likely to allow major substitutions: 6.9 percent of the small-sized vendors allowed a major substitution while only 2.6 percent of the medium-sized vendors and 2.1 percent of the large-sized vendors allowed a major substitution (see Figure VI-4). A contrast analysis was conducted to determine significance across specific cells. The analysis

found that small vendors appeared to significantly differ from those vendors of medium and large size (see Table D-7 in Appendix D).

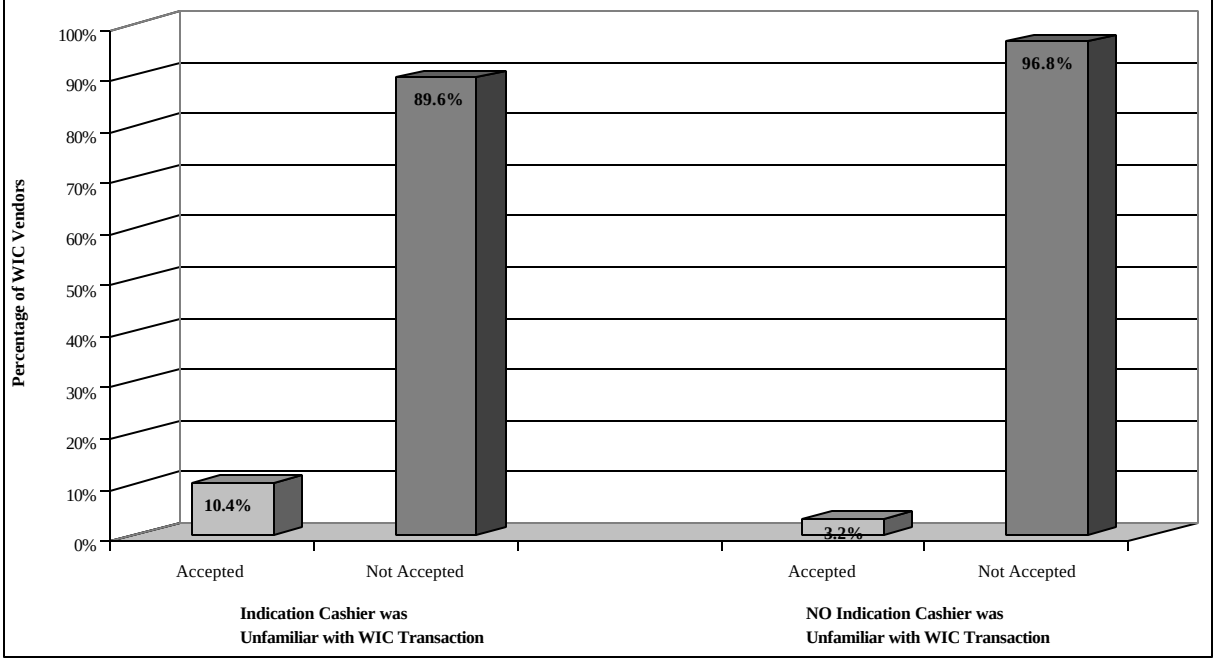
Figure VI-4.
Outcome of WIC Vendors Accepting Buyer-Initiated Major Substitution by Vendor Size



3. Relationship between Cashier Familiarity and Type of Substitution

Familiarity with a WIC transaction was also examined for association with allowing minor and major substitutions. No significant difference was found between minor substitution and cashier unfamiliarity. However, lack of familiarity with WIC transactions was associated with allowing major substitutions. Of the vendors where a major substitution buy was attempted, a substitution was allowed at 10.4 percent of the vendors where a cashier indicated he/she was unfamiliar with a WIC transaction and at only 3.2 percent of the vendors where no indication was given that the cashier was unfamiliar with WIC transactions (see Figure VI-5). A contrast analysis found that a cashier's unfamiliarity with WIC transactions was significantly associated with allowing buyer-initiated major substitutions (see Table D-7 in Appendix D).

Figure VI-5.
Outcome of WIC Vendors Accepting Buyer-Initiated Major Substitution by Cashier Experience



4. Relationship between Locale and Type of Substitution

When data were examined to determine if vendor allowance of minor and major substitutions was associated with vendor locale, no significant associations were found. Among vendors in a metropolitan location, 34.7 percent allowed a minor substitution and 35.6 percent of vendors in a non-metropolitan location allowed a minor substitution. In regards to major substitutions, among vendors in a metropolitan location, 4.3 percent allowed a major substitution and 2.3 percent of vendors in a non-metropolitan location allowed a major substitution.

5. Relationship between Type of Food Instrument System and Type of Substitution

Neither major nor minor substitutions were found to be significantly associated with the type of FI system used by the State. Among vendors located in States with an open FI system 34.5 percent allowed a minor substitution while 35.6 percent of vendors located in States with a vendor-specific FI

system allowed a minor substitution. Regarding major substitutions, among vendors located in States with an open FI system only 3.7 percent allowed a substitution and 5.4 percent of vendors located in States with a vendor-specific FI system allowed a major substitution.

6. Relationship between Administrative Errors and Type of Substitution

Data were also examined to determine whether minor or major substitutions were associated with administrative errors. Insufficient stock, not following proper FI countersignature proceduress, and asking the buyer to pay cash in addition to the FI were not significantly associated with either minor or major substitutions. Vendors offering rainchecks was not significantly associated with a minor substitution, but was significantly associated with whether a vendor would allow a major substitution, in the sense that none of the vendors offering a raincheck allowed a major substitution. Although the number of vendors offering a raincheck was quite small, it is noteworthy that these vendors, which were likely out of stock for a WIC authorized food item, provided a raincheck instead of allowing a substitution for the out-of-stock food item.

During the course of conducting the compliance buys, a small number of vendors asked the buyer to accept the substitution of an unauthorized food item for an authorized food item. This usually occurred when the vendor did not carry a particular food item. Where three buys were completed, one percent of the vendors asked buyers to accept unauthorized items in substitution for the WIC-authorized foods they had attempted to obtain during at least one of the three buys.

This chapter examined the frequency of vendors allowing buyer-initiated minor and major substitutions and how acceptance of buyer-initiated minor and major substitutions varied by vendor and State demographics and administrative errors. Appendix D presents additional information regarding the findings in this chapter.

CHAPTER VII

Conclusion and Discussion

The 1998 WIC Vendor Management Study presents information about the extent to which authorized WIC vendors may be violating program requirements when conducting WIC transactions. However, simply examining the statistics does not provide a complete picture of the issues and challenges facing FNS and WIC State agencies as they attempt to prevent vendor fraud and abuse in the WIC Program and to develop improved methods to detect vendor violations. In this chapter, some of the key findings are discussed in terms of the challenges facing the WIC Program and the opportunities that may be explored to improve State vendor management systems.

A. Challenges Facing WIC State Agencies

One of the challenges facing WIC State agencies is obtaining reliable estimates of the outcome of WIC transactions by participants. Although this study can make reliable estimates regarding the number of vendors who overcharge the WIC Program and/or allow participants to substitute unauthorized foods for their WIC authorized foods, it was not possible to expand on these estimates using reliable transaction data. The results of this study must be viewed in their proper context, in that while the data reflect the variety of possible WIC transactions, they do not necessarily reflect the variety in the proportion that actually occurs. For example, there are no data on the number of participants attempting to substitute unauthorized food items, nor are there data on the number of participants transacting their FIs to obtain only a portion of their authorized foods. In addition, the study was limited in that it was unable to measure the impact of vendor familiarity with the WIC participant on whether or not substitutions were allowed. These issues and their impact on the study results are discussed below:

- **Developing reliable estimates of substitution among WIC participants.** While a considerable number of vendors allowed minor substitutions, and a minimal number allowed major substitutions, there are currently no reliable estimates of how often WIC participants attempt to substitute unauthorized items for items listed on their FI. The fact that 34.7 percent of the WIC vendors allowed the compliance buyers to make minor substitutions is somewhat meaningless without a reliable estimate of how often participants attempt these substitutions. The same is true for the 3.7 percent of vendors who allowed major substitutions. Unless estimates of the actual frequency of such substitution attempts can be obtained, the true extent of the problem can not adequately be defined.

- **Identifying the cause of WIC vendor overcharging**. The issue of vendors overcharging the Program must be examined beyond simply counting the number of vendors overcharging. Exploring the reasons for vendor overcharges provides a context for detecting and preventing this problem. For example, the presence of both overcharging and undercharging may be an indication that errors are committed by the cashier who is viewing the register and then transferring price information onto the FI. To examine this issue, a review was conducted of all vendor overcharge transactions reported in this study. Results showed that 27 percent of the overcharges appeared to be a result of the cashier transposing numbers, such as recording 91 cents instead of 19 cents. However, because there was no way to determine if the transposition was accidental or purposeful, no conclusions could be drawn from this examination. Therefore, it is unknown exactly how much vendor overcharge can be attributed to simple mistakes by the cashier, and how much can be attributed to purposeful attempts to overcharge the Program.

- **Quantifying the extent to which participants purchase only a portion of their WIC food package.** A second issue related to determining the extent of vendor overcharges is the proportion of vendors who overcharged during the partial buy. If a participant does not purchase all of their WIC foods, it is more likely that an overcharge will occur. Because current State FI systems using a FI have no method to verify how much of the food package was purchased during a transaction, there are no reliable data to determine the extent to which a participant decides to purchase only a portion of their WIC food package. It is, therefore, difficult to know the extent of the problem without knowing how often a partial buy takes place.

- **Estimating the impact of vendor familiarity with the individual WIC participant on vendor fraud and abuse levels**. While the 1998 WIC Vendor Management Study made extensive efforts to use data collectors that matched the demographic characteristics of the WIC population being served by a vendor, the data collectors only had three opportunities to conduct a WIC transaction with each vendor. Therefore, it is unknown if results of substitution buys might have been different if the buyer had shopped at the vendor for a longer period of time and thus become familiar to the vendor. It is possible that more substitutions would have been allowed if the vendor was more familiar with the individual WIC participant.

B. Opportunities for WIC State Agencies to Use Study Findings to Improve Vendor Management Systems

Even with the key challenges to the study noted above, the study results still present a number of opportunities for improving State vendor management systems. The association of various vendor demographics and practices with overcharging and substitutions may provide WIC State agencies with key information about how to prevent or detect vendor fraud and abuse. These opportunities are discussed below.

1. Encouraging vendors to use enhanced technology may help to prevent substitutions and overcharges.

The use of technology may be essential in preventing vendors from overcharging or allowing substitutions of unauthorized foods. Certain technologies were observed by the compliance buyers in some vendors that would work to prevent these problems. These technologies included:

- **Vendor use of scanning equipment that identifies WIC purchases by Universal Product Codes (UPCs).** In some vendors where the data collectors tried to substitute unauthorized foods, the scanning system detected the attempt and refused to allow the cashier to process the transaction. These types of scanning systems have the UPC codes of all WIC-approved food items in an accessible database linked to the scanning system. When a cashier identifies the purchase as a WIC transaction through the inputting of a special code or pressing a special cash register key, the system automatically accesses the UPC data and matches it to the transaction. If the product codes do not match, the cashier is alerted to the problem and the transaction is halted. If properly handled by the cashier, the participant would then be required to exchange the food item for one that is approved. The use of UPC scanning codes may be one of the most effective methods by which vendors can prevent their cashiers from allowing minor substitutions, as most of the vendors allowing minor substitutions had scanning equipment. However, using UPC scanning codes may not be as effective in preventing major substitutions, as 51 percent of the stores allowing major substitutions did not have scanning equipment.

- **Vendor use of cash register systems that print the amount of the purchase directly on a personal check.** During the compliance buys some data collectors noted that some cash registers were capable of printing the total amount of a purchase on a personal check. Because many States' FIs are similar to a personal check, it may be possible to use this technology to print the purchase price of the WIC items directly onto the FI. If this were possible, the errors in both overcharging and undercharging attributable to cashier error in recording the price could be significantly reduced.

Although these two technologies have the potential to assist WIC State agencies in preventing overcharges and substitutions, it must be remembered that larger vendors may be more likely to have the resources to afford scanners and the capability to link UPC codes to WIC authorized food items. Smaller vendors in both urban and rural areas may not find it cost-effective to install the scanning equipment or to program the system to flag non-authorized WIC food items. WIC State agencies may need to provide incentives to vendors to encourage use of scanning equipment and implementation of UPC-WIC approved flagging systems, particularly focusing on vendors with high WIC redemptions. It is generally believed that if these technologies were used by all vendors, the overall rates of overcharging and substitution would likely drop. The WIC Program would need to reassess traditional vendor monitoring practices to determine what type of vendor oversight would be needed in an environment where all vendors use scanning systems and have developed a system to flag WIC-approved food items.

2. Using WIC Program participants to assist in monitoring WIC vendor transactions may help to prevent vendor overcharges.

Although participants do not gain anything when a vendor overcharges the WIC Program, they may have much to lose. In situations in which funding shortfalls result in some applicants being placed on waiting lists, losses due to vendor overcharges are directly responsible for preventing some applicants from receiving program benefits. Consequently, State agencies may want to consider encouraging participants to play a more active role in monitoring WIC transactions in two key areas:

- **Requesting participants to insist on signing FIs only after the purchase price has been entered**. Vendors who asked the data collectors to sign the WIC FI prior to entering the purchase price were about four times more likely to overcharge than those vendors who had the participant sign the FI after the purchase price was entered. By educating participants about how vendor overcharges may affect the level of Program participation and asking participants to insist on signing the FI only after the purchase price has been entered, WIC State agencies may be able to reduce the opportunity for a WIC vendor to overcharge the Program.

- **Requiring vendors to provide, and participants to request, receipts for WIC transactions**. Vendors who did not provide a receipt to the data collector were 10 times more likely to overcharge the Program than those providing a receipt. It may be difficult for State agencies to require vendors to always provide the participants with receipts, but some local agencies have had success in encouraging participants to ask for receipts for WIC transactions and to provide these receipts to local agency staff. By requiring vendors to provide a receipt, and asking participants to insist on a receipt, the WIC State agencies may provide a disincentive for vendors to overcharge.

C. Conclusion

The 1998 WIC Vendor Management Study provides important information related to the extent to which vendors overcharge the WIC program and allow substitutions of unauthorized foods during WIC transactions. In addition, the study identifies some of the key demographic and programmatic factors that may be associated with vendor violations. Ongoing efforts by FNS and WIC State agencies to improve vendor management practices and to address some of the factors associated with vendor fraud and abuse will likely result in continued improvements in WIC vendor management systems.

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