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Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) Erroneous Payments to Vendors: Annual Estimates for FY 2010

Summary of Vendor Overcharges and Undercharges for FY 2010

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United States Department of Agriculture **Food and Nutrition Service**

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EXECUTIVE SUMMARY

BACKGROUND

The U.S. Department of Agriculture Food and Nutrition Service (FNS) Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) was designed to respond to the health and nutritional needs of low-income pregnant, breastfeeding, and postpartum women; infants; and children up to age 5. WIC provides participants with food instruments that can be used at authorized vendors to obtain a monthly package of supplemental foods. It also provides nutrition education and health care and social service referrals.

About every 7 years, FNS performs a nationally representative study to examine the extent of error and program violations among food vendors authorized to accept WIC food instruments. The most recent study, the 2005 WIC Vendor Management Study (2005 bookend study[1]), found that overcharges amounted to $6.1 million, while undercharges amounted to $15.4 million. In terms of the $3.32 billion paid by WIC for food in that year, overcharges amounted to 0.18 percent, and undercharges amounted to 0.46 percent.[2]

This report provides improper payment estimates for FY 2010 using a methodology for "aging" the 2005 bookend study. This report updates previous reports providing estimates from FY 2005 to FY 2009. The methodology yields nationally representative estimates of the number of vendors that over- and undercharged and the amount of over- and undercharges across all WIC vendors. (It is important to note that the term "overcharge" refers to a vendor charging the WIC customer more than a non-WIC customer, not charging higher prices than other vendors, and the term "undercharge" refers to a vendor charging the WIC customer less than a non-WIC customer.)

RESULTS

WIC improper payments for FY 2010 amounted to $44.0 million, constituting 1.1 percent of the $4.1 billion in WIC food outlays. This is less than the FY 2009 figure of $49.8 million that constituted about 1.2 percent of total WIC food outlays[3] (see Figure ES-1). Overcharges

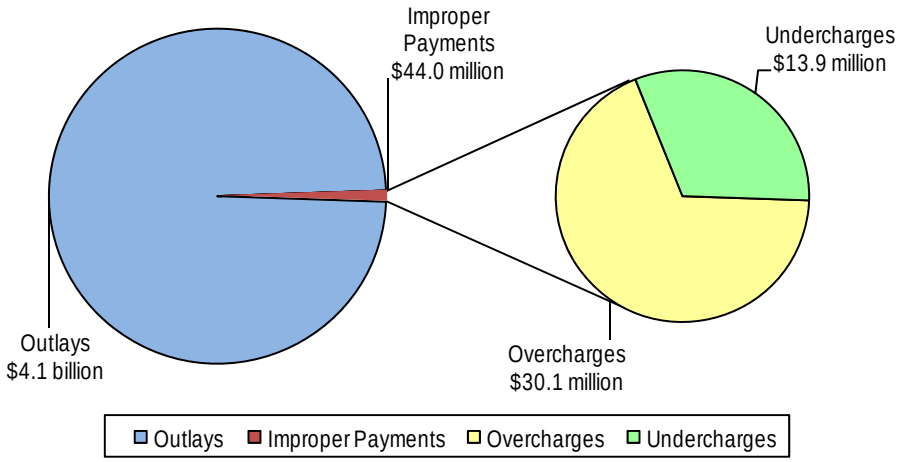
[1] The term "bookend" derives from the fact that these studies occur about every 7 years and, as such, frame a period of time during which no observations were made. The 2005 bookend study represents data collected between October 2004 and March 2005. These updates provide estimates for the years between the 2005 WIC Vendor Management Study and the next WIC Vendor Management Study.

[2] It should be noted that these estimates were different from previous studies in two ways. First, overpayments showed a significant decline in dollar amount. Second, underpayments exceeded overpayments for the first time.

[3] The $4.1 billion represents post-rebate food outlays within 45 States and the District of Columbia. Five States (Alaska, Hawaii, Mississippi, North Dakota, and Vermont) were excluded from the estimate, as were the value of foods delivered by direct distribution in other States, and transactions in pharmacies and commissaries, to maintain

were estimated at $30.1 million (0.7 percent), undercharges at $13.9 million (0.3 percent), and net improper payments at $16.2 million of the annual food outlays.

Figure ES-1. WIC Improper Payments, FY 2010 Update



Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Figure ES-2 shows the trends in overcharges and undercharges as percentages of WIC food outlays for FY 2005–FY 2010. Although the overcharge rate for WIC food outlays showed a decrease from FY 2009 levels, the difference could result from statistical variation due to differences in the investigation sample.

Some sense of whether the difference is real or an artifact of sampling differences can be examined by looking at confidence interval. Confidence intervals were estimated for each of the annual rates to provide a measure of precision. FY 2010's overcharge rate of 0.74 percent lies in a 90 percent confidence interval of 0.53 to 0.97 percent. Although the samples used to establish annual confidence intervals were not designed to test for differences across years, they can be useful in determining whether the annual rates are similar. The previous year's point estimate of 0.86, and the point estimates back to 2007, are contained in the confidence interval around the 2010 estimate. The reduction in the point estimates from FY 2009 to FY 2010 probably should not be interpreted as demonstrating a decline in rates - particularly since the years back to FY 2007 show a relatively similar level. Nevertheless, it should be noted that as a whole, there was about a 1 percent decline in overcharge violations among State agencies during this period. This decline could have resulted from changes in State investigative practices or with the introduction of EBT, which would be expected to reduce error in the program.

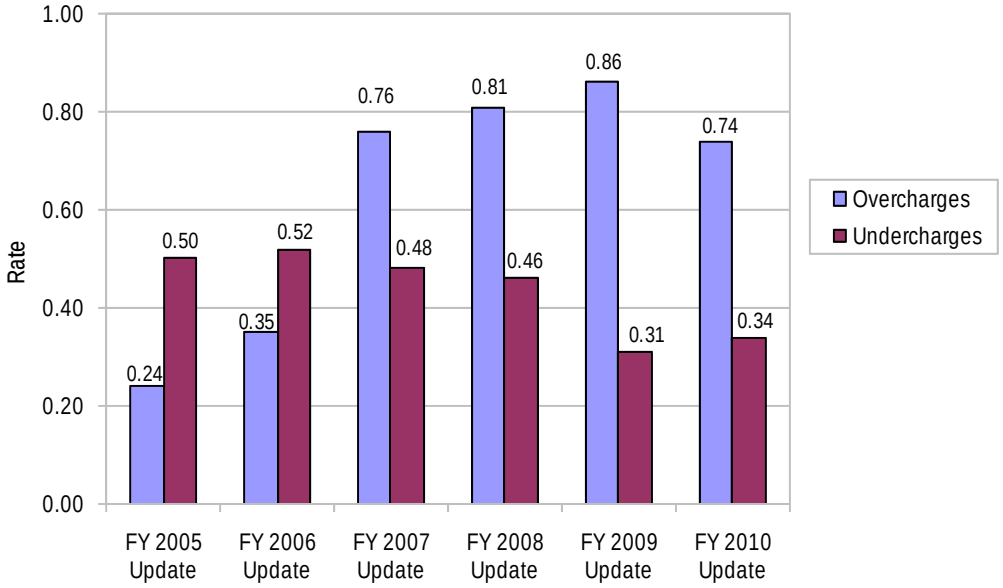
For undercharge rates as a percent of food outlays, the FY 2010 estimate of 0.34 percent falls in a narrow range of 0.32 to 0.35 percent. The FY 2009 estimate of 0.31 percent is outside the 90

consistency with the estimates generated for the 2005 bookend study. The $50 million improper payment estimate for 2010 in USDA's *Performance and Accountability Report* applies the same improper payment rate to all post-rebate food outlays to yield a national estimate.

percent confidence interval around the 2010 estimate. Whether or not this suggests a small increase in the undercharge rate from FY 2009 to FY 2010, it should be noted that both the FY 2009 and FY 2010 rates are lower than the rates for previous years.

Furthermore, from FY 2007 through 2010, both the overcharge amount and rate exceeded the undercharge amount and rate.

Figure ES-2. Comparison of Overcharge and Undercharge Rates by Fiscal Year (FY 2005–FY 2010) (Percentage of WIC food outlays)

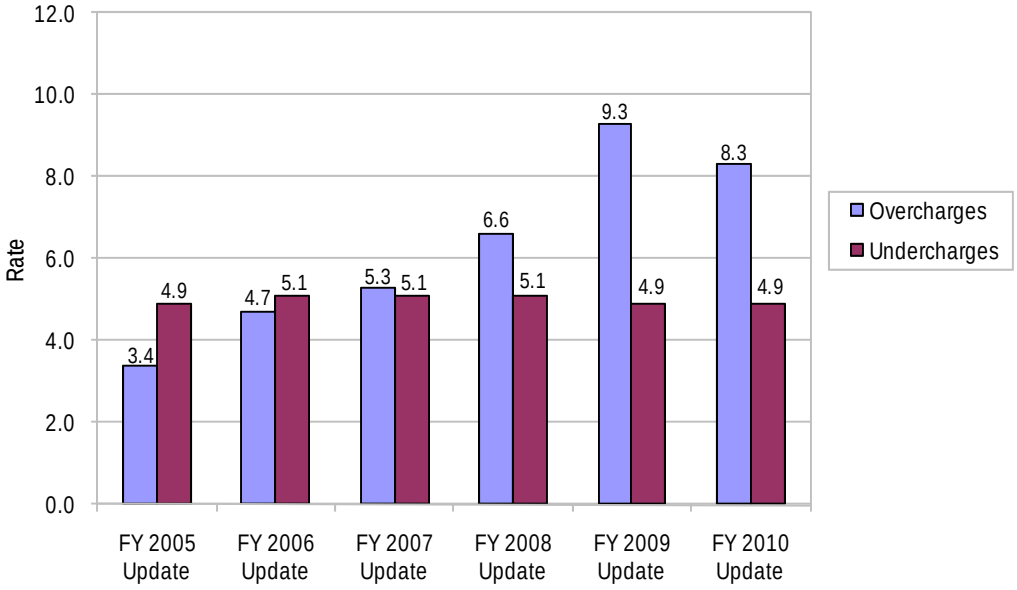


Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

The 8.3 percent vendor-based overcharge rate for 2010 (i.e., the proportion of vendors overcharging; see Figure ES-3) lies in a 90 percent confidence interval of 7.1 to 9.5 percent. The FY 2009 rate, which falls within this confidence interval, should be considered similar to the FY 2010 rate. The same cannot be said for the overcharge rates in earlier years, particularly those from FY 2005 to FY 2007.

No real change is observed in the vendor-based undercharge rates from FY 2005 to FY 2010.

Figure ES-3. Comparison of Overcharge and Undercharge Rates by Fiscal Year (FY 2005–FY 2010) (Percentage of Vendors)



Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

The results indicate that improper payments seem to have leveled off or experienced a slight decline when compared to the previous year, although they are higher than the amounts in years prior to FY 2009.

CHAPTER 1

INTRODUCTION

BACKGROUND

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) was designed to respond to the health and nutritional needs of low-income pregnant, breastfeeding, and postpartum women; infants; and children up to age 5. Established by the Child Nutrition Act of 1966 (as amended by P.L. 92-433) and implemented in 1972, WIC was most recently reauthorized in 2010 through P.L. 111-296. WIC is administered by agencies in the 50 States, the District of Columbia, the 34 Independent Tribal Organizations (ITOs), and the 5 U.S. Territories.

WIC provides women and children with food instruments for purchasing a monthly allotment of nutritious foods, including eggs, cheese, cereal, fruit juice, milk, peanut butter, and beans. Breastfeeding is a priority in the WIC Program, and WIC staff are committed to educating WIC participants about the many benefits of breastfeeding, as well as providing the support breastfeeding mothers need to meet their infant feeding goals. However, for various reasons, some women cannot or choose not to breastfeed. For these mothers, the WIC Program provides the option of iron-fortified infant formula to assure the health and well-being of their infants. Breastfeeding mothers may also receive tuna fish, carrots, and nutritional supplements. In FY 2009, the States implemented a food package that provided a wider range of foods that can be purchased through WIC. Among these additional foods were those that accommodated ethnic food preferences, and fruits and vegetables.

WIC participants obtain these foods by using a food instrument, which designates the type and amount of foods participants may purchase at authorized vendors, and cash value vouchers, which can be used to purchase fresh fruits and vegetables. It should be noted that the cash value voucher, unlike the food instrument, is in the form of dollar-denominated coupon that is contributes to the purchase of an unspecified kind and amount of fruits and vegetables.

Approximately 73 percent of national program expenditures are used for the purchase of supplemental foods. The remaining funds are used for management functions, nutrition education and counseling, breastfeeding promotion, and health care and social service referrals.

WIC's retail food delivery system works through transactions with authorized vendors. The participant presents the food instrument to the vendor, who rings up the purchase, collects the food instrument, adds the food costs for each item, and redeems the instrument with the State

agency. These vendors include small and large food retailers, pharmacies, WIC-only vendors,[4] and commissaries. In Federal fiscal year (FY) 2010 there were approximately 48,000 authorized vendors in the United States and its territories and possessions.[5, 6]

One of the programmatic concerns of the Food and Nutrition Service (FNS) is vendor overcharging.[7] Overcharging occurs when vendors, intentionally or not, charge the WIC participant more than a non-WIC customer for food items prescribed by the food instrument. This results in reducing the funds available to serve other participants. More recently, undercharging has been a concern, although it results in no apparent benefit to the vendor. The Improper Payments Information Act of 2002 (P.L. 107-300) requires FNS to report on these activities.

PURPOSE OF THE STUDY

About every 7 years, FNS performs a study to examine improper payments and other program violations by WIC vendors. Of particular concern relative to improper payments are over- and undercharges Such studies were conducted in 1991, 1998, and, most recently, 2005[8, 9] using covert purchases in a nationally representative sample of vendors to produce estimates of the proportion of stores and the total dollar value of over- and undercharges. These studies have been denoted as bookend studies because they provide estimates at periodic intervals. The last study, the 2005 bookend study, provides the benchmark estimates that were "aged" for subsequent years.

On an annual basis, FNS also receives information on investigations and other actions taken by States and other entities as part of The Integrity Profile (TIP) data system. The TIP system also provides information on other authorized vendors that were not subject to investigations or other actions, including total amounts redeemed during a year. Through TIP, a comprehensive, continually updated portrait of violation-prone vendor activity is provided. Because vendors that have a high-risk profile are selected for investigation, the data from State investigations alone would be expected to overestimate violations and therefore not provide a representative sample, as the 2005 bookend study does. With this in mind, this project is being conducted to adjust the TIP data to provide estimates that are consistent with the 2005 bookend estimates.

[4] WIC-only vendors are stores that sell only WIC foods to WIC participants. In addition, there are WIC above-50-percent vendors, whose WIC redemption dollars are more than 50 percent of their total sales. WIC-only vendors are a special case of WIC above-50-percent vendors, in that all their sales derive from WIC redemptions.

[5] The source for this total is The Integrity Profile (TIP) data file. Some States, such as Mississippi and Vermont, operate food delivery systems independent of the State retail vendor communities.

[6] The roster of WIC agencies in TIP contains duplicate stores. They are duplicates because they are authorized by two different WIC State agencies or have exited the program and reemerged as a new entity. In some cases, larger supermarkets with pharmacies have a WIC authorization number for each component.

[7] Other programmatic concerns include partial buys, substitutions, and trafficking because these subvert the intention of the program. Substitution occurs when an item not on the program is purchased; trafficking involves the outright purchase of food instruments at a discount by the vendor, who then redeems them at full value.

[8] Although the last study references 2005, it used data collected for vendors authorized at the end of the 2004 calendar year. To avoid confusion, we will refer to that study as the 2005 bookend study.

[9] Another study is scheduled to be fielded in 2012, with an expected final report publishing date in late 2013 or early 2014.

The first report under this series of updates was published using the FY 2005 TIP data. The estimates yielded nationally representative statistics on the proportions of vendors found violating (vendor-based rates) and the total amount of redemption dollars resulting in over- or undercharges (redemption-based rates).[10] The focus of the examination was to validate a methodology for producing estimates on an annual basis. Additional estimates were generated by studies conducted for FY 2006 through FY 2009 using the TIP data submitted for each year. The estimates provided in this study use the FY 2010 TIP data file. The following research questions were examined:

- What are the national and regional dollar estimates of vendor over- and undercharges to the WIC Program as a result of erroneous payments to WIC vendors?
- Do the rates and dollar estimates of erroneous payments vary by type of vendor (e.g., regular retail, WIC-only, WIC above-50-percent) and/or the duration of vendor authorization (new or existing)?
- Did the change in WIC eligible foods impact over- and undercharging?

[10] Throughout the rest of this report, "redemption dollars" and similar terminology is used to describe outlays for WIC food purchases, i.e. WIC food costs after rebates have reduced the net cost to the government.

CHAPTER 2

METHODOLOGY

To address the research questions, an approach for updating the statistics generated by the 2005 bookend study was developed. The approach required consistency with the definitions of that study. Two separate methodologies were developed: one each for the estimations of overcharges and undercharges.

To estimate overcharges, a post-stratification weighting algorithm known as raking was applied to the TIP data. TIP is a roster of all WIC vendors authorized by State agencies. It contains information on WIC vendor characteristics, annual redemption dollars, monitoring, investigations, and audit activities. Because investigators target vendors that are most likely to be error prone, using TIP data without adjustment for this tendency would result in an overestimate of erroneous payment activity. The weights generated through the raking algorithm allow the TIP data to be adjusted to more reasonably reflect the activities of all WIC vendors.

Estimating undercharges required a different approach because TIP does not contain information on vendor undercharging. Undercharge estimates were based on the data collected in the 2005 bookend study, adjusted for changes in WIC redemption dollars and vendor characteristics. Using the results of a logistic regression conducted with the 2005 bookend data, the probability of undercharging was estimated for every vendor in the TIP file. Similarly, using the results of a linear regression conducted with the 2005 bookend data, the dollar value of annual undercharges (assuming that the vendor undercharged) was calculated for each vendor in the TIP file. For each vendor, the probability of undercharging was then multiplied by the annual value of undercharges to determine the expected value of undercharges. Undercharge estimates presented in this report are based on this expected value.

This report provides information that updates the 2005 bookend study and subsequent estimates through FY 2009, using data from the FY 2010 TIP profile. Estimates are provided on four measures of improper payments:

- **Overcharges—**the extent to which the WIC Program overpaid on safe transactions with vendors, where a safe transaction is defined as one in which the foods presented to the retailer match, both in identity and quantity, those listed on the food instrument;
- **Undercharges—**the extent to which the WIC Program underpaid on safe transactions with vendors;

- **Total improper payments—**the sum of the absolute values of overpayments and underpayments; and
- **Net improper payments—**the difference between total overpayments and total underpayments.

In this report, the measurement of overcharges uses a post-stratification methodology that focuses on translating the results of TIP investigations to the population of WIC vendors.[11] Undercharges are estimated through the use of relationships suggested by the 2005 bookend data projected onto the entire FY 2010 population of WIC vendors.[12] Each of these measures is presented in the form of vendor-based and redemption-based estimates, defined as follows:

- **Vendor-based estimates—**numbers and percentages of vendors involved in over- or undercharging during the FY 2010 reporting period. Because of the definitions and methodologies employed, vendor-based rates for the total and net improper payment estimates are not possible.
- **Redemption-based estimates—**numbers and percentages of all redeemed WIC dollars resulting from over- or undercharging. Redemption-based rates are also provided for total and net improper payment estimates.

This report presents estimates of vendor- and redemption-based over- and undercharge rates for FY 2010 and compares these estimates with those derived in the FY 2005 through FY 2009 annual updates. It describes potential factors affecting variations in improper payments (over- and undercharges), such as vendor type. Significance testing was not done because the focus was on whether there were any large differences, rather than on the detection of small differences that might be significant. It should be noted that all the estimates indicate that over- and undercharging represent a relatively small proportion of all redemptions and thus pose a small risk to program integrity. Although no significance testing was done, information on confidence intervals is presented in Appendix E. This should give the reader a context for noting possible differences due to the samples and methodologies used to produce the estimates.

In addition to developing estimates of over- and undercharging, this report explores the effect of the changes in the WIC food package on over- and undercharging. The essence of this analysis is to use previous and current estimates to describe trends were the changes not implemented and to compare them to what occurred in FY 2009 and FY 2010.

[11] See Appendix B for a more complete discussion of the methodology for developing estimates of overcharges.
[12] The methodology for developing estimates of undercharges is described in Appendix C.

CHAPTER 3

RESULTS

NATIONAL ESTIMATES OF OVERCHARGES AND UNDERCHARGES

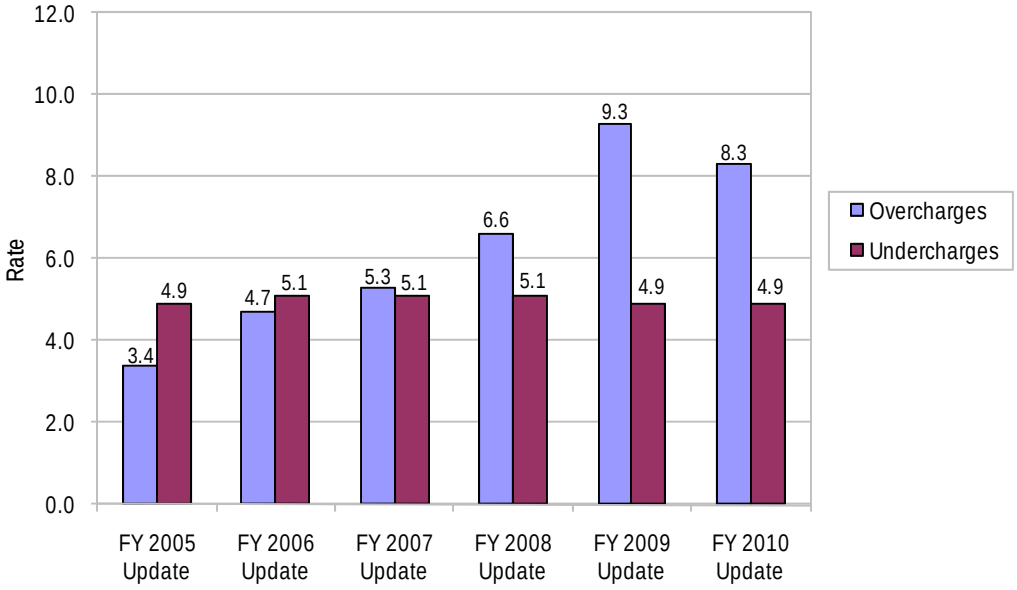
Overcharges

The overcharge estimate tailed off in 2010 after a continued upward trend in vendor- and redemption-based rates between FY 2005 and FY 2009 (see Figures 1a and 1b). The FY 2010 estimate indicated that approximately 8.3 percent of WIC vendors overcharged and that their overcharges accounted for $30.1 million, or 0.74 percent, of the $4.1 billion redeemed that year. This is a decrease from the amount estimated for FY 2009, in which 9.3 percent of WIC vendors were estimated to have overcharged about $36.7 million, or 0.86 percent, of all redemption dollars. Some sense of whether the difference is real or an artifact of sampling differences can be examined by looking at confidence interval. Confidence intervals were estimated for each of the annual rates to provide a measure of precision. FY 2010's overcharge rate of 0.74 percent lies in a 90 percent confidence interval of 0.53 to 0.97 percent. Although the samples used to establish annual confidence intervals were not designed to test for differences across years, they can be useful in determining whether the annual rates are similar. The previous year's point estimate of 0.86, and the point estimates back to 2007, are contained in the confidence interval around the 2010 estimate. The reduction in the point estimates from FY 2009 to FY 2010 probably should not be interpreted as demonstrating a decline in rates - particularly since the years back to FY 2007 show a relatively similar level. Nevertheless, it should be noted that as a whole, there was about a 1 percent decline in overcharge violations among State agencies during this period. This decline could have resulted from changes in State investigative practices or with the introduction of EBT, which would be expected to reduce error in the program.

The 8.3 percent vendor-based overcharge rate for 2010 (i.e., the proportion of vendors overcharging) lies in a 90 percent confidence interval of 7.1 to 9.5 percent. The FY 2009 rate, which falls within this confidence interval, should be considered similar to the FY 2010 rate. The same cannot be said for the overcharge rates in earlier years, particularly those from FY 2005 to FY 2007.

No real change is observed in the vendor-based undercharge rates from FY 2005 to FY 2010.

Figure 1a. Comparison of Overcharge and Undercharge Rates by Fiscal Year (FY 2005–FY 2010) (Percentage of Vendors)



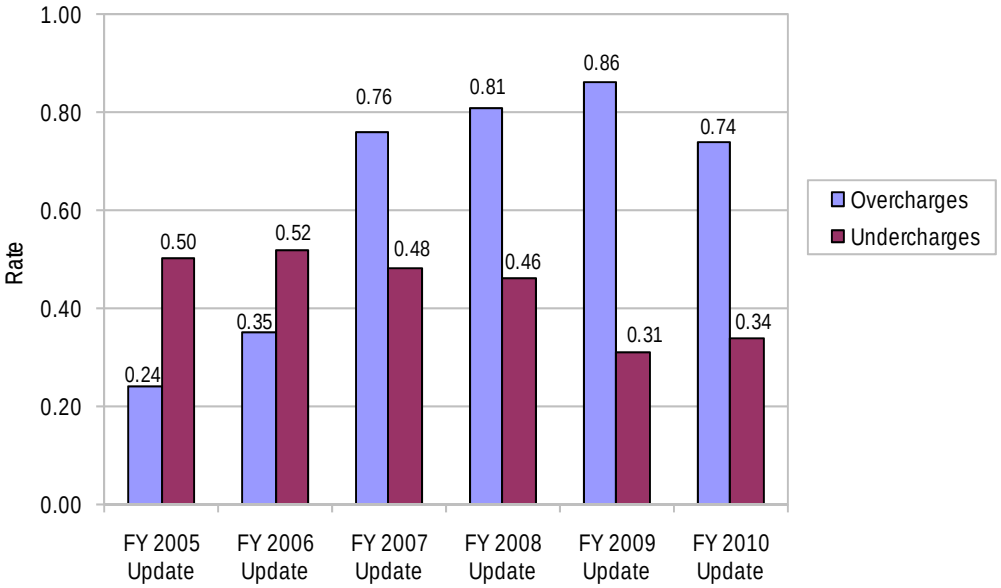
Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Undercharges

Vendor-based undercharge rates declined in comparison to previous estimates for FY 2005–FY 2009, while redemption-based undercharge rates remained the same (see Figures 1a and 1b). In FY 2010, 4.9 percent of the vendors were estimated to have undercharged, for an estimated amount of $13.9 million, or 0.34 percent, of the total food outlay for that year. In comparison, in the FY 2009 update, 4.9 percent of the vendors undercharged an estimated equivalent of $13.9 million in food outlays, a rate of 0.31 percent of all redemption dollars.

For undercharge rates as a percent of food outlays, the FY 2010 estimate of 0.34 percent falls in a narrow range of 0.32 to 0.35 percent. The FY 2009 estimate of 0.31 percent is outside the 90 percent confidence interval around the 2010 estimate. Whether or not this suggests a small increase in the undercharge rate from FY 2009 to FY 2010, it should be noted that both the FY 2009 and FY 2010 rates are lower than the rates for previous years.

Figure 1b. Comparison of Overcharge and Undercharge Rates by Fiscal Year (FY 2005–FY 2010) (Percentage of Redemption Dollars)



Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

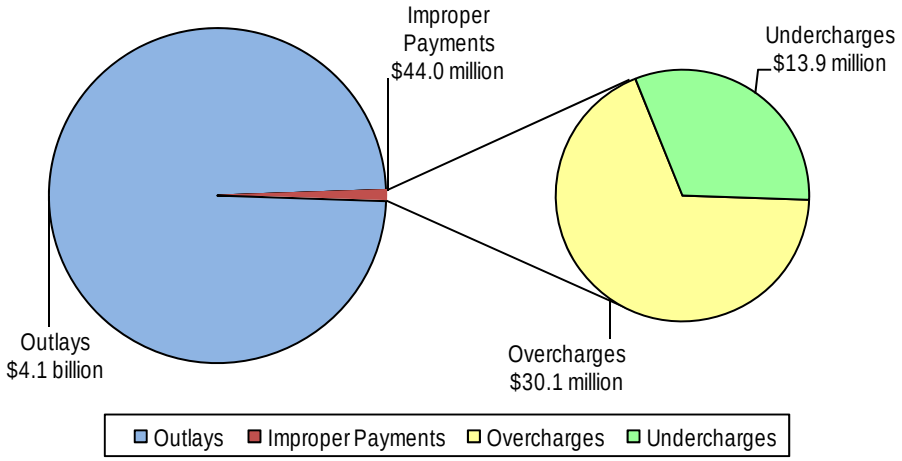
With regard to both over- and undercharges, it should be noted that the redemption-based rates are very small, translating to about $0.74 overcharged and $0.34 undercharged for every $100 redeemed in FY 2010 (see Figure 1b). The small magnitude of error should be kept in mind when examining the estimates, especially when considering the dramatic drop in undercharge rates.

Total Improper Payments

Total improper payments for FY 2010 were estimated at $44.0 million (see Figure 2).[13] This figure accounts for about 1.1 percent of all redemption dollars. Net improper payments were equal to $16.2 million, indicating that overpayments, by a relatively large degree, exceeded underpayments.

[13] The $4.1 billion figure for food outlays represents post-rebate food outlays within 45 States and the District of Columbia. Five States (Alaska, Hawaii, Mississippi, North Dakota, and Vermont) were excluded from the estimate, as were the value of foods delivered by direct distribution in other States, and transactions in pharmacies and commissaries, to maintain consistency with the estimates generated for the 2005 bookend study. The $50 million improper payment estimate for 2010 in USDA's *Performance and Accountability Report* applies the same improper payment rate to all post-rebate food outlays to yield a national estimate.

Figure 2. WIC Improper Payments, FY 2010 Update



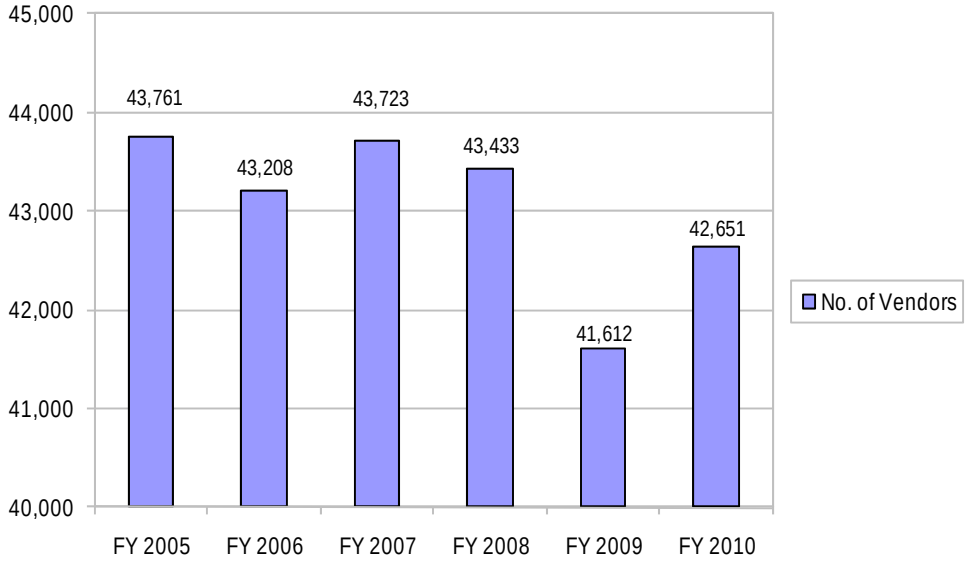
Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

SUMMARY OF ACTIVITY (FY 2005–FY 2010)

Figures 3a–3c present summary trends of the number of vendors included in the study, the amount of food outlays accounted for by these vendors, and WIC over- and undercharge improper payments.

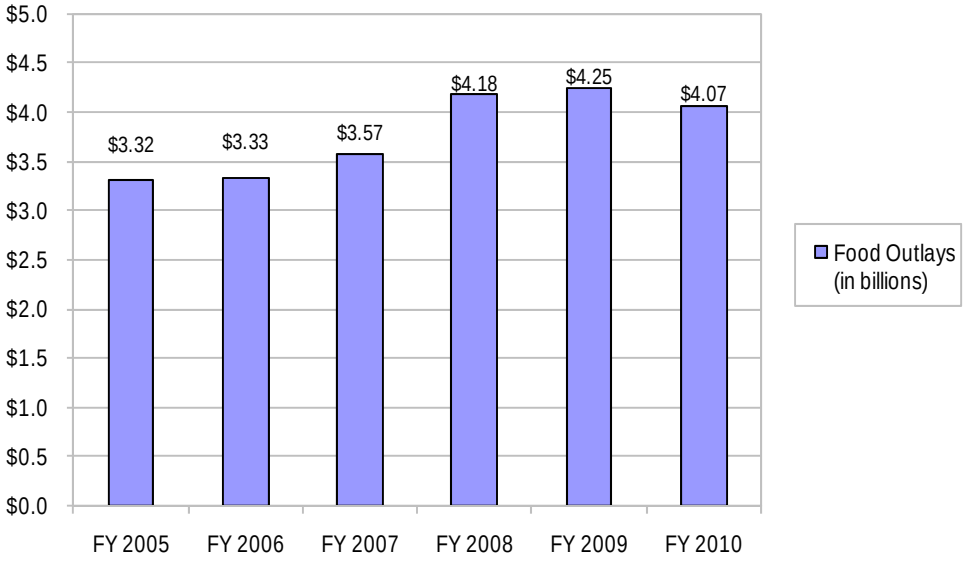
From FY 2005 to FY 2008, the number of WIC vendors remained between 43,000 and 44,000 stores. However, after falling to 41,612 in FY 2009, the number of vendors increased to 42,651 in FY 2010. This number represents vendors in 45 States and the District of Columbia. Five States (Alaska, Hawaii, Mississippi, North Dakota, and Vermont) were excluded from the estimate to maintain consistency with the estimates generated for the 2005 bookend study. From FY 2005 to FY 2009, food outlays increased from $3.3 billion to $4.3 billion, but declined to $4.1 billion in FY 2010. The food outlay amounts presented in Figure 3b excluded redemptions of vendors from the States and territories cited as excluded above and attempted to eliminate formula rebate redemptions.

Figure 3a. Number of Vendors Used To Generate Estimates



Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

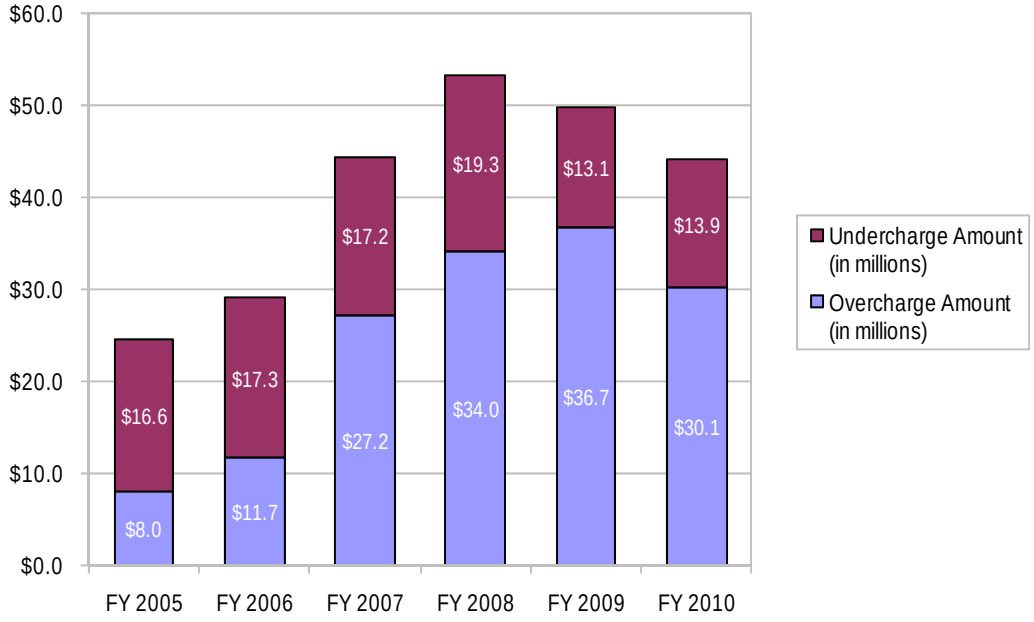
Figure 3b. Food Outlays of Vendors Included in the Study



Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

During the FY 2005 to FY 2009 period, total improper payments (over- and undercharges) increased from about $25 million to about $50 million and then declined again to $44 million in FY 2010 (see Figure 3c). Undercharges also increased between FY 2005 and FY 2008 but then suddenly declined in FY 2009 to $13.1 million, from $19.3 million in FY 2008. Although undercharges increased a little in FY 2010, the amount was relatively close to the FY 2009 figure ($13.1 million in FY 2009 and $13.9 million in FY 2010).

Figure 3c. Trends in Total Improper Payments, Overcharge and Undercharge Amounts



Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

POTENTIAL CONTRIBUTING FACTORS TO OVERCHARGING AND UNDERCHARGING

As previously indicated, interpretation of the data in this report must take into account the fact that because the overcharge and undercharge numbers are very small, there is the possibility that differences from one year to the next could be within normal acceptable limits of variation. This is particularly the case when trying to examine or assess the effects of the potential contributing factors to over- and undercharging.

In addition to the overall national figures presented above, vendor-based and redemption-based over- and undercharge rates were examined in more detail by selected vendor characteristics for the following reasons:

- To provide information on the possible factors leading to the increase or decrease in improper payments rates; for example, a higher rate for a vendor type may mean that the vendor type is more prone to over- or undercharging;
- To gain an understanding of changes in investigative patterns that might affect the national-level statistics on improper payments; and
- To seek ways to improve the estimation methodologies.

Vendor Type

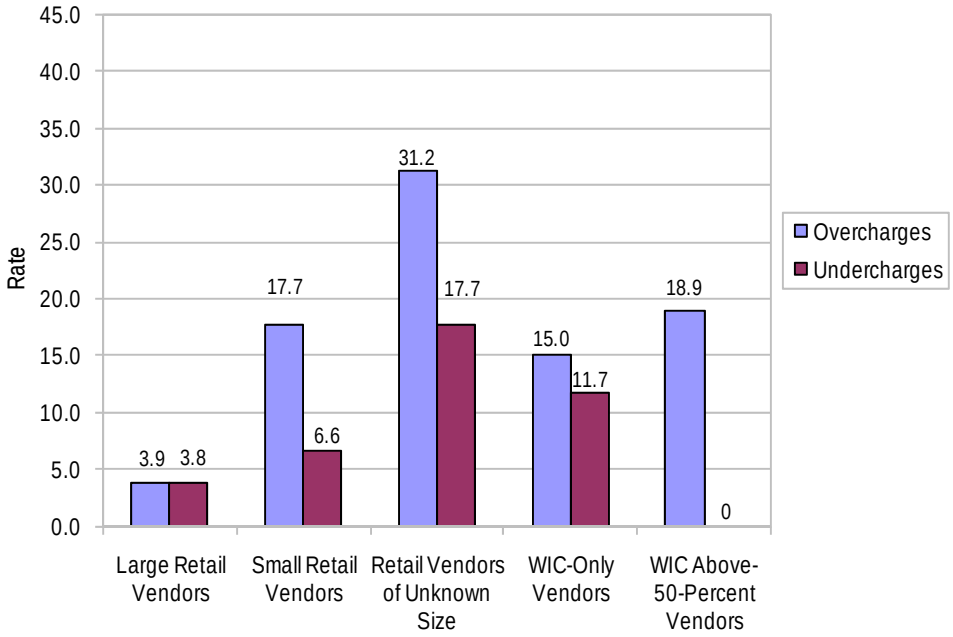
In FY 2010, large retail vendors had a vendor-based overcharge rate of 3.9 percent (see Figure 4a), compared with 5.5 percent in the previous year. Other types of vendors had overcharge rates as follows:

- 17.7 percent for small retail vendors, compared with 19.7 percent in the previous year;
- 31.2 percent for retail vendors of unknown size, compared with 23.4 percent in the previous year;
- 15.0 percent for WIC-only vendors, compared with 4.0 percent in the previous year; and
- 18.9 percent for WIC above-50-percent vendors, compared with 30.3 percent in the previous year.

With regard to overcharges, there was some difference between the FY 2009 and FY 2010 numbers. It should be noted that the SNAP store classifications, which were used to characterize WIC retailer vendors, were modified in 2007. How different stores were reclassified could have an impact on the final statistics.

With regard to undercharges, the FY 2010 vendor-based rates were generally similar to previous estimates. WIC above-50-percent and large retail vendors showed the lowest undercharge rates (no undercharging and 3.8 percent, respectively), and retail vendors of unknown size exhibited the highest undercharge rate (17.7 percent) (see Figure 4a).

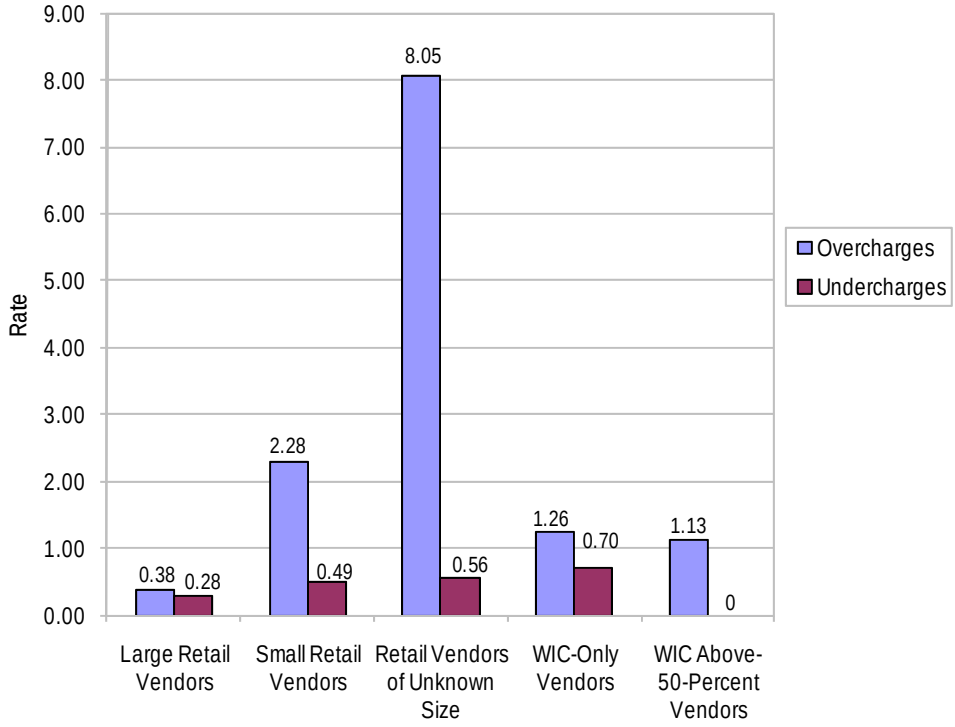
Figure 4a. Vendor-Based Overcharge and Undercharge Rates, by Vendor Type, FY 2010 Update



Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

In terms of redemption dollars, large retail vendors had the lowest overcharge rate (0.38 percent) of all store types, which was lower than the 0.67 percent rate estimated for FY 2009. Retail vendors of unknown size had the highest rate at 8.05 percent, while other types of vendors clustered between 1 and 3 percent (see Figure 4b). With regard to redemption-based undercharges, in FY 2010 large retail vendors had the lowest rate (0.28 percent), aside from WIC above-50-percent vendors, which showed no undercharging. The other vendor types ranged from 0.49 to 0.70 percent of redemptions.

Figure 4b. Redemption-Based Overcharge and Undercharge Rates, by Vendor Type, FY 2010 Update



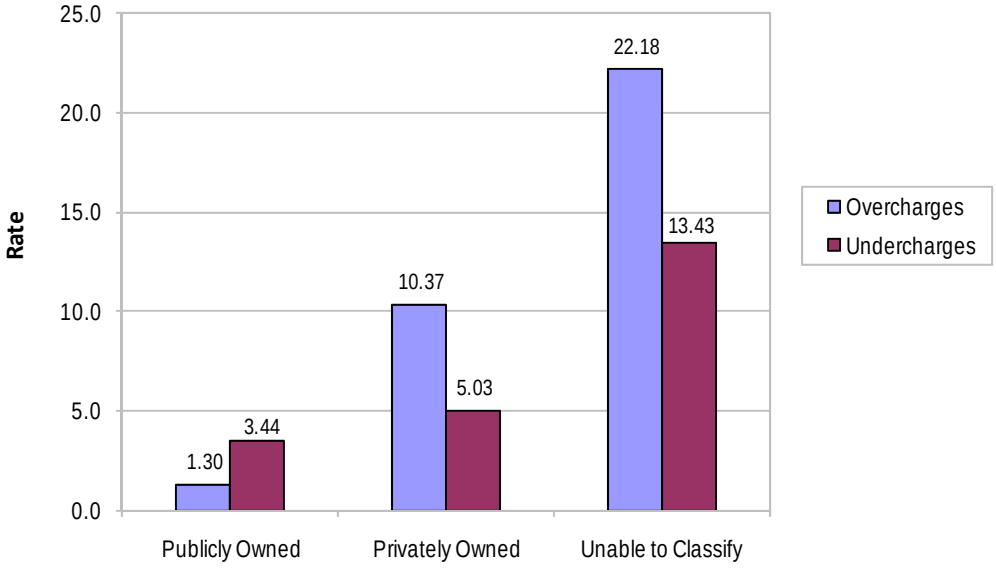
Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Ownership Type

Retailers were classified as publicly and privately owned, with some retailers and WIC-only stores classified as unknown. In this context, publicly owned means publicly traded while privately owned means not publicly traded (i.e., all stores in this study are in what is known as the private sector). The thought here was that publicly owned stores have operations that are open and transparent and thus would be more likely to have management controls in place to avoid violations. The results, as observed in previous studies, reveal that there is a disparity between these two types of vendors. Publicly owned vendors are much less likely to over- and undercharge than privately owned retailers. For example, in Figure 5a, 1.3 percent of publicly owned retailers overcharged, compared with 10.4 percent of privately owned retailers. Furthermore, those vendors that could not be classified were notably more prone to overcharge

than the other two groups. The patterns for undercharges were similar, although the disparity between publicly and privately owned stores was much less.

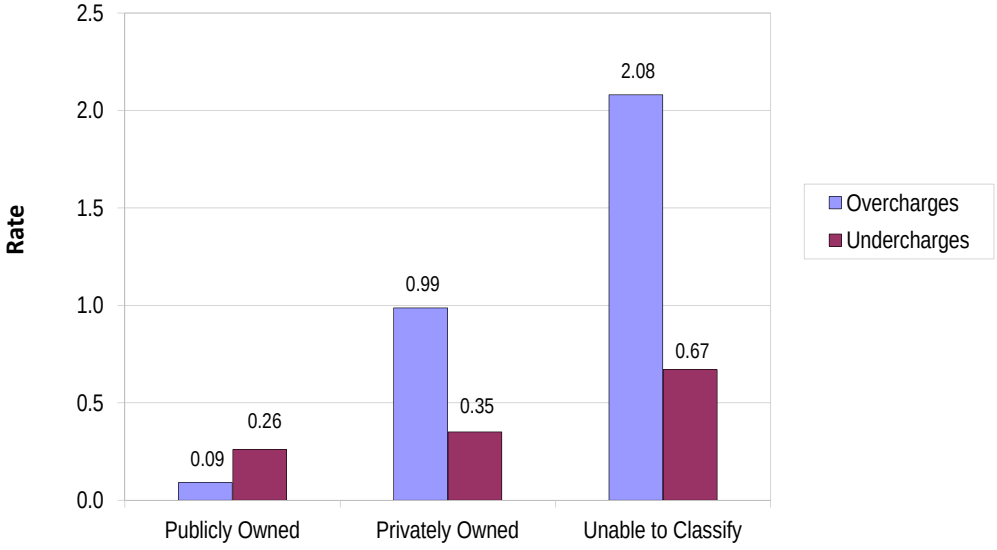
Figure 5a. Vendor-Based Overcharge and Undercharge Rates, by Vendor Ownership, FY 2010 Update



Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

In terms of redemptions, there is a relatively large difference in redemption-based overcharge rates between publicly and privately owned vendors (see Figure 5b). It should be noted that vendors that could not be classified have much higher overcharge rates than privately owned vendors. With regard to undercharges, variation across the three ownership types is less notable.

Figure 5b. Redemption-Based Overcharge and Undercharge Rates, by Vendor Ownership, FY 2010 Update



Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Changes in the WIC Food Package

FNS required that State agencies implement a revised WIC food package by October 2009. This package included foods that have more appeal to individuals with different ethnic backgrounds, and it allowed for the purchase of fruits and vegetables. Although these additional foods still use the traditional food instrument that specifies the type and quantity of the product (and not the price, although a maximum allowable amount may be identified), the purchase of fruits and vegetables is facilitated through a separate dollar-denominated voucher. With these changes the potential for errors would be expected to increase, because the new packages may result in processing complications for the WIC retailer. For example, errors may result from the fact that the new fruit and vegetable benefit is dollar denominated and offered on a separate voucher, while traditional WIC vouchers are defined based on number and size of package or product weight. However, this change would probably dissipate with time as vendors became familiar with the new instrument and voucher. This section attempts to measure the effect, if any, of these changes in the food package on over- and undercharges.

Effect on Overcharging

For the development of annual overcharge estimates, TIP has been the primary source of information on overcharging in general. However, neither TIP nor any other currently available data source offers any specific information on how the investigations are conducted and thus no linkage to whether overcharges were related to changes in the WIC food packages. However, if we assume that investigations include the full range of purchase options available through food instruments and cash value vouchers, we might expect that any confusion due to the changes would show up during regular food purchases. In other words, this expression would yield a greater percentage of violations than would have occurred had the new food packages not been

implemented. To examine this question, an interrupted time series approach is used to detect significant differences between pre-change and post-change outcomes, with outcomes being defined as an overcharge. The major comparison is based on constructing an intervention variable that represents the period in which the food package changes were in effect. That intervention variable would indicate the degree to which the outcome variable, as measured in the intervention period, changed relative to earlier periods.

In estimating the overcharge impact related to the change in food packages, we used investigations information provided by TIP.[14] TIP data from FY 2005 to FY 2010 were assembled, and the file was processed to include those records in which the investigation was completed. We also confined the study to the States and vendor types that were used for generating the FY 2010 estimates presented earlier in this chapter. Two States, New York and Delaware, implemented the food package in early January 2009, about 3 months into the fiscal year. All others implemented the food package in the latter part of FY 2009.[15] Because TIP does not provide a monthly profile of investigative activity, we considered FY 2009 and FY 2010 as the intervention period for New York State and Delaware and FY 2010 as the intervention period for all other States. For New York State and Delaware, we assumed that if the change in the food package had any effect, it would begin to show up in FY 2009.[16]

In examining the changes in the overcharge rate over time, Exhibit 6 reveals that the violation rate (blue line) trends upward between FY 2006 and FY 2009. The rate declines slightly for FY 2009 and FY 2010, leading us to think that changes in the food package had no effect. It should be noted that New York State accounted for a very large proportion of investigations. Of the 3,872 investigations occurring in FY 2010, 1,174, or 30.32 percent, were conducted in New York State. Thus, in the following analysis we will look at New York separately from other States. The trend line for New York State showed dramatic increases in the overcharge rate, including the time period from FY 2009 to FY 2010. Although this might be consistent with the hypothesis that overcharging increased as a result of the introduction of the new food package, it does not account for the dramatic rise in the overcharge rate throughout the period. For other States, there was a slight decline in the rate. There is one seeming inconsistency related to the overcharge rates in FY 2010.

Because of the level of activity and the earlier implementation of the new food package in New York State, we will separately explore the effect in New York and in other States.[17] Because of issues with the FY 2005 value (related to its similarity to the FY 2006 value, which seemed to initiate a growth in the overcharge rate), we limited the regression analyses to FY 2006 to FY 2010.

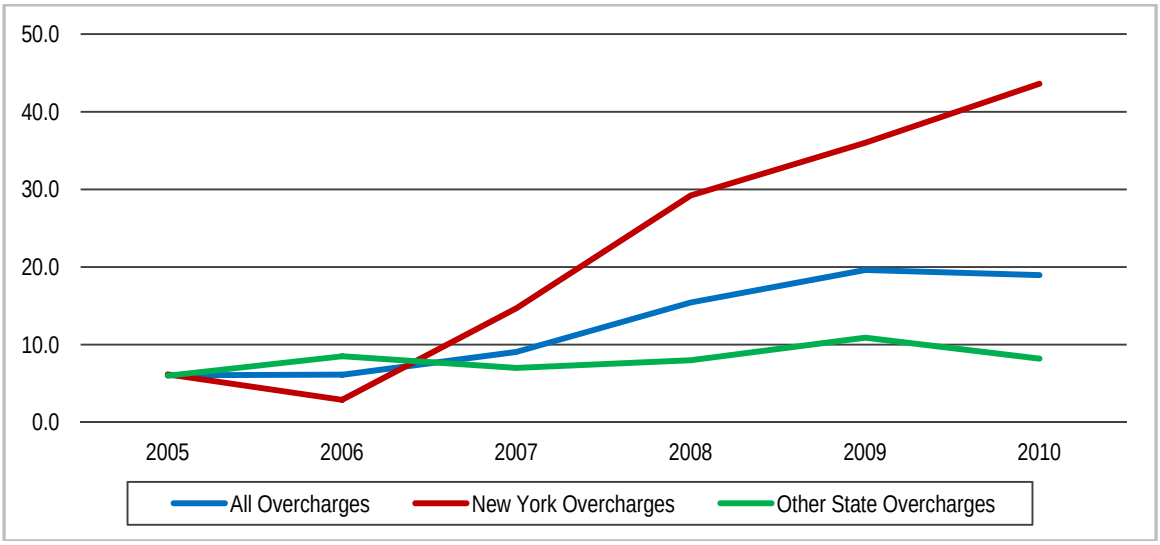
[14] As discussed previously, this sample contains a selection bias that tends toward including those vendors that are most prone to violate. However, we would expect that the sample would be consistently biased over the years with the no reason to assume that there are selection issues with the magnitude of the bias.

[15] See Appendix F for implementation dates.

[16] One issue is the lag between the actual covert purchases made during an investigation and its completion. It could be argued that many investigations completed in FY 2009 were conducted in FY 2008, before the package was adopted.

[17] As in the other chapters, ITOs, U.S. Territories, Alaska, Hawaii, Vermont, North Dakota, and Mississippi were eliminated from this analysis.

Exhibit 6. Trend in the Overcharge Violations Rate



Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

To measure the effect independent of the trend and changes in the composition of the vendors, we developed the following model.

$$\Pr(Overcharge(i)) = e^{y}/(1 + e^{y})$$

Where y is a linear combination defined by:

$$y = \alpha + b1\ trend + b2\ intervention \sum_{i=3}^{15} \beta iXi + \varepsilon$$

- α is an intercept term that contains the estimate for cases that are not explicitly included in the equation.
- $b1$ represents a linear trend term, which controls for the linear increase in the proportion of violations.
- $b2$ represents the effect of the impact of the change in the food package (the intervention) controlling for the trend and other variables.
- β_i represent terms that will help ensure that any effect is not due to changes in the vendor population.
- ε is the error term.

The X_i's include the following covariates or control variables:

- Store Type:
  - Large Stores
  - Small Stores
  - Retailers of Unknown Size

    - WIC-Only Retailers
    - WIC Above-50-Percent Stores

- Ownership:

    - Public
    - Private
    - Ownership Not Known

- Poverty Level:

    - Twenty Percent Under the Poverty Level
    - Twenty to Thirty Percent Under the Poverty Level
    - Thirty or More Percent Under the Poverty Level

- Urbanization Level:

    - Less Than 50 Percent Urbanized
    - Between 50 and 90 Percent Urbanized
    - More Than 90 Percent Urbanized

- Vendor Authorization Status:

    - Authorized in Last Fiscal Year
    - Authorized Prior to Last Fiscal Year

Analysis for New York State—Over the 5-year period, 7,240 stores in New York State were investigated, and 1,656 (23 percent) were found to be overcharging. Equation 1 was fit to these observations through a logistic regression, with the overall results showing that the only factor not significant is the poverty level of the vendor's neighborhood (see Exhibit 7).

Exhibit 7. GLM Regression Results for Predicting the Probability of an Overcharge (New York State)

Source	DF	Chi-Square	Pr > ChiSq
Trend Term	1	349.36	<.0001
Change in Food Package	1	21.61	<.0001
Vendor Type	3	240.55	<.0001
Ownership Type	2	21.08	<.0001
Urbanization Level	2	175.79	<.0001
Poverty Level	2	2.08	0.3537
Vendor Authorization Status	1	90.02	<.0001

Exhibit 8 presents details on these factors. The exhibit shows the variables, the value being modeled, the degrees of freedom, an estimate, standard error, confidence limits, chi-square, and probability that the estimate is significant. The estimates show that there is a significant and positive trend, and the difference between the intervention and nonintervention periods is significant and negative. Once the trend and other vendor characteristics have been controlled, the intervention (change in the food package) has a negative coefficient, meaning that the change in the food package, if anything, resulted in fewer overcharge errors.

Exhibit 8. Maximum Likelihood Parameter Estimates

Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept	1	-1417.09	80.9098	-1575.67	-1258.51	306.76	<.0001
Trend	1	0.7048	0.0403	0.6258	0.7838	305.74	<.0001
Change in Food Package	1	-0.5324	0.1144	-0.7566	-0.3083	21.67	<.0001
Large Stores	1	-1.3363	0.2478	-1.8219	-0.8507	29.08	<.0001
Small Stores	1	0.0058	0.2344	-0.4536	0.4652	0.00	0.9803
Store Type Unknown	1	0.3984	0.3564	-0.3002	1.0969	1.25	0.2637
Privately Owned	1	1.3166	0.4307	0.4725	2.1608	9.35	0.0022
Publicly Owned	1	0.2681	0.5643	-0.8379	1.3741	0.23	0.6347
Low Urbanization	1	-2.6492	0.3670	-3.3685	-1.9300	52.12	<.0001
Suburban	1	-1.9298	0.2663	-2.4517	-1.4078	52.51	<.0001
Low Level of Poverty	1	0.0945	0.0764	-0.0553	0.2442	1.53	0.2162
Moderate Level of Poverty	1	-0.0091	0.0808	-0.1674	0.1491	0.01	0.9099
New Vendor	1	-1.1998	0.1408	-1.4758	-0.9238	72.58	<.0001

Analysis for States Other Than New York—In total, there were 13,680 vendors investigated over the 5-year period in States other than New York. Exactly 1,124 (8.2 percent) were found to be overcharging. Exhibit 9 provides information on the significance of the various factors in the model. All except for the poverty level of the vendor's neighborhood are significant.

Exhibit 9. GLM Regression Results for Predicting the Probability of an Overcharge (Other States)

Source	DF	Chi-Square	Pr > ChiSq
Trend	1	22.95	<.0001
Change in the Food Package	1	14.44	0.0001
Store Type	4	216.47	<.0001
Ownership Type	2	59.31	<.0001
Urbanization Level	2	76.08	<.0001
Poverty Level	2	2.69	0.2605
New Vendor	1	11.44	0.0007

Exhibit 10 provides the specific results of the analysis. In short, the results reflect those generated from the New York State analysis—the trend line is significant and positive, and the intervention (change in food package) is significant and negative. It should be noted that the estimate for the trend is smaller than in the New York State model and that the parameter estimate for intervention is also smaller. In terms of control variables, it is interesting that in New York State publicly owned stores were more likely to overcharge (once other factors had been controlled) than privately owned stores, but in this analysis the opposite was true.

Conclusions on the Effect of Food Package Changes on Overcharges—Both models show that the effect of food package changes is negative (i.e., vendors were less likely to overcharge after the food package changes were implemented). This defies our expectation, which was based on the possibility that new products would cause confusion and increase overcharging. Our initial conclusion is that the effect of the food package changes had little effect on overcharge rates and other factors appeared between FY 2009 and FY 2010 that reversed the upward trend between FY 2006 and FY 2009. However, because of the way that TIP is set up, many cases completed in New York State in FY 2009 may have begun in FY 2008, and for all other States, many of the cases completed in FY 2010 may have begun in FY 2009. In addition, many cases that had their field work completed in FY 2009 were still being considered in FY 2010, and many cases initiated in FY 2010 will not be completed until FY 2011. So in general, there is a lag in when the cases were initiated and when they were, or will be, completed. Examining FY 2011 data will provide a more accurate measure of the effect. Because there was no positive effect, we did not attempt to estimate the impact in dollar terms.

Exhibit 10. Maximum Likelihood Parameter Estimates

Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept	1	-245.582	51.4847	-346.490	-144.674	22.75	<.0001
Trend	1	0.1217	0.0257	0.0714	0.1720	22.50	<.0001
Change in Food Package	1	-0.3929	0.1039	-0.5966	-0.1892	14.29	0.0002
Large Stores	1	-0.8881	0.2088	-1.2973	-0.4788	18.09	<.0001
Small Stores	1	0.1173	0.2040	-0.2825	0.5172	0.33	0.5652
Store Type Unknown	1	0.3069	0.2586	-0.1999	0.8138	1.41	0.2353
WIC-Only Stores	1	-0.8352	0.2993	-1.4218	-0.2487	7.79	0.0053
Privately Owned	1	-0.4832	0.1798	-0.8356	-0.1308	7.22	0.0072
Publicly Owned	1	-1.3654	0.2224	-1.8014	-0.9294	37.68	<.0001
Low Urbanization	1	-0.7497	0.0988	-0.9433	-0.5561	57.60	<.0001
Suburban	1	-0.4430	0.0943	-0.6278	-0.2581	22.06	<.0001
Low Level of Poverty	1	0.0419	0.1013	-0.1566	0.2405	0.17	0.6790
Moderate Level of Poverty	1	0.1501	0.1094	-0.0644	0.3645	1.88	0.1702
New Vendor	1	-0.5558	0.1756	-0.9001	-0.2116	10.01	0.0016

Effect on Undercharges

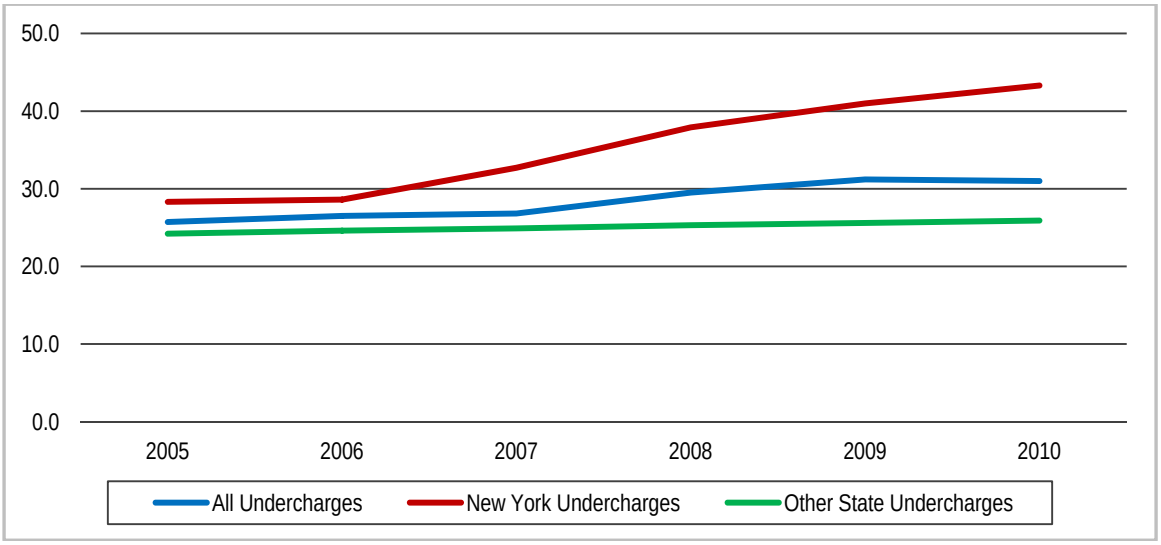
The effect of the food package changes on underpayments is more difficult to estimate because TIP does not contain information on occurrences of undercharges, and the only available source of information is the 2005 WIC Vendor Management Study. We constructed a two-stage approach. First, using data from the 2005 WIC Vendor Management Study, we generated an equation predicting undercharges. This is similar to what was done for estimating the undercharge estimates (see Appendix C), except that we revised the equation to include an overcharge variable. This is possible because each vendor was visited three times, during which they could have over- or undercharged. Any instance of undercharging was used. In this first stage, we estimated the probability of an undercharge using the following factors:

- Large retailers versus all other vendors,
- Small retailers versus all other vendors,
- Newly authorized vendors versus previously authorized vendors,
- Poverty level of the neighborhood,
- Urbanization level of the neighborhood, and
- Whether the store overcharged.

This yielded a set of parameters that were then applied to the dataset that included all complete investigations to obtain the probability of undercharging for each store in the investigative file. Exhibit 11 shows the trend lines for all investigations during the FY 2005 to FY 2010 period and the trend lines for investigations of New York State vendors and vendors in other States.

In general, the trend lines show the same trends that we saw when we examined overcharges, except the lines are not as dramatic and they do not drop off during FY 2010. As before, we estimated the impact of the new food package on erroneous payments separately in New York State and in other States.

Exhibit 11. Trend in the Undercharge Violations Rate



Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Analysis for New York State—For this analysis, we used a regression with a probit link function because the dependent variable was a continuous variable within the range of 0 to 1. The results indicate that the linear trend term is positive and significant (see Exhibit 12). The intervention variable was negative and significant, indicating that there was a lower probability that an undercharge would occur during the period in which the new food package existed.

Exhibit 12. Analysis of Maximum Likelihood Parameter Estimates

Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept	1	-203.984	9.9000	-223.387	-184.580	424.55	<.0001
Trend	1	0.1014	0.0049	0.0917	0.1110	422.46	<.0001
Change in Food Package	1	-0.0466	0.0162	-0.0783	-0.0149	8.31	0.0039
Large Stores	1	-0.3685	0.0429	-0.4526	-0.2844	73.70	<.0001
Small Stores	1	0.2607	0.0413	0.1797	0.3417	39.77	<.0001
Store Type Unknown	1	0.0571	0.0607	-0.0618	0.1759	0.88	0.3469
Privately Owned	1	0.0929	0.0635	-0.0316	0.2173	2.14	0.1435
Publicly Owned	1	0.0782	0.0723	-0.0636	0.2199	1.17	0.2797
Low Urbanization	1	-0.3048	0.0296	-0.3628	-0.2468	106.10	<.0001
Suburban	1	-0.0528	0.0233	-0.0985	-0.0070	5.11	0.0238
Low Level of Poverty	1	-0.0630	0.0121	-0.0868	-0.0393	26.99	<.0001
Moderate Level of Poverty	1	0.0183	0.0128	-0.0067	0.0433	2.06	0.1510
New Vendor	1	-0.1616	0.0181	-0.1970	-0.1261	79.91	<.0001

Analysis for States Other Than New York—Exhibit 13 shows the results when we regress the probability of an undercharge on a trend, intervention, and other factors for States other than New York. Again, the results indicate a positive trend and a negative intervention.

Conclusions on the Effects of the New Food Package on Undercharges—As with overcharges, there seemed to be no positive effects from the food package. Therefore, estimating the dollar impact is not appropriate. Because the outcome variable was estimated through a rather circuitous procedure that first obtained a general equation generated from the 2005 WIC Vendor Management Study, then applied that to the completed investigations file to predict the probability of an undercharge, and finally used a regression approach to explore its effect in the intervention period, the estimate is probably subject to a great deal of measurement error. As with overcharges, we believe that FY 2011 data will allow for a better estimate.

Exhibit 13. Analysis of Maximum Likelihood Parameter Estimates

Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept	1	-26.6759	5.2201	-36.9072	-16.4446	26.11	<.0001
Trend	1	0.0131	0.0026	0.0080	0.0182	25.28	<.0001
Change in Food Package	1	-0.0396	0.0082	-0.0558	-0.0235	23.24	<.0001
Large Stores	1	-0.2897	0.0188	-0.3266	-0.2527	236.18	<.0001
Small Stores	1	0.2245	0.0186	0.1880	0.2610	145.40	<.0001
Store Type Unknown	1	0.0224	0.0241	-0.0248	0.0695	0.86	0.3528
WIC-Only Stores	1	-0.1049	0.0259	-0.1558	-0.0541	16.39	<.0001
Privately Owned	1	-0.0759	0.0162	-0.1077	-0.0441	21.89	<.0001
Publicly Owned	1	-0.1069	0.0178	-0.1418	-0.0721	36.15	<.0001
Low Urbanization	1	-0.1838	0.0070	-0.1975	-0.1701	691.22	<.0001
Suburban	1	0.0313	0.0064	0.0187	0.0438	23.97	<.0001
Low Level of Poverty	1	-0.0593	0.0080	-0.0750	-0.0436	54.61	<.0001
Moderate Level of Poverty	1	0.0212	0.0087	0.0041	0.0383	5.91	0.0150
New Vendor	1	-0.0574	0.0122	-0.0813	-0.0334	21.99	<.0001

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APPENDIX A: VENDOR CHARACTERISTICS

APPENDIX A:

VENDOR CHARACTERISTICS

This appendix describes the distributions of characteristics of the 42,651 WIC vendors described in the FY 2010 TIP data file and used in this analysis, and the associated redemption dollars.

DERIVATION OF THE ANALYTIC DATASET

The FY 2010 TIP system maintains records for a total of 48,621 authorized WIC vendors in the United States and its territories and possessions. This report, like the previous updates, focuses on only those vendor types and locations considered in the 2005 bookend study.

The 2005 bookend study used only WIC vendors with traditional retail delivery systems operating in the continental United States. As a result, the following classes of vendors were removed from that study:

- Direct distribution delivery systems—all vendors in Mississippi and a few in Illinois;
- Home delivery systems—all Vermont vendors and vendors in some areas of Ohio;
- Military commissaries—located on military bases;
- Pharmacies that only provide prescription infant formula and WIC-approved medical foods;
- All vendors in Alaska, Hawaii, and the U.S. Territories;
- North Dakota vendors, which were not included in the 2005 sampling frame; and
- All vendors authorized solely by ITOs.

In order to replicate the study population examined by the 2005 bookend study, 5,970 vendors in the groups listed above were removed from the FY 2010 TIP file. The remaining vendors were matched with SNAP files to identify their retailer and ownership type.[18]

Redemption dollar figures reported through TIP for each vendor were adjusted. The focus of this study was on food sales only, not redemptions related to the purchase of formula. However, redemption dollars reported by the States through TIP did not separate formula redemption dollars from food redemption dollars. TIP provided a national redemption dollar figure of almost $5.63 billion for the subset of vendors used in this study. FNS recorded WIC food outlays of $4.07 billion for FY 2010, which excluded formula rebates.[19] Because FNS furnished food outlays by State and TIP provided redemption dollars by State, we adjusted the amount reported

[18] In 2007 SNAP mounted an effort to redesign its store type categories and reassigned retailers to the new categories. Every effort was made to ensure that the store type categories used for the FY 2010 estimate matched those used in previous years.

[19] The amount was based on those vendors and agencies that were previously defined as being in scope.

in TIP by the ratio of outlays over TIP-reported redemption dollars by State.[20] The adjusted figure equaled the reported food outlays figure provided by FNS.

As was mentioned above, information from SNAP from the Store Tracking and Redemption System (STARS) II database was used to add store type information as well as whether the store was publicly traded. Census 2000 data were used to add geographic information on areas served by the vendor.

VENDOR TYPE

This study included the following TIP vendor categories: retailers, WIC-only vendors, and WIC above-50-percent vendors. STARS II data were matched to authorized SNAP retailers and used to further categorize WIC retailer vendors. After matching WIC vendors in the FY 2010 TIP file to the STARS II retailer list, store business type and retailer size from that list were used to further separate retailer vendors into large or small retailers. Retailers that could not be matched with SNAP were categorized as stores with unknown sales. In comparison with FY 2009, large retail vendors' proportion of all vendors declined. In FY 2010, these stores represented 69.4 percent of WIC vendors, compared with 73.3 percent in 2009. These retailers redeemed 78.1 percent of all food outlays in FY 2010, compared with about 86.9 percent of WIC benefits (see Exhibits A1 and A2). In contrast, large retail vendors only represented 43.1 percent of all investigated vendors and about 54.4 percent of all investigated vendors' redemption dollars. Conversely, small retail vendors made up 26.8 percent of all WIC vendors and 51.7 percent of investigated vendors. Like small retail vendors, WIC above-50-percent vendors and WIC-only stores were investigated at a higher rate (relative to their proportion of the population) than other vendors. As in earlier years, the focus of investigation tended not to target large retailers.

One of the issues confounding comparisons with previous years is the use of SNAP to clarify store type information for vendors also participating in the food stamp program. The translation of previous store type designations and current ones was not clear for stores currently classified as combination stores, which include stores that offer a variety of goods but may be of very different sizes. For example, Walmart, despite its usually large grocery offerings, was paired with very small stores. In addition, the new SNAP store classification schema segmented large, medium, and small-size groceries, designations which were not totally consistent with previous designations.

Another issue relates to our discovery that the same SNAP ID number was duplicated in the file. Having the same SNAP ID would indicate that the stores, although treated as different stores in WIC, are in fact the same store. There were three reasons for these duplicate IDs. First, the vendor provided the wrong SNAP ID, or the State erred in recording the information. Second, some vendors, usually on the border of two or more States, are authorized by different WIC State

[20] This report represents an improvement over previous reports in how outlays are treated. It has always been the case that since vendor-based outlay values were not available, vendor level TIP redemption values were modified by state level outlay to redemption values. In the current study, a more accurate ratio was generated that in effect eliminated outlays associated with direct distribution vendors, home deliver vendors, commissaries, and certain other types of vendors. The 2010 dollar overcharge estimate is within 1.1 million dollars of the estimate had the unimproved approach been used.

agencies. Because TIP is assembled from State files, duplication in this regard cannot be avoided. The third reason this occurs is when a store, located at the same address and having the same or similar name, has one SNAP ID number but multiple WIC vendor ID numbers. Our conclusion is that stores are exiting (voluntarily or not) the roster of WIC authorized vendors and then reentering as a new vendor or being reinstated with a new WIC vendor ID. In any case, the number of stores listed in TIP is somewhat greater than the actual number of different vendors.

Exhibit A1. Distribution of Vendors, by Vendor Type (TIP FY 2010)

Vendor Type	Investigated Vendors		All Vendors	
	Number	Percent	Number	Percent
Large retail vendors (superstores, supermarkets, and grocery stores with gross sales of more than $500,000)	2,555	43.09	29,604	69.41
Small retail vendors (retailers with gross sales of $500,000 or less)	3,066	51.71	11,449	26.84
Retail vendors of unknown size	53	0.89	524	1.23
WIC-only vendors	140	2.36	790	1.85
Vendors for which WIC redemption dollars represented 50 percent or more of revenues	115	1.94	284	0.67
Total	5,929	100.00	42,651	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit A2. Distribution of Redemption Dollars, by Vendor Type (TIP FY 2010)

Vendor Type	Investigated Vendors		All Vendors	
	Total Redemptions (in thousands)	Percent of All Redemption Dollars	Total Redemptions (in thousands)	Percent of All Redemption Dollars
Large retail vendors (superstores, supermarkets, and grocery stores with gross sales of more than $500,000)	$309,459	54.39	$3,175,512	78.09
Small retail vendors (retailers with gross sales of $500,000 or less)	$156,562	27.52	$462,598	11.38
Retail vendors of unknown size	$14,014	2.46	$33,636	0.83
WIC-only vendors	$77,228	13.57	$367,189	9.03
Vendors for which WIC redemption dollars represented 50 percent or more of revenues	$11,707	2.06	$27,757	0.68
Total	$568,971	100.00	$4,066,692	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

OWNERSHIP

Using STARS, stores were classified as public or privately owned. Unmatched retailers were categorized as stores with unknown ownership, although an algorithm was used to determine whether the store was part of a chain and, as such, could be classified as public or private based on the classification of other stores in the chain. Almost 70 percent (69.7 percent) of all WIC vendors were privately owned (the same percent as in 2009). Privately owned WIC vendors accounted for only 53.0 percent of all redemption dollars (see Exhibits A3 and A4), a notable decrease over their observed share in FY 2009. As in the FY 2009 period, privately owned vendors were also more frequently investigated (87.8 percent) than publicly owned vendors, and these investigated vendors accounted for a high level of redemptions (73.7 percent) relative to the share of redemptions transacted by these stores in the population.

Exhibit A3. Distribution of Vendors, by Vendor Ownership (TIP FY 2010)

Ownership Type	Investigated Vendors		All Vendors	
	Number	Percent	Number	Percent
Private	5,206	87.81	29,745	69.74
Public	558	9.41	11,607	27.21
Unknown	165	2.78	1,299	3.05
Total	5,929	100.00	42,651	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit A4. Distribution of Redemption Dollars, by Vendor Ownership (TIP FY 2010)

Ownership Type	Investigated Vendors		All Vendors	
	Total Redemptions (in thousands)	Percent of All Redemption Dollars	Total Redemptions (in thousands)	Percent of All Redemption Dollars
Private	$419,127	73.66	$2,154,516	52.98
Public	$90,116	15.84	$1,558,183	38.32
Unknown	$59,729	10.50	$353,993	8.70
Total	$568,971	100.00	$4,066,692	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

URBANIZATION

WIC vendors were matched by their ZIP Code to Census files, which contained information for calculating the level of urbanization within that ZIP Code. More than half of all WIC vendors (57.7 percent) were located in highly urbanized areas (90 percent or more urbanization) (see Exhibit A5). Vendors in these areas also constituted 71.9 percent of all investigated vendors, thus indicting that they were overrepresented in the investigated vendor list. The corresponding proportions of redemption dollars of highly urbanized vendors among all vendors (66.7 percent) and among investigated vendors (78.2 percent) were also high (see Exhibit A6).

Exhibit A5. Distribution of Vendors, by Urbanization (TIP FY 2010)

Percentage of Population in ZIP Code Identified as Living in Urbanized Area	Investigated Vendors		All Vendors	
	Number	Percent	Number	Percent
50 percent or less	804	13.56	8,060	18.90
More than 50 percent but less than 90 percent	860	14.51	9,950	23.33
90 percent or more	4,265	71.93	24,641	57.77
Total	5,929	100.00	42,651	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010

Exhibit A6. Distribution of Redemption Dollars, by Urbanization (TIP FY 2010)

Percentage of Population in ZIP Code Identified as Living in Urbanized Area	Investigated Vendors		All Vendors	
	Total Redemptions (in thousands)	Percent of All Redemption Dollars	Total Redemptions (in thousands)	Percent of All Redemption Dollars
50 percent or less	$35,963	6.32	$377,627	9.29
More than 50 percent but less than 90 percent	$87,840	15.44	$978,226	24.05
90 percent or more	$445,168	78.24	$2,710,839	66.66
Total	$568,971	100.00	$4,066,692	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

PERCENTAGE IN POVERTY

Census files also provided information on the percentage of households below the poverty level within the vendor's ZIP Code area. Three-quarters of vendors (74.9 percent) and 57.0 percent of investigated vendors were located in areas in which 20 percent or less of households live in poverty (see Exhibit A7). About 9.2 percent of all vendors and 19.9 percent of investigated vendors were in areas in which 30 percent or more of households live in poverty. Thus, vendors in these higher poverty areas were investigated at a relatively higher rate than other vendors. The redemption dollar values reflected a similar result (see Exhibit A8). In terms of vendors and redemption dollars, the lowest poverty areas were investigated least, relative to their

representation in the overall population. The tendency toward conducting investigations in areas of higher poverty continues relative to investigations in areas of lower poverty.

Exhibit A7. Distribution of Vendors, by Poverty Level (TIP FY 2010)

Percentage of Households Below Poverty Level	Investigated Vendors		All Vendors	
	Number	Percent	Number	Percent
20 percent or less	3,380	57.01	31,948	74.91
More than 20 percent but less than 30 percent	1,367	23.06	6,780	15.90
30 percent or more	1,182	19.94	3,923	9.20
Total	5,929	100.00	42,651	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit A8. Distribution of Redemption Dollars, by Poverty Level (TIP FY 2010)

Percentage of Households Below Poverty Level	Investigated Vendors		All Vendors	
	Total Redemptions (in thousands)	Percent of All Redemption Dollars	Total Redemptions (in thousands)	Percent of All Redemption Dollars
20 percent or less	$351,631	61.80	$3,032,954	74.58
More than 20 percent but less than 30 percent	$138,626	24.36	$713,267	17.54
30 percent or more	$78,715	13.83	$320,471	7.88
Total	$568,971	100.00	$4,066,692	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

REDEMPTIONS

Vendors with fewer redemption dollars tended to be investigated to a greater extent than their high-redemption counterparts (see Exhibit A9). Exhibit A10, displaying redemption dollars by quartile, shows that the majority of all redemption dollars (69.7 percent) were accounted for by investigated vendors redeeming more than $15,954 per vendor per year. This is about the same proportion that was observed in the population (70.9 percent).

Exhibit A9. Distribution of Vendors, by Redemption Dollar Quartile (TIP FY 2010)

Redemption Dollar Quartile	Investigated Vendors		All Vendors	
	Number	Percent	Number	Percent
Less than or equal to $15,711	1,340	22.60	10,662	25.00
Greater than $15,711 but less than or equal to $46,046	1,797	30.31	10,662	25.00
Greater than $46,046 but less than or equal to $115,954	1,506	25.40	10,663	25.00
Greater than $115,954	1,286	21.69	10,664	25.00
Total	5,929	100.00	42,651	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit A10. Distribution of Redemption Dollars, by Redemption Dollar Quartile (TIP FY 2010)

Redemption Dollar Quartile	Investigated Vendors		All Vendors	
	Total Redemptions (in thousands)	Percent of All Redemption Dollars	Total Redemptions (in thousands)	Percent of All Redemption Dollars
Less than or equal to $15,711	$10,104	1.78	$70,061	1.72
Greater than $15,711 but less than or equal to $46,046	$51,897	9.12	$311,069	7.65
Greater than $46,046 but less than or equal to $115,954	$110,425	19.41	$803,099	19.75
Greater than $115,954	$396,545	69.70	$2,882,463	70.88
Total	$568,971	100.00	$4,066,692	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

GEOGRAPHIC REGION

FNS has seven offices serving distinct geographic regions. All vendors are associated with a particular region, and this information is provided in the TIP data file. About 42.9 percent of all investigated vendors were in the Northeast, which accounted for only 14.0 percent of all vendors (see Exhibit A11). The proportion investigated in this region is an almost 7 percent drop from FY 2009. Most of the investigative activity took place in New York State. The second largest region in terms of investigations was the Midwestern region (16.1 percent). In redemption dollar terms, the proportion of dollar values investigated was higher in the Northeast region (24.0 percent) than in the other regions (see Exhibit A12).

This pattern reflects the fact that a much higher percentage of Northeast region retailers are investigated (42.3 percent) than in the other regions (i.e., the number of investigated vendors in the Northeast over the number of total vendors in that region). For instance, the second highest rate of investigations is in the Southwest (17.5 percent) and the third highest is in Midwest (12.7 percent).

Exhibit A11. Distribution of Vendors, by Geographic Region (TIP FY 2010)

Geographic Region	Investigated Vendors		All Vendors	
	Number	Percent	Number	Percent
Mid-Atlantic	349	5.89	4,431	10.39
Midwestern	955	16.11	7,510	17.61
Mountain Plains	464	7.83	5,182	12.15
Northeast	2,519	42.49	5,954	13.96
Southeast	627	10.58	8,715	20.43
Southwest	585	9.87	3,349	7.85
Western	430	7.25	7,510	17.61
Total	5,929	100.00	42,651	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit A12. Distribution of Redemption Dollars, by Geographic Region (TIP FY 2010)

Geographic Region	Investigated Vendors		All Vendors	
	Total Redemptions (in thousands)	Percent of All Redemption Dollars	Total Redemptions (in thousands)	Percent of All Redemption Dollars
Mid-Atlantic	$37,069	6.51	$373,466	9.18
Midwestern	$94,333	16.58	$512,734	12.61
Mountain Plains	$53,283	9.37	$414,451	10.19
Northeast	$136,508	23.99	$369,957	9.10
Southeast	$62,001	10.90	$855,335	21.03
Southwest	$89,332	15.70	$450,530	11.08
Western	$96,453	16.95	$1,090,218	26.81
Total	$568,971	100.00	$4,066,692	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

NEW VENDORS

A new vendor is identified in TIP as a vendor that was not authorized at the beginning of the fiscal year but became an authorized vendor sometime during the fiscal year. Relative to their representation in the vendor population, new vendors were investigated at a rate slightly higher than that for previously authorized vendors. These new vendors represented 10.2 percent of those vendors that were investigated, and they represented about 9.0 percent of the vendor population (see Exhibit A13). In terms of dollars, new vendors accounted for 2.8 percent of redemption dollars and investigated vendors accounted for a slightly higher percentage (4.1 percent) (see Exhibit A14). Two issues should be noted with regard to new vendors. First, the TIP file contained some stores identified as new vendors that had the same address and sometimes the same name as another vendor that had left the program. Although technically new vendors, these were stores that offered the same set of services as the stores that were previously at those locations. Second, in terms of investigations, many new vendors investigated as "new vendors" in FY 2010 still had undecided cases at the end of year. Because these vendors will not retain the "new vendor" designation in 2011, the outcomes of these investigations will be associated with previously authorized vendors, not new vendors.

Exhibit A13. Distribution of Vendors, by Vendor Tenure (TIP FY 2010)

New Vendor	Investigated Vendors		All Vendors	
	Number	Percent	Number	Percent
No	5,324	89.80	38,806	90.99
Yes	605	10.20	3,845	9.01
Total	5,929	100.00	42,651	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit A14. Distribution of Redemption Dollars, by Vendor Tenure (TIP FY 2010)

New Vendor	Investigated Vendors		All Vendors	
	Total Redemptions (in thousands)	Percent of All Redemption Dollars	Total Redemptions (in thousands)	Percent of All Redemption Dollars
No	$545,413	95.86	$3,954,262	97.24
Yes	$23,558	4.14	$112,430	2.76
Total	$568,971	100.00	$4,066,692	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

CHILDREN UNDER 5

Using Census data, the percentage of children under 5 was calculated for the vendor's ZIP Code area. Vendors in areas with high densities of children under 5 were investigated more often than vendors in lower child-density areas, both absolutely and proportional to their representation in the population. For example, 35.4 percent of all investigated vendors were from high child-density areas, about 10 percentage points more than their proportion of the vendor population (see Exhibit A15). Of all redemption dollars accounted for by investigated stores, 46.4 percents were transacted in the highest child-density areas, while the percentage of all redemption dollars of vendors in these areas was 36.8 percent (see Exhibit A16).

Exhibit A15. Distribution of Vendors, by Percentage of Children Under 5 (TIP FY 2010)

Percentage of Children Under 5	Investigated Vendors		All Vendors	
	Number	Percent	Number	Percent
Less than or equal to 5.86 percent	998	16.83	9,631	22.58
Greater than 5.86 percent but less than or equal to 6.78 percent	1,162	19.60	10,910	25.58
Greater than 6.78 percent but less than or equal to 7.89 percent	1,670	28.17	10,650	24.97
Greater than 7.89 percent	2,099	35.40	10,460	24.52
Total	5,929	100.00	42,651	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit A16. Distribution of Redemption Dollars, by Percentage of Children Under 5 (TIP FY 2010)

Percentage of Children Under 5	Investigated Vendors		All Vendors	
	Total Redemptions (in thousands)	Percent of All Redemption Dollars	Total Redemptions (in thousands)	Percent of All Redemption Dollars
Less than or equal to 5.86 percent	$66,033	11.61	$608,163	14.95
Greater than 5.86 percent but less than or equal to 6.78 percent	$101,548	17.85	$914,932	22.50
Greater than 6.78 percent but less than or equal to 7.89 percent	$136,007	23.90	$1,068,429	26.27
Greater than 7.89 percent	$265,386	46.64	$1,496,530	36.80
Total	$568,971	100.00	$4,066,692	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

CHILDREN UNDER 1

Similar to vendors in areas with a high density of children under 5, vendors located in areas with a high density of children under 1 accounted for a greater percentage of investigations (35.0 percent) than their proportion of the vendor population (25.9 percent) (see Exhibit A17). Investigated vendors in areas with high densities of children under 1 also accounted for a greater proportion of redemption dollars of investigated vendors (44.0 percent) than their proportion of the vendor population (36.1 percent) (see Exhibit A18).

Exhibit A17. Distribution of Vendors, by Percentage of Children Under 1 (TIP FY 2010)

Percentage of Children Under 1	Investigated Vendors		All Vendors	
	Number	Percent	Number	Percent
Less than or equal to 1.11 percent	977	16.48	10,134	23.76
Greater than 1.11 percent but less than or equal to 1.37 percent	1,243	20.96	10,340	24.24
Greater than 1.37 percent but less than or equal to 1.66 percent	1,634	27.56	11,146	26.13
Greater than 1.66 percent	2,075	35.00	11,031	25.86
Total	5,929	100.00	42,651	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit A18. Distribution of Redemption Dollars, by Percentage of Children Under 1 (TIP FY 2010)

Percentage of Children Under 1	Investigated Vendors		All Vendors	
	Total Redemptions (in thousands)	Percent of All Redemption Dollars	Total Redemptions (in thousands)	Percent of All Redemption Dollars
Less than or equal to 1.11 percent	$58,208	10.23	$598,757	14.72
Greater than 1.11 percent but less than or equal to 1.37 percent	$114,778	20.17	$931,524	22.91
Greater than 1.37 percent but less than or equal to 1.66 percent	$145,944	25.65	$1,069,298	26.29
Greater than 1.66 percent	$250,041	43.95	$1,467,113	36.08
Total	$568,971	100.00	$4,066,692	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

APPENDIX B: METHODOLOGY FOR THE ESTIMATION OF OVERCHARGE

APPENDIX B:

METHODOLOGY FOR THE ESTIMATION OF OVERCHARGE

DEFINITION AND DISCUSSION OF OVERCHARGE VIOLATIONS

For the purpose of this study, an overcharge occurs when the WIC Program makes a payment to a vendor (for a food item) that is greater than the price that a non-WIC customer would have paid. This definition is consistent with the TIP data system and the 2005 bookend study.

Operationally, however, there are a number of differences between the overcharge indicators used in TIP and the 2005 bookend study. First, the bookend study indicators reflect outcomes that derive from a one-time data collection on randomly selected stores, while the TIP data reflect continuing investigative actions pursued by trained undercover personnel. This is likely to result in more concerted activity to work a case and perhaps different outcomes than those generated by the bookend study.

A second difference in the overcharge definition reflects how overcharging relates to safe buys (the purchase of items specified on the food instrument), partial buys (the purchase of only some of the items specified on the food instrument), and substitutions (the replacement of an item on the food instrument with another item) in the bookend study. With regard to safe buys, overcharge has one meaning, which is the amount charged by the retailer over and above the amount that should have been charged for the same items on the food instrument. With regard to partial buys and substitutions, overcharges can occur in two ways:

- As in a safe buy, an overcharge can occur with regard to a particular item that is bought (e.g., peanut butter is charged at $2.40 rather than $2.20).
- An overcharge may reflect a charge that occurs with regard to an item that is specified on the food instrument but is not purchased (e.g., the charged but unpurchased item is peanut butter at $2.20).

Partial buys and substitutions were included in the 2005 bookend study; however, their prevalence as a proportion of all transactions is not known. WIC investigations data recorded in TIP do not provide any evidence of the kind of buy that was used, resulting in our inability to exactly replicate the 2005 bookend study in this regard. The working assumption for this study is that TIP investigations data represent only safe buys, thereby making the results, as least in interpretation, equivalent to those produced by the 2005 bookend study. This allows us to use statistics produced by the bookend study for establishing the percentage of redemptions represented by overcharges (see below). However, it should be noted that use of these statistics may lead to the underestimation of overcharge rates because partial buys offer the greatest opportunity for overcharging, and these are not being considered in the estimate.

DESCRIPTION OF THE ESTIMATION APPROACH FOR OVERCHARGES

The estimation approach for overcharges involves three steps:

- The estimation of weights that allow sample information to be translated to the population of vendors,
- The application of those weights to vendor redemption dollar information, and
- The application of an adjustment factor for characterizing vendors' erroneous payment behaviors.

These steps are described in the following sections.

Estimation of Weights That Allow Sample Information To Be Translated to the Population of Vendors

Raking Example

The approach used for developing overcharge estimates is a post-stratification adjustment known as raking. The following illustration provides an explanation of the raking process.

Starting with a two-dimensional matrix with 3 categories in each dimension, suppose that the population consisting of 10,000 vendors is scattered across the cells, as shown in Exhibit B1. Suppose also that the corresponding sample of 1,000 investigated vendors is scattered across the same 9 cells, as shown in Exhibit B2.

Exhibit B1. Vendor Population Distributed Across Two Dimensions

Dimension 1 (e.g., urbanization)	Dimension 2 (e.g., poverty)			
	Low	Medium	High	Total
Low	300	400	300	1,000
Medium	1,500	1,500	1,000	4,000
High	700	600	3,700	5,000
Total	2,500	2,500	5,000	10,000

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit B2. Vendor Sample Distributed Across Two Dimensions

Dimension 1 (e.g., urbanization)	Dimension 2 (e.g., poverty)			
	Low	Medium	High	Total
Low	40	60	100	200
Medium	100	200	200	500
High	60	40	200	300
Total	200	300	500	1,000

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

In comparing Exhibits B1 and B2, it can be seen that the sample is not consistent with the population—it overstates representation in certain categories and understates it in others. The object of raking is to determine weights that would allow for the translation of the sample to the population so that the sample is truly representative of the population.

Exhibit B3 provides an example of the initial raking matrix. The cell entries represent sample values, and the marginal totals represent population values. As discussed above, the idea is to identify values for the cells that will add up to the marginal population values. Each value is assigned a weight that allows this transformation to occur. Multiple iterations are needed to accomplish this when the transformation involves two or more dimensions.

Exhibit B3. Initial Raking Matrix

Dimension 1 (e.g., urbanization)	Dimension 2 (e.g., poverty)			
	Low	Medium	High	Total
Low	40	60	100	1,000
Medium	100	200	200	4,000
High	60	40	200	5,000
Total	2,500	2,500	5,000	10,000

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

For the first iteration, the weight is calculated by dividing the population total by the sum of the cell sample values (see Exhibit B4). Thus, 1,000 is divided by 200 for a weight of 5. The weights are calculated for the first iteration. Note that the weights for the second iteration are not calculated.

Exhibit B4. Marginal Frequencies and Percentages for the Population and Sample

Dimension		Population (Marginals)		Sample (Marginals)		Weight
		Number	Percent	Number	Percent	
Dimension 1	Low	1,000	10	200	20	5
	Medium	4,000	40	500	50	8
	High	5,000	50	300	30	16.7
	Total	10,000	100	1,000	100	
Dimension 2	Level 1	2,500	25	200	20	*
	Level 2	2,500	25	300	30	*
	Level 3	5,000	50	500	50	*
	Total	10,000	100	1,000	100	

* = no weight assigned at this stage.

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

A new sample cell frequency is calculated by applying the weights to the original sample cell frequency (see Exhibit B5). These new cell frequencies will add to the Dimension 1 marginals but not to the Dimension 2 marginals. Therefore we have to adjust the cell values to the Dimension 2 marginals.

Exhibit B5. Weights Resulting From Initial Rake

Dimension 1	Dimension 2	Original Sample Cell Frequency	Weights From Initial Rake (Exhibit 4)	New Cell Frequency
Low	Low	40	5	200
	Medium	60	5	300
	High	100	5	500
Medium	Low	100	8	800
	Medium	200	8	1,600
	High	200	8	1,600
High	Low	60	16.7	1,000
	Medium	40	16.7	760
	High	200	16.7	3,340

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

The second step is to divide the population marginals for Dimension 2 by the new cell frequencies summed over Dimension 2. This gives a new set of weights as shown in Exhibit B6. Note that Dimension 1 is ignored in this iteration.

Exhibit B6. Marginal Frequencies and Percentages for the Population and Sample

Dimension		Population (Marginals)		New Cell Frequencies (Marginals)		Weight
		Number	Percent	Number	Percent	
Dimension 1	Low	1,000	10	1,000	20	*
	Medium	4,000	40	4,000	50	*
	High	5,000	50	5,000	30	*
	Total	10,000	100	10,000	100	
Dimension 2	Level 1	2,500	25	2,000	20	1.25
	Level 2	2,500	25	2,660	27	0.94
	Level 3	5,000	50	5,340	53	0.94
	Total	10,000	100	10,000	100	

* = no weight assigned at this stage.

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

When the Dimension 2 weights are applied to the cell frequencies, we get the results displayed in Exhibit B7. When added, the cell values sum to the Dimension 2 marginals; however, they lose their coherence with Dimension 1 marginals. To ensure that the cell values maintain coherence with both the first and second dimensions, we repeat the rakings, first across Dimension 1, then over Dimension 2. Each repetition will result in values that are closer to the population values. Raking will be completed when the marginals calculated from the cell values are equal, or close to equal, to the population marginals for all dimensions. The ultimate weight after these iterations will represent the number of vendors represented by each sample point.

Exhibit B7. Weights Resulting From Initial Rake

Dimension 1	Dimension 2	New Cell Frequency	Weights From Initial Rake	New Cell Frequency After Dimension 2 Rake
Low	Low	200	1.25	250
	Medium	300	0.94	282
	High	500	0.94	470
Medium	Low	800	1.25	1,000
	Medium	1,600	0.94	1,504
	High	1,600	0.94	1,504
High	Low	1,000	1.25	1,250
	Medium	760	0.94	714
	High	3,340	0.94	3,140

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Estimation of Weights

Exhibit B8 shows the population of vendors in the FY 2010 TIP file that were sanctioned for overcharging by type of oversight (or compliance investigation).[21] Compliance investigations are covert activities in which an undercover purchaser seeks to uncover instances of fraud and abuse.[22] In previous studies, the raking estimate was based on all investigations that were started in the fiscal year, not just those that were completed. This decision was based on the presence of resolved cases among investigations that were identified in TIP as initiated or ongoing. Discussions regarding the methodology in preparation for this report suggested appropriately that completed cases would probably provide more accurate estimates. In this report, we continue to report estimates using the definition used in previous studies, primarily to maintain our ability to detect trends in improper payments. However, we describe results associated with using completed cases here for comparison purposes.

Of the 5,929 vendors undergoing compliance investigations by State and other agencies, 778, or 13.1 percent, were identified as overcharging. Compared with FY 2009, this was a decrease in the number of cases, the number of overcharge violations, and the overcharge rate. Both the number and proportion of overcharges have increased dramatically over last year's results. In

[21] There are other reasons for sanctions indicated in the TIP file, which could potentially increase overcharges. If these other reasons were used, the assumption would be that any vendor found to show a pattern of abuse, regardless of its specific nature, would also be a potential overcharger.

[22] A compliance buy is a covert onsite investigation in which a representative of the program poses as a participant, parent, or caretaker of an infant or child participant or proxy; transacts one or more food instruments; and does not reveal during the visit that he or she is a program representative (7 CFR 246, p. 314).

identifying overcharging, only violations in which the State indicated that the reason for sanction was an overcharge were included.

Exhibit B8. Frequency of Overcharges, by Type of Oversight (TIP FY 2010)

Type of Oversight	Total Investigated	Total Overcharging	
		Number	Rate
All compliance investigations by State agency or other entity*	5,929	778	13.1
Competed compliance investigations by State agency or other entity	3,875	734	18.9

* The TIP User Guide Data Dictionary defines investigations by other entities as "compliance investigations conducted by an outside agency, such as another State agency or the Food Stamp Program, or a Federal law enforcement agency."

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

When the completed compliance investigations are included, the rate jumps 5 percentage points, and almost one of five vendors was caught overcharging.

As indicated above, the raking procedure attempts to translate sample results to the population through a set of characteristics. The five characteristics over which the data were raked (vendor type, ownership, urbanization, poverty level, and redemption dollar quartile) were chosen on the basis of previous research on SNAP showing a relationship between food stamp trafficking and vendor and neighborhood characteristics.[23] That research substantiated a basic set of indicators that, when modified, would be useful for characterizing WIC transactions and examining WIC over- and undercharges. These variables are described in greater detail in Appendix A. The raking process established weights for each investigated retailer.

Application of Weights to Vendor Redemption Dollar Information

The raking weights were used to provide initial estimates. The population estimate of vendors that overcharged was the sum of the weighted number of vendors found to be overcharging within the sample. The vendor-based overcharge rate was the weighted number of overcharging vendors divided by the total vendor population. The unadjusted value of overcharges was the sum of the weighted redemption dollars represented by the vendors that were found to be

[23] See U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition and Evaluation (2003). *The Extent of Trafficking in the Food Stamp Program: 1999–2002,* FSP-03-TRAF, by Theodore F. Macaluso, Ph.D., Alexandria, VA and U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition and Evaluation (2000). *The Extent of Trafficking in the Food Stamp Program: An Update,* by Theodore F. Macaluso, Ph.D., Alexandria, VA.

overcharging within the sample. The unadjusted redemption-based overcharge rate was the amount of overcharges found in the population of overcharging vendors divided by the total amount of redemption dollars reported in the population.

Preliminary raking estimates of the percentage of vendors overcharging in the WIC Program in FY 2010 were based on vendors investigated by the State or another entity. An error was deemed to have occurred if TIP data indicated that a vendor was sanctioned for overcharging. The raked weights would adjust the numbers presented in Exhibit B8 to the population. After raking, the number of vendors sanctioned for investigation was estimated to be 3,524, a decline from the 3,885 vendors estimated in the last study. In percentage terms, this FY 2010 estimate amounts to 8.26 percent of all vendors. When only completed cases were considered, the number of vendors estimated to be overcharging after raking equaled 5,380, with a violation rate of 12.61 percent.

To estimate the variance associated with the raking estimates, a bootstrap approach was used in which estimates were made for random samples selected from investigated cases.[24] We provide the results of these bootstrap estimates in Appendix E.

Application of an Adjustment Factor for Characterizing Vendors' Erroneous Payment Behaviors

Redemption dollar results represent the total amount of redemption dollars that were estimated to occur with vendors that overcharged and include correctly charged redemption dollars as well as overcharges. The amount of actual overcharges is a proportion of these redemptions. Approximately $281 million in redemption dollars were associated with vendors that overcharged, a significant decline from the FY 2009 figure of $342 million. This overcharge estimate represents all redemption dollars for vendors that overcharged. Because it would be expected that not all of these redemption dollars were overcharges, the figures must be adjusted. This section describes the approach for doing so and presents adjusted overcharge amounts and rates.

The 2005 bookend study provided data that were useful in computing this adjustment factor. It examined three types of buys (safe, partial, and substitution buys) in which a purchase was made with a food instrument from a particular sampled vendor. The study provides information on the overall charge for each type of buy and the amount that was supposed to be charged. Thus, overcharges can be identified as a percentage of the total value of the food instrument that was redeemed. For the purposes of this study, only safe buys were used.

Exhibit B9 shows that the average overcharge was $1.82 for safe buy violations. It should be noted that this amount reflects the activities of only those vendors that overcharged, which were very few. The data also show that the amount of the overcharge was very small in many cases. For example, for safe buys the minimum overcharge was $0.02, with 25 percent of all safe buy overcharges valued at less than $0.20.

[24] Samples were drawn from the investigative files and subjected to the raking algorithm. Each sample provided a mean. A grand mean and a standard deviation were estimated for all these samples.

Exhibit B9. Weighted Distribution of Overcharges in the 2005 Bookend Study, by Buy Type

Buy Type	No. of Buys	Average	Minimum	25th Percentile	Median	75th Percentile	Maximum
Safe	46	$1.82	$0.02	$0.20	$0.64	$2.01	$10.00
Partial	65	$7.86	$0.02	$0.44	$2.39	$7.87	$65.54
Minor substitution	39	$4.38	$0.01	$0.30	$0.71	$2.40	$67.00
Major substitution	24	$1.57	$0.02	$0.20	$0.60	$2.16	$9.30

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

In the 2005 bookend study, the mean percentage overcharge for safe buys was 10.74 percent. This rate was used as the adjustment factor in the raking analysis. Exhibit B10 presents summary statistics on safe buy overcharges.

Exhibit B10. Mean 2005 Bookend Study Overcharge as a Percentage of the Food Instrument for Safe Buys Only

Number of Safe Buy Overcharges	Mean Overcharge Percent	Standard Deviation	Minimum	Maximum
46	10.74	77.87	0.07	73.64

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Using the adjustment factor, the amount is reduced to $30.1 million, which constitutes 0.74 percent of total redemptions. The value when only completed cases were used was about $38.1 million, with a rate of 0.94 percent. Appendix E provides confidence intervals resulting from bootstrapping.

APPENDIX C: METHODOLOGY FOR THE ESTIMATION OF UNDERCHARGE

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METHODOLOGY FOR THE ESTIMATION OF UNDERCHARGE

DEFINITION AND DISCUSSION OF UNDERCHARGES

A formal definition of an undercharge in the WIC Program does not exist in the Code of Federal Regulations or the 10 State vendor agreements and handbooks reviewed as part of this research. However, the 2005 bookend study defined an undercharge as a negative difference between the redeemed value of a food instrument and the best retail price for the food bundle as recorded by field data collectors. This study also used that definition.

Unlike overcharges, undercharges are not recorded in TIP and have not been used to issue sanctions. Therefore, both the probability of a vendor's transacting an undercharge and the dollar amount of an undercharge were estimated using the 2005 bookend study and applied to the TIP data. This means that when applied to TIP data in subsequent years, the total expected value of undercharges will change strictly as a function of changes in redemption dollar amounts and the characteristics of the population of WIC vendors.

The 2005 bookend study allowed retailers to undercharge on any of three types of buys. As shown in Exhibit C1, the percentage of vendors undercharging in any one of the three buys is approximately 10 percent, which is equivalent to the result for overcharging when all three buy types are taken into consideration.

Exhibit C1. Weighted Frequency of Vendors With Undercharges, 2005 Bookend Study

Number of Undercharges	Number	Percent	Cumulative Number	Cumulative Percent
No undercharges	33,318	89.71	33,318	89.71
One undercharge	3,384	9.11	36,702	98.83
Two undercharges	346	0.93	37,047	99.76
Three undercharges	90	0.24	37,138	100.00

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

The proportion of vendors undercharging by type of buy is presented in Exhibit C2. The data show that the percentage of vendors undercharging on partial buys was lower than that for other buys. Vendors were more likely to undercharge for major substitutions than they were for partial or safe buys.

Exhibit C2. Weighted Frequency of Undercharges in the 2005 Bookend Study, by Buy Type*

Buy Type	Undercharge		No Undercharge		Total	
	Number	Percent	Number	Percent	Number	Percent
Safe	1,554	4.6	32,289	95.4	33,843	100.0
Partial	971	2.9	32,681	97.1	33,651	100.0
Minor substitution	1,131	5.1	20,995	94.9	22,127	100.0
Major substitution	656	6.0	10,308	94.0	10,963	100.0
Total	4,312	4.3	96,273	95.7	100,585	100.0

* Numbers represent the number of buys, not the number of vendors.

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

With regard to dollar amount, the average undercharge in a safe buy was $0.94 for vendors undercharging (see Exhibit C3). In a partial buy, it was $1.43; in a minor substitution, it was $2.41; and in a major substitution, it was $0.96. As opposed to overcharges, undercharges became larger when partial buys replaced safe buys.

Exhibit C3. Weighted Distribution of Undercharges in the 2005 Bookend Study, by Buy Type

Buy Type	No. of Buys	Average	Minimum	25th Percentile	Median	75th Percentile	Maximum
Safe	74	-$0.94	-$5.43	-$1.16	-$0.49	-$0.18	-$0.01
Partial	40	-$1.43	-$9.00	-$2.09	-$0.60	-$0.20	-$0.01
Minor substitution	51	-$2.41	-$14.67	-$3.00	-$1.20	-$0.40	-$0.01
Major substitution	23	-$0.96	-$3.00	-$1.42	-$0.50	-$0.23	-$0.02

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

As shown in Exhibit C4, undercharges ranged from 5.5 percent (major substitutions) to almost 12 percent (partial buys and minor substitutions) of the total value of the food instrument, which supports the claim that undercharges vary with the type of interaction that WIC participants have with WIC vendors. However, because the relative frequency of the natural occurrence of buy types cannot be determined and because these estimates are meant to build on the 2005 bookend study results, only safe buys were used to generate estimates of undercharges.

Exhibit C4. Weighted Distribution of Undercharges as a Percentage of Food Instrument Value in the 2005 Bookend Study, by Buy Type

Buy Type	No. of Buys	Mean Percentage	Minimum Percentage	25th Percentile	Median	75th Percentile	Maximum Percentage
Safe	74	7.211	0.098	1.147	3.511	7.567	46.530
Partial	40	11.786	0.072	1.715	6.834	13.599	91.667
Minor substitution	51	11.759	0.031	1.105	6.651	16.534	71.030
Major substitution	23	5.483	0.314	1.401	3.840	8.186	25.063

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

STRATEGY FOR ESTIMATING UNDERCHARGES

Because the TIP files do not contain any information about undercharges, any estimate must be based solely on the undercharge behavior of those vendors sampled for the 2005 bookend study as applied to the TIP population. Our approach involved developing predictive equations based on behaviors revealed in safe buys only. In developing a predictive equation, logistic regression was used to model the probability of a vendor undercharge, and ordinary least squares regression techniques were used to model the amount of an undercharge.

The first step was to predict the probability of an undercharge. A predictive equation using a logit model was generated from the weighted 2005 bookend study sample. Because it is the probability of undercharging that is modeled at this stage, logistic regression is appropriate because it is nonlinear, allowing the modeler to take into account the fact that probabilities are bounded by 0 and 1. The vendor characteristics used as predictors were:

- Vendor type, expressed as a series of nominal variables, one each for large retail vendors, small retail vendors, and WIC-only vendors and an indicator for all other types of vendors. It should be noted that the 2005 bookend study did not include pharmacies that only provided special formulas and medical foods,[25] commissaries, direct vendors, or home delivery vendors in its sample. As a result, the indicator for all other types of vendors was necessarily estimated based on WIC above-50-percent vendors only;
- Ownership type, either public or private;
- Percentage of families within the vendor's ZIP Code living in a U.S. Census Bureau-designated urban setting;
- Percentage of households within the vendor's ZIP Code living at or below the poverty level; and
- Vendor's total annual WIC redemption dollars in 2005.

Next, the logistic regressions, as estimated, were applied to all vendors in the TIP file, and the resulting log odds ratios were converted to probabilities. The equation that was applied is specified as follows:

$$P_v = 1/(1 + \exp(-(-1.8174 + 0.0598*U_v + 1.5633*PO_v - 3.54*(1/10^7)*R_v - 1.6523*LR_v - 1.2922*SR_v - 0.4434*WO_v - 0.0475*PU_v + 0.0835*PR_v)))$$

Where: P_v is the probability that the vendor undercharged

U_v is the percentage of the population living in urban areas within the vendor's ZIP Code

PO_v is the percentage of households living in poverty within the vendor's ZIP Code

R_v is the annual amount of redemptions for that vendor

LR_v is whether the vendor is a large retailer

SR_v is whether the vendor is a small retailer

[25] Because the focus was on food outlays, it was difficult on a store-by-store basis to isolate formula sales from food outlay sales. We made a decision to exclude pharmacies because most would sell formula, and although some would sell food, these vendors would probably account for a small portion of overall food sales.

WO_v is whether the vendor is a WIC-only store

PU_v is whether the vendor is publicly owned

PR_v is whether the vendor is privately owned

The second step was to predict the expected dollar value of an undercharge. Linear regression was appropriate because the predicted (dependent) variable is continuous, and unlike probabilities there was no reason to expect a nonlinear relationship. The regression used only those cases of undercharging in the estimation procedure. Thus, it provided the amount of the average undercharge, given certain vendor characteristics, if the vendor undercharged.

These predictive equations were applied to all vendors in the TIP file. Again, all values were predicted for each vendor using the parameters estimated based on safe buys. When predicting from the TIP file, total redemption dollars were substituted for the value of the food instrument that was used when generating the equation from the 2005 bookend study data. The prediction equation is specified as:

$$EU_v = \mathbf{0.07302} - \mathbf{0.01322}*U_v - \mathbf{0.20337}*PO_v + \mathbf{2.496827}*(\mathbf{1}/\mathbf{10^8})*R_v + \mathbf{0.04108}*LR_v + \mathbf{0.06282}*SR_v + \mathbf{0.03089}*WO_v - \mathbf{0.00542}*PU_v$$

Where: EU_v is the expected amount of underpayments given that the vendor undercharged

U_v is the percentage of the population living in urban areas within the vendor's ZIP Code

PO_v is the percentage of households living in poverty within the vendor's ZIP Code

R_v is the annual amount of redemptions for that vendor

LR_v is whether the vendor is a large retailer

SR_v is whether the vendor is a small retailer

WO_v is whether the vendor is a WIC-only store

PU_v is whether the vendor is publicly owned

The third step was to obtain the expected amount of an undercharge for each vendor in the TIP file. Multiplying the probability of undercharging (step 1) by the average amount undercharged (step 2) produced an expected value for undercharges for each vendor. This value represents the total dollar amount undercharged. This is represented as:

$$AU_v = R_v*P_v*EU_v$$

Where AU_v is the final adjusted undercharge for vendor v, and the other factors are defined above.

The vendor undercharge rate was calculated by summing the probabilities of undercharging across all vendors in the TIP file, and the redemption undercharge rate was calculated by determining the total amount of undercharges as a percentage of all redemption dollars.

APPENDIX D: SUPPORTING TABLES

APPENDIX D:

SUPPORTING TABLES

This appendix contains the raking overcharge estimates and regression-based undercharge estimates obtained for each of the following variables:

- Vendor type: Exhibits D1a and D1b,
- Store ownership: Exhibits D2a and D2b,
- Level of poverty: Exhibits D3a and D3b,
- Urbanization area: Exhibits D4a and D4b,
- Vendor authorization status: Exhibits D5a and D5b,
- Child density (proportion of children under 5 years within ZIP Code): Exhibits D6a and D6b, and
- Child density (proportion of children under 1 year within ZIP Code): Exhibits D7a and D7b.

These variables either constitute the basis for the raking algorithm or, in the case of the latter three, are of intrinsic interest to FNS.

Exhibit D1a. Amount and Percentage of Redemption Dollars Overcharged and Undercharged by Vendor Type, FY 2010

Vendor Type	Total Redemption Dollars	Overcharges		Undercharges	
		Amount	Percent	Amount	Percent
Large retail vendors (superstores, supermarkets, and grocery stores with gross sales of more than $500,000)	$3,175,512,238	$11,954,760	0.38	$8,871,583	0.28
Small retail vendors (retailers with gross sales of $500,000 or less)	$462,598,486	$10,536,717	2.28	$2,261,417	0.49
Retail vendors with unknown sales	$33,635,583	$2,707,885	8.05	$188,733	0.56
WIC-only vendors	$367,189,213	$4,614,290	1.26	$2,584,027	0.70
Vendors for which WIC redemptions represent 50 percent or more of revenues	$27,756,685	$313,854	1.13	$0	0.00
All vendors	$4,066,692,205	$30,127,505	0.74	$13,905,761	0.34

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D1b. Number and Percentage of Vendors Overcharging and Undercharging by Vendor Type, FY 2010

Vendor Type	Total Vendors	Overcharging		Undercharging	
		Number	Percent	Number	Percent
Large retail vendors (superstores, supermarkets, and grocery stores with gross sales of more than $500,000)	29,604	1,159	3.91	1,135	3.84
Small retail vendors (retailers with gross sales of $500,000 or less)	11,449	2,029	17.72	750	6.56
Retail vendors with unknown sales	524	164	31.24	93	17.67
WIC-only vendors	790	119	15.04	92	11.66
Vendors for which WIC redemptions represented 50 percent or more of revenues	284	54	18.93	0	0.00
All vendors	42,651	3,524	8.26	2,071	4.85

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D2a. Amount and Percentage of Redemption Dollars Overcharged and Undercharged by Store Ownership, FY 2010

Store Ownership	Total Redemption Dollars	Overcharges		Undercharges	
		Amount	Percent	Amount	Percent
Private	$2,154,516,313	$21,292,986	0.99	$7,449,440	0.35
Public	$1,558,183,005	$1,460,511	0.09	$4,088,927	0.26
Unknown	$353,992,886	$7,374,007	2.08	$2,367,393	0.67
All vendors	$4,066,692,205	$30,127,505	0.74	$13,905,761	0.34

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D2b. Number and Percentage of Vendors Overcharging and Undercharging by Store Ownership, FY 2010

Store Ownership	Total Vendors	Overcharging		Undercharging	
		Number	Percent	Number	Percent
Private	29,745	3,085	10.37	1,496	5.03
Public	11,607	151	1.30	400	3.44
Unknown	1,299	288	22.18	174	13.43
All vendors	42,651	3,524	8.26	2,071	4.85

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D3a. Amount and Percentage of Redemption Dollars Overcharged and Undercharged by Poverty Level, FY 2010

Percentage of Households Below the Poverty Level in ZIP Code	Total Redemption Dollars	Overcharges		Undercharges	
		Amount	Percent	Amount	Percent
20 percent or less	$3,032,953,926	$17,164,544	0.57	$10,504,817	0.35
More than 20 percent but less than 30 percent	$713,266,940	$8,914,151	1.25	$2,550,378	0.36
30 percent or more	$320,471,338	$4,048,810	1.26	$850,566	0.27
All vendors	$4,066,692,205	$30,127,505	0.74	$13,905,761	0.34

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D3b. Number and Percentage of Vendors Overcharging and Undercharging by Poverty Level, FY 2010

Percentage of Households Below the Poverty Level in ZIP Code	Total Vendors	Overcharging		Undercharging	
		Number	Percent	Number	Percent
20 percent or less	31,948	1,820	5.70	1,365	4.27
More than 20 percent but less than 30 percent	6,780	1,037	15.29	404	5.97
30 percent or more	3,923	668	17.02	301	7.67
All vendors	42,651	3,524	8.26	2,071	4.85

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D4a. Amount and Percentage of Redemption Dollars Overcharged and Undercharged by Urbanization Area, FY 2010

Percentage of Population in ZIP Code Identified as Living in Urbanized Area	Total Redemption Dollars	Overcharges		Undercharges	
		Amount	Percent	Amount	Percent
50 percent or less	$377,626,815	$399,260	0.11	$1,238,100	0.33
More than 50 percent but less than 90 percent	$978,226,241	$2,138,279	0.22	$2,967,442	0.30
90 percent or more	$2,710,839,149	$27,589,966	1.02	$9,700,218	0.36
All vendors	$4,066,692,205	$30,127,505	0.74	$13,905,761	0.34

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D4b. Number and Percentage of Vendors Overcharging and Undercharging by Urbanization Area, FY 2010

Percentage of Population in ZIP Code Identified as Living in Urbanized Area	Total Vendors	Overcharging		Undercharging	
		Number	Percent	Number	Percent
50 percent or less	8,060	180	2.24	376	4.67
More than 50 percent but less than 90 percent	9,950	266	2.68	423	4.25
90 percent or more	24,641	3077	12.5	1,272	5.16
All vendors	42,651	3,524	8.26	2,071	4.85

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D5a. Amount and Percentage of Redemption Dollars Overcharged and Undercharged by Vendor Authorization Status, FY 2010

Vendor Authorization Status	Total Redemption Dollars	Overcharges		Undercharges	
		Amount	Percent	Amount	Percent
Newly authorized vendors in FY 2010	$112,430,255	$1,602,227	1.43	$447,479	0.44
Previously authorized vendors	$3,954,261,949	$28,525,278	0.72	$13,458,281	0.34
All vendors	$4,066,692,205	$30,127,505	0.74	$13,905,761	0.34

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D5b. Number and Percentage of Vendors Overcharging and Undercharging by Vendor Authorization Status, FY 2010

Vendor Authorization Status	Total Vendors	Overcharging		Undercharging	
		Number	Percent	Number	Percent
Newly authorized vendors in FY 2010	3,845	108	2.82	234	6.44
Previously authorized vendors	38,806	3,416	8.80	1,837	4.71
All vendors	42,651	3,524	8.26	2,071	4.85

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D6a. Amount and Percentage of Redemption Dollars Overcharged and Undercharged by Proportion of Children Under 5 Years Within ZIP Code, FY 2010

Proportion of Children Under 5 Years	Total Redemption Dollars	Overcharges		Undercharges	
		Amount	Percent	Amount	Percent
Less than or equal to 5.86 percent	$608,163,397	$2,511,539	0.41	$2,246,520	0.32
Greater than 5.86 percent but less than or equal to 6.78 percent	$914,932,285	$5,889,311	0.64	$2,821,651	0.32
Greater than 6.78 percent but less than or equal to 7.89 percent	$1,068,429,480	$6,362,436	0.60	$3,512,144	0.34
Greater than 7.89 percent	$1,496,529,527	$15,364,218	1.04	$5,325,446	0.37
All vendors	$4,066,692,205	$30,127,505	0.74	$13,905,761	0.34

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D6b. Number and Percentage of Vendors Overcharging and Undercharging by Proportion of Children Under 5 Years Within ZIP Code, FY 2010

Proportion of Children Under 5 Years	Total Vendors	Overcharging		Undercharging	
		Number	Percent	Number	Percent
Less than or equal to 5.86 percent	9,631	453	4.71	463	4.35
Greater than 5.86 percent but less than or equal to 6.78 percent	10,910	736	6.75	457	4.38
Greater than 6.78 percent but less than or equal to 7.89 percent	11,650	1,024	8.79	512	4.82
Greater than 7.89 percent	10,460	1,310	12.53	638	5.83
All vendors	42,651	3,524	8.26	2,071	4.85

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D7a. Amount and Percentage of Redemption Dollars Overcharged and Undercharged by Proportion of Children Under 1 Year Within ZIP Code, FY 2010

Proportion of Children Under 1 Year	Total Redemption Dollars	Overcharges		Undercharges	
		Amount	Percent	Amount	Percent
Less than or equal to 1.11 percent	$598,757,027	$2,226,913	0.37	$2,220,299	0.31
Greater than 1.11 percent but less than or equal to 1.37 percent	$931,524,150	$5,434,901	0.58	$2,972,059	0.32
Greater than 1.37 percent but less than or equal to 1.66 percent	$1,069,297,636	$8,118,874	0.76	$3,690,041	0.35
Greater than 1.66 percent	$1,467,113,391	$14,346,817	0.98	$5,023,362	0.36
All vendors	$4,066,692,205	$30,127,505	0.74	$13,905,761	0.34

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit D7b. Number and Percentage of Vendors Overcharging and Undercharging by Proportion of Children Under 1 Year Within ZIP Code, FY 2010

Proportion of Children Under 1 Year	Total Vendors	Overcharges		Undercharges	
		Number	Percent	Number	Percent
Less than or equal to 1.11 percent	10,134	367	3.62	463	4.35
Greater than 1.11 percent but less than or equal to 1.37 percent	10,340	633	6.12	470	4.47
Greater than 1.37 percent but less than or equal to 1.66 percent	11,146	1,233	11.06	513	4.84
Greater than 1.66 percent	11,031	1,291	11.70	625	5.73
All vendors	42,651	3,524	8.26	2,071	4.85

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

APPENDIX E: CONFIDENCE INTERVALS FOR CRITICAL VARIABLES

APPENDIX E:

CONFIDENCE INTERVALS FOR CRITICAL VARIABLES

This appendix provides confidence intervals computed from bootstrap estimates on both over- and undercharges for each of the variables discussed in the text. In the case of overcharges, the estimates were based on iteratively based predictive values from regression results; in the case of undercharges, the estimates were based on iteratively derived raking values. The variables are:

- Vendor type: Exhibits E1a and E1b,
- Store ownership: Exhibits E2a and E2b,
- Level of poverty: Exhibits E3a and E3b,
- Urbanization area: Exhibits E4a and E4b,
- Vendor authorization status: Exhibits E5a and E5b,
- Child density (proportion of children under 5 years within ZIP Code): Exhibits E6a and E6b, and
- Child density (proportion of children under 1 year within ZIP Code): Exhibits E7a and E7b.

Exhibit E1a. Confidence Intervals for Redemption Dollars Overcharged and Undercharged by Vendor Type, FY 2010

Vendor Type		Estimate and Confidence Intervals for Overcharges			Estimate and Confidence Intervals for Undercharges		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Large retail vendors (superstores, supermarkets, and grocery stores with gross sales of more than $500,000)	Amt.	$11,954,760	$6,948,338	$18,846,665	$8,871,583	$8,536,412	$8,968,917
	Rate	0.38%	0.22%	0.59%	0.28%	0.27%	0.28%
Small retail vendors (retailers with gross sales of $500,000 or less)	Amt.	$10,536,717	$7,536,886	$14,056,055	$2,261,417	$1,572,835	$2,406,437
	Rate	2.28%	1.63%	3.04%	0.49%	0.34%	0.52%
Retail vendors with unknown sales	Amt.	$2,707,885	$140,906	$3,543,980	$188,733	$114,761	$233,253
	Rate	8.05%	0.42%	10.54%	0.56%	0.34%	0.69%
WIC-only vendors	Amt.	$4,614,290	$213,851	$11,278,584	$2,584,027	$2,486,679	$2,668,217
	Rate	1.26%	0.06%	3.07%	0.70%	0.68%	0.73%
Vendors for which WIC redemptions represented 50 percent or more of revenues	Amt.	$313,854	$39,623	$775,772	$0	$0	$0
	Rate	1.13%	0.14%	2.79%	0.00%	0.00%	0.00%
All vendors	Amt.	$30,127,505	$21,710,443	$39,622,595	$13,905,761	$13,207,803	$14,415,611
	Rate	0.74%	0.53%	0.97%	0.34%	0.32%	0.35%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E1b. Confidence Intervals for Number of Vendors Overcharging and Undercharging by Vendor Type, FY 2010

Vendor Type		Estimate and Confidence Intervals for Vendors Overcharging			Estimate and Confidence Intervals for Vendors Undercharging		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Large retail vendors (superstores, supermarkets, and grocery stores with gross sales of more than $500,000)	No.	1,159	799	1,557	1,135	1,130	1,141
	Rate	3.91%	2.70%	5.26%	3.84%	3.82%	3.85%
Small retail vendors (retailers with gross sales of $500,000 or less)	No.	2,029	1,748	2,341	750	745	756
	Rate	17.72%	15.27%	20.45%	6.56%	6.50%	6.60%
Retail vendors with unknown sales	No.	164	43	310	93	90	95
	Rate	31.24%	8.20%	59.09%	17.67%	17.13%	18.21%
WIC-only vendors	No.	119	28	228	92	89	96
	Rate	15.04%	3.54%	28.87%	11.66%	11.25%	12.10%
Vendors for which WIC redemptions represented 50 percent or more of revenues	No.	54	15	98	0	0	0
	Rate	18.93%	5.31%	34.48%	0.00%	0.00%	0.00%
All vendors	No.	3,524	3,026	4,068	2,071	2,047	2,093
	Rate	8.26%	7.09%	9.54%	4.85%	4.80%	4.91%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E2a. Confidence Intervals for Redemption Dollars Overcharged and Undercharged by Store Ownership, FY 2010

Store Ownership		Estimate and Confidence Intervals for Overcharges			Estimate and Confidence Intervals for Undercharges		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Private	Amt.	$21,292,986	$15,850,992	$27,752,325	$7,449,440	$6,830,894	$7,752,812
	Rate	0.99%	0.74%	1.29%	0.35%	0.32%	0.36%
Public	Amt.	$1,460,511	$0	$6,304,408	$4,088,927	$4,053,613	$4,125,134
	Rate	0.09%	0.00%	0.40%	0.26%	0.26%	0.26%
Unknown	Amt.	$7,374,007	$2,144,878	$14,011,392	$2,367,393	$2,248,315	$2,467,932
	Rate	2.08%	0.61%	3.96%	0.67%	0.64%	0.70%
All vendors	Amt.	$30,127,505	$21,710,443	$39,622,595	$13,905,761	$13,207,803	$14,415,611
	Rate	0.74%	0.53%	0.97%	0.34%	0.32%	0.35%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E2b. Confidence Intervals for Number of Vendors Overcharging and Undercharging by Store Ownership, FY 2010

Store Ownership		Estimate and Confidence Intervals for Vendors Overcharging			Estimate and Confidence Intervals for Vendors Undercharging		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Private	No.	3,085	2,664	3,535	1,496	1,483	1,509
	Rate	10.37%	8.96%	11.89%	5.03%	4.98%	5.07%
Public	No.	151	0	403	400	397	402
	Rate	1.30%	0.00%	3.48%	3.44%	3.42%	3.47%
Unknown	No.	288	133	470	174	166	183
	Rate	22.18%	10.23%	36.18%	13.43%	12.77%	14.09%
All vendors	No.	3,524	3,026	4,068	2,071	2,047	2,093
	Rate	8.26%	7.09%	9.54%	4.85%	4.80%	4.91%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E3a. Confidence Intervals for Redemption Dollars Overcharged and Undercharged by Poverty Level of the Population in the Vendor's ZIP Code Area, FY 2010

Percentage of Households Below the Poverty Level in ZIP Code		Estimate and Confidence Intervals for Overcharges			Estimate and Confidence Intervals for Undercharges		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
20 percent or less	Amt.	$17,164,544	$9,689,378	$25,868,064	$10,504,817	$9,844,968	$10,960,186
	Rate	0.57%	0.32%	0.85%	0.35%	0.32%	0.36%
More than 20 percent but less than 30 percent	Amt.	$8,914,151	$5,331,242	$13,788,876	$2,550,378	$2,370,685	$2,724,180
	Rate	1.25%	0.75%	1.93%	0.36%	0.33%	0.38%
30 percent or more	Amt.	$4,048,810	$2,283,038	$6,493,070	$850,566	$762,530	$957,280
	Rate	1.26%	0.71%	2.03%	0.27%	0.24%	0.30%
All vendors	Amt.	$30,127,505	$21,710,443	$39,622,595	$13,905,761	$13,207,803	$14,415,611
	Rate	0.74%	0.53%	0.97%	0.34%	0.32%	0.35%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E3b. Confidence Intervals for Number of Vendors Overcharging and Undercharging by Poverty Level of the Population in the Vendor's ZIP Code Area, FY 2010

Percentage of Households Below the Poverty Level in ZIP Code		Estimate and Confidence Intervals for Vendors Overcharging			Estimate and Confidence Intervals for Vendors Undercharging		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
20 percent or less	No.	1,820	1,405	2,275	1,365	1,350	1,381
	Rate	5.70%	4.40%	7.12%	4.27%	4.22%	4.32%
More than 20 percent but less than 30 percent	No.	1,037	802	1,286	404	394	415
	Rate	15.29%	11.83%	18.97%	5.97%	5.82%	6.12%
30 percent or more	No.	668	507	844	301	292	310
	Rate	17.02%	12.93%	21.51%	7.67%	7.45%	7.91%
All vendors	No.	3,524	3,026	4,068	2,071	2,047	2,093
	Rate	8.26%	7.09%	9.54%	4.85%	4.80%	4.91%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E4a. Confidence Intervals for Redemption Dollars Overcharged and Undercharged by Urbanization Area, FY 2010

Percentage of Population in ZIP Code Identified as Living in Urbanized Area		Estimate and Confidence Intervals for Overcharges			Estimate and Confidence Intervals for Undercharges		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
50 percent or less	Amt.	$399,260	$45,542	$942,557	$1,238,100	$1,211,011	$1,269,204
	Rate	0.11%	0.01%	0.25%	0.33%	0.32%	0.34%
More than 50 percent but less than 90 percent	Amt.	$2,138,279	$415,551	$4,799,178	$2,967,442	$2,455,152	$3,141,182
	Rate	0.22%	0.04%	0.49%	0.30%	0.25%	0.32%
90 percent or more	Amt.	$27,589,966	$19,145,301	$36,799,641	$9,700,218	$9,223,901	$10,116,038
	Rate	1.02%	0.71%	1.36%	0.36%	0.34%	0.37%
All vendors	Amt.	$30,127,505	$21,710,443	$39,622,595	$13,905,761	$13,207,803	$14,415,611
	Rate	0.74%	0.53%	0.97%	0.34%	0.32%	0.35%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E4b. Confidence Intervals for Number of Vendors Overcharging and Undercharging by Urbanization Area, FY 2010

Percentage of Population in ZIP Code Identified as Living in Urbanized Area		Estimate and Confidence Intervals for Vendors Overcharging			Estimate and Confidence Intervals for Vendors Undercharging		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
50 percent or less	No.	180	51	339	376	368	385
	Rate	2.24%	0.63%	4.20%	4.67%	4.56%	4.77%
More than 50 percent but less than 90 percent	No.	266	85	517	423	414	431
	Rate	2.68%	0.85%	5.19%	4.25%	4.16%	4.33%
90 percent or more	No.	3,077	2,634	3,543	1,272	1,252	1,291
	Rate	12.5%	10.69%	14.38%	5.16%	5.08%	5.24%
All vendors	No.	3,524	3,026	4,068	2,071	2,047	2,093
	Rate	8.26%	7.09%	9.54%	4.85%	4.80%	4.91%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E5a. Confidence Intervals for Redemption Dollars Overcharged and Undercharged by Vendor Authorization Status, FY 2010

Vendor Authorization Status		Estimate and Confidence Intervals for Overcharges			Estimate and Confidence Intervals for Undercharges		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Newly authorized vendors in FY 2010	Amt.	$28,525,278	$20,919,117	$38,158,628	$13,485,281	$12,337,264	$14,396,485
	Rate	0.74%	0.53%	0.97%	0.34%	0.31%	0.36%
Previously authorized vendors	Amt.	$1,602,227	$30,085	$4,120,232	$447,479	$353,284	$554,162
	Rate	1.43%	0.03%	3.66%	0.44%	0.35%	0.55%
All vendors	Amt.	$30,127,505	$21,710,443	$39,622,595	$13,905,761	$13,207,803	$14,415,611
	Rate	0.74%	0.53%	0.97%	0.34%	0.32%	0.35%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E5b. Confidence Intervals for Number of Vendors Overcharging and Undercharging by Vendor Authorization Status, FY 2010

Vendor Authorization Status		Estimate and Confidence Intervals for Vendors Overcharging			Estimate and Confidence Intervals for Vendors Undercharging		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Newly authorized vendors in FY 2010	No.	108	19	292	234	214	257
	Rate	2.82%	0.49%	7.59%	6.44%	5.88%	7.09%
Previously authorized vendors	No.	3,416	3,007	3,776	1,837	1,793	1,881
	Rate	8.80%	7.75%	9.73%	4.71%	4.60%	4.82%
All vendors	No.	3,524	3,026	4,068	2,071	2,047	2,093
	Rate	8.26%	7.09%	9.54%	4.85%	4.80%	4.91%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E6a. Confidence Intervals for Redemption Dollars Overcharged and Undercharged by Proportion of Children Under 5 Years Within ZIP Code, FY 2010

Proportion of Children Under 5 Years		Estimate and Confidence Intervals for Overcharges			Estimate and Confidence Intervals for Undercharges		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Less than or equal to 5.86 percent	Amt.	$2,511,539	$809,154	$5,112,830	$2,246,520	$2,100,161	$2,494,618
	Rate	0.41%	0.13%	0.84%	0.32%	0.30%	0.36%
Greater than 5.86 percent but less than or equal to 6.78 percent	Amt.	$5,889,311	$2,058,718	$11,193,282	$2,821,651	$2,654,341	$3,119,584
	Rate	0.64%	0.23%	1.22%	0.32%	0.30%	0.35%
Greater than 6.78 percent but less than or equal to 7.89 percent	Amt.	$6,362,436	$3,553,228	$11,684,345	$3,512,144	$3,217,355	$3,953,154
	Rate	0.60%	0.33%	1.09%	0.34%	0.31%	0.38%
Greater than 7.89 percent	Amt.	$15,364,218	$9,340,795	$23,166,023	$5,325,446	$4,638,572	$5,960,663
	Rate	1.04%	0.63%	1.57%	0.37%	0.32%	0.41%
All vendors	Amt.	$30,127,505	$21,710,443	$39,622,595	$13,905,761	$13,207,803	$14,415,611
	Rate	0.74%	0.53%	0.97%	0.34%	0.32%	0.35%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E6b. Confidence Intervals for Number of Vendors Overcharging and Undercharging by Proportion of Children Under 5 Years Within ZIP Code, FY 2010

Proportion of Children Under 5 Years		Estimate and Confidence Intervals for Overcharging			Estimate and Confidence Intervals for Undercharging		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Less than or equal to 5.86 percent	No.	453	247	723	463	446	482
	Rate	4.71%	2.56%	7.51%	4.35%	4.19%	4.53%
Greater than 5.86 percent but less than or equal to 6.78 percent	No.	736	458	1,044	457	438	478
	Rate	6.75%	4.20%	9.57%	4.38%	4.20%	4.58%
Greater than 6.78 percent but less than or equal to 7.89 percent	No.	1,024	789	1,350	512	489	535
	Rate	8.79%	6.77%	11.59%	4.82%	4.60%	5.04%
Greater than 7.89 percent	No.	1,310	1,053	1,651	638	604	670
	Rate	12.53%	10.07%	15.78%	5.83%	5.52%	6.12%
All vendors	No.	3,524	3,026	4,068	2,071	2,047	2,093
	Rate	8.26%	7.09%	9.54%	4.85%	4.80%	4.91%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E7a. Confidence Intervals for Redemption Dollars Overcharged and Undercharged by Proportion of Children Under 1 Year Within ZIP Code, FY 2010

Proportion of Children Under 1 Year		Estimate and Confidence Intervals for Overcharges			Estimate and Confidence Intervals for Undercharges		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Less than or equal to 1.11 percent	Amt.	$2,226,913	$627,365	$5,485,213	$2,220,209	$2,111,928	$2,519,106
	Rate	0.37%	0.10%	0.92%	0.31%	0.30%	0.36%
Greater than 1.11 percent but less than or equal to 1.37 percent	Amt.	$5,434,901	$2,102,693	$10,093,064	$2,972,059	$2,784,535	$3,365,626
	Rate	0.58%	0.23%	1.08%	0.32%	0.30%	0.37%
Greater than 1.37 percent but less than or equal to 1.66 percent	Amt.	$8,118,874	$4,305,053	$14,039,878	$3,690,041	$3,302,753	$4,105,889
	Rate	0.76%	0.40%	1.31%	0.35%	0.31%	0.39%
Greater than 1.66 percent	Amt.	$14,346,817	$8,820,283	$21,309,822	$5,023,462	$4,361,141	$5,638,985
	Rate	0.98%	0.60%	1.45%	0.36%	0.32%	0.41%
All vendors	Amt.	$30,127,505	$21,710,443	$39,622,595	$13,905,761	$13,207,803	$14,415,611
	Rate	0.74%	0.53%	0.97%	0.34%	0.32%	0.35%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

Exhibit E7b. Confidence Intervals for Number of Vendors Overcharging and Undercharging by Proportion of Children Under 1 Year Within ZIP Code, FY 2010

Proportion of Children Under 1 Year		Estimate and Confidence Intervals for Vendors Overcharging			Estimate and Confidence Intervals for Vendors Undercharging		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Less than or equal to 1.11 percent	No.	367	206	547	463	445	484
	Rate	3.62%	2.04%	5.40%	4.35%	4.18%	4.55%
Greater than 1.11 percent but less than or equal to 1.37 percent	No.	633	417	917	470	451	491
	Rate	6.12%	4.04%	8.87%	4.47%	4.29%	4.67%
Greater than 1.37 percent but less than or equal to 1.66 percent	No.	1,233	934	1,624	513	490	539
	Rate	11.06%	8.38%	14.57%	4.84%	4.62%	5.08%
Greater than 1.66 percent	No.	1,291	1,039	1,594	625	593	657
	Rate	11.70%	9.42%	14.45%	5.73%	5.43%	6.02%
All vendors	No.	3,524	3,026	4,068	2,071	2,047	2,093
	Rate	8.26%	7.09%	9.54%	4.85%	4.80%	4.91%

Source: WIC Erroneous Payments to Vendors: Annual Estimates for FY 2010.

APPENDIX F: WIC FOOD PACKAGE IMPLEMENTATION FINAL DATES

Blue—Early Implementer

Green—Implemented by Regulatory Deadline of October 1, 2009

Red—Late implementer

WIC State Agency	Implementation Date
ACL (ITO)	10/01/2009
Alabama	09/28/2009
Alaska	10/01/2009
American Samoa	10/01/2009
Arizona	10/01/2009
Arkansas	10/01/2009
California	10/01/2009
Cherokee Eastern Band (ITO)	10/01/2009
Cherokee Nation of OK (ITO)	10/01/2009
Cheyenne River Sioux (ITO)	10/01/2009
Chickasaw Nation (ITO)	08/03/2009
Choctaw (MS) (ITO)	10/01/2009
Choctaw (OK) (ITO)	08/03/2009
Citizen Potawatomi (ITO)	10/01/2009
Colorado	06/01/2009
CNMI	10/01/2009
Connecticut	10/01/2009
Delaware	01/01/2009
District of Columbia	10/01/2009
Eastern Shoshone (ITO)	10/01/2009
Eight Northern Pueblo (ITO)	10/01/2009
Five Sandoval (ITO)	10/01/2009
Florida	10/01/2009
Georgia	10/01/2009
Guam	10/01/2009
Hawaii	10/01/2009
Idaho	10/01/2009
Illinois	08/03/2009
Indiana	09/28/2009
Indian Township (ITO)	10/01/2009

ITCA (ITO)	10/01/2009
ITCN (ITO)	10/01/2009
ITC (OK) (ITO)	08/03/2009
Iowa	10/01/2009
Kansas	08/01/2009
Kentucky	05/04/2009
Louisiana	10/01/2009
Maine	10/01/2009
Maryland	10/01/2009
Massachusetts	10/01/2009
Michigan	08/03/2009
Minnesota	09/01/2009
Mississippi	10/01/2009
Missouri	10/01/2009
Montana	11/30/2009
Muscogee (Creek) (ITO)	08/03/2009
Navajo Nation (ITO)	06/02/2009
Nebraska	10/01/2009
Nevada	10/01/2009
New Hampshire	10/01/2008
New Jersey	10/01/2009
New Mexico	10/01/2009
New York	01/03/2009
North Carolina	10/01/2009
North Dakota	10/01/2009
Northern Arapaho (ITO)	10/01/2009
Ohio	10/01/2009
Oklahoma	08/01/2009
Omaha Nation (ITO)	10/01/2009
Oregon	08/03/2009
Osage Nation (ITO)	08/03/2009
Otoe-Missouria (ITO)	08/03/2009
Pennsylvania	10/01/2009
Pleasant Point (ITO)	10/01/2009
Pueblo of Isleta (ITO)	10/01/2009

Pueblo of San Felipe (ITO)	10/01/2009
Pueblo of Zuni (ITO)	09/01/2009
Puerto Rico	10/01/2009
Rhode Island	10/01/2009
Rosebud Sioux Tribe (ITO)	10/01/2009
Santee Sioux (ITO)	10/01/2009
Santo Domingo (ITO)	10/01/2009
Seneca Nation (ITO)	10/01/2009
South Carolina	05/01/2009
South Dakota	09/03/2009
Standing Rock Sioux (ITO)	07/01/2009
Tennessee	10/01/2009
Texas	10/01/2009
Three Affiliated (ITO)	10/01/2009
Utah	07/01/2009
UTE Mountain (ITO)	05/01/2009
Vermont	10/01/2009
Virginia	10/01/2009
Virgin Islands	10/01/2009
Washington	10/01/2009
WCD Enterprises (ITO)	08/01/2009
West Virginia	10/01/2009
Winnebago (ITO)	10/01/2009
Wisconsin	08/03/2009
Wyoming	10/01/2009