

How Increasing Breastfeeding Rates Will Affect WIC Expenditures:

Saving Money While Meeting the Goals of Healthy People 2020

By Heidi Hartmann, Jeffrey Hayes, and Youngmin Yi



About This Report

This study examines the cost structure of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) food packages for mother/infant pairs and how food package costs to WIC would be affected by changes in rates of breastfeeding among the mothers of infants participating in the WIC program. The research represents a continuation of earlier Institute for Women's Policy Research (IWPR) analyses of the impact of healthcare reform on rates of breastfeeding and is part of IWPR's broader emphasis on women's health issues. The research was made possible by a contract from the W.K. Kellogg Foundation.

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Executive Summary

Since its inception in 1972, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) has provided free infant formula while simultaneously attempting to promote breastfeeding. Efforts to promote breastfeeding have resulted in relatively continuous increases in rates of breastfeeding among mothers of infants participating in WIC over the last two decades. This report analyzes the cost structure of WIC food packages in relation to breastfeeding, including estimates of total spending on each of the different packages, and estimates of total costs from simulations if Healthy People 2020 breastfeeding goals were reached.

The analysis here provides 2010 estimates for the cost and utilization of each of the WIC food packages for pairs of infants and their mothers. New food packages were introduced in all states by 2009 and were intended to promote breastfeeding.

The estimates suggest that in 2010 just below 74 percent of infant participants (children under one year of age) received food packages associated with exclusive formula use. Relative to food packages for mother/infant pairs who exclusively breastfeed, the exclusive formula packages are around 25 percent more expensive for infants in the first six months of life, but 64 percent cheaper during the second six months.

Simulations of changes in breastfeeding patterns suggest that the achievement of the Healthy People 2020 breastfeeding targets among WIC participants would likely reduce food package costs overall. This result occurs because a large number of women switching to breastfeeding during the first six months of an infant's life would reduce costs while a small number of mothers switching during the second six months would increase costs. Simulations for extreme cases (e.g. all fully breastfeeding for one year) suggest that food package costs could be reduced by 18 percent if all WIC mother/infant pairs engaged in exclusive breastfeeding for the first six months, followed by exclusive formula use in the next six months. A 38-percent reduction could be achieved if all mother/infant pairs received the partial breastfeeding packages.

Viewed in terms of the value of WIC food packages to participants, the current cost structure still tends to bias mothers of newborns toward formula use, since breastfeeding costs less in the first six months and formula is more valuable in dollar terms. Nonetheless, in part because any switch from breastfeeding to exclusive formula use tends to be permanent, it is likely that continuing improvements in breastfeeding rates will be concentrated among mothers of infants in the first six months of life. If that occurs, as seems likely since the new packages reduce the bias toward formula, the WIC program will experience modest cost-savings as a result.

Introduction

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides food supplements for low-income pregnant women, new mothers with infants, and children up to the age of five years. Beginning as an experiment in 1972, WIC was made permanent in 1975 (see Oliveira, Racine, Olmsted, and Ghelfi 2002, iii). The program grew steadily from an initial base of 88,000 participants per month to cover an average of 7.4 million participants in 1997 (Oliveira et al. 2002, 11). The relevant population for consideration of breastfeeding concerns the 2.1 million infants under the age of one year participating in WIC (USDA FNS 2011c), and their mothers who participate.¹

WIC is a federally-funded program, administered by the states. The federal government has increased the WIC budget each year since 1974, reaching a level of \$6.2 billion in fiscal year 2008, \$6.9 billion in 2009, and \$7.3 billion in 2010, followed by a cut of \$500 million in a budget agreement reached in April 2011.² The 2011 cut has arrived at an inauspicious moment, given that the poverty rate reached a 16-year high of 15.1 percent in 2010 (DeNavas, Proctor, and Smith 2011).

WIC has recently provided between 57 and 68 percent of all infant formula sold in the United States (Oliveira, Frazão, and Smallwood 2010, 24). WIC already subsidizes the cost of formula and may be at least partially responsible for the low rates of breastfeeding found here relative to other nations (see, e.g., Drago, Hayes, and Yi 2010, 3). Because of substantial evidence of the health benefits of breastfeeding (Bartick and Reinhold 2010), efforts have been made to improve rates of breastfeeding among WIC participants and those efforts continue today. The estimates here may shed light on the likely effects of any shift towards breastfeeding occurring today.

This report begins by describing the operations of WIC pertaining to breastfeeding and how these have changed over time. Next, the role of infant formula in shaping food package costs and utilization is described. The main analyses provide updated estimated costs of the WIC food packages and simulations of total costs for various levels of breastfeeding, including those associated with meeting the Healthy People 2020 targets, as well as extreme possibilities (all WIC participants exclusively formula-feeding, for example).³

¹ The analyses in this report focus on a subgroup of WIC participants composed of infants under the age of one year and their mothers; the overall WIC population also includes children aged one to four years, who made up more than half of WIC participants in 1998 (Oliveira et al. 2002, 13).

² Figures in this paragraph are from Oliveira and Frazão (2009, 22), Harden (2010, 2), and Mascaro (2011).

³ Many of the estimates provided here appeared previously in *Breastfeeding Medicine* (Drago 2011).

WIC, Breastfeeding, and Infant Formula

The WIC Program and Breastfeeding Promotion

In the United States, breastfeeding promotion dates to the 1979 Surgeon General's report on *Healthy People* (U.S. Surgeon General 1979), which set breastfeeding targets of 75 percent for initiation and 35 percent of mothers breastfeeding through six months. That report ultimately led to the U.S. Department of Health and Human Service's Healthy People 2010 initiative and the current Healthy People 2020 initiative, both of which contain breastfeeding targets (CDC undated). Other efforts include the American Academy of Pediatrics (AAP) policy statement, "Breastfeeding and the Use of Human Milk" (2005), as well as supportive statements from the Academy of Breastfeeding Medicine, the American Academy of Family Physicians, and the American College of Obstetricians and Gynecologists (AAP 2005, 498). In 2001, Representative Carolyn Maloney first introduced the Breastfeeding Promotion Act in the U.S. House of Representatives,⁴ and related provisions protecting breast milk expression in the workplace were adopted as part of the 2010 Affordable Care Act (Drago, Hayes, and Yi 2010). Both the broader-reaching, proposed Breastfeeding Promotion Act and the relevant provisions adopted in 2010 are designed to facilitate the combining of employment and breastfeeding, which could help promote breastfeeding among WIC mothers who are employed.

From its inception, mothers of infants could choose whether or not to receive infant formula through WIC, but there were no gains to mothers who breastfed. Breastfeeding mothers were effectively turning away free food for their infants. Although WIC was likely not the only factor involved, as of 1990, mothers of infants participating in WIC were engaging in breastfeeding when the child was six months of age at less than half the rate of non-participating mothers (8.6 percent compared to 17.8 percent, respectively; Haider, Jacknowitz, and Schoeni 2003, Table 1).

Regardless of the role of infant formula, WIC was always intended to promote breastfeeding. When the program became official in 1975, the word "breastfeeding" was explicitly included in the legislation. In 1989, federal reauthorization of WIC included requirements for states to promote and support breastfeeding (USDA FNS 2011b).

In 1992, a trade-off was introduced in the form of an alternative and enhanced food package for mothers of infants who exclusively breastfeed and consequently opt out of receiving the formula (Oliveira et al. 2002, 9). In 1997, the USDA initiated a National Breastfeeding Promotion Campaign targeting WIC participants (Oliveira et al. 2002, 9). Reauthorization of WIC in 1998 permitted the use of food funds to purchase breast pumps in an effort to support mothers who chose to breastfeed (USDA FNS 2011b). Although the precise role of these revisions to WIC in promoting breastfeeding will likely never be known—given other related initiatives in the United States—rates of breastfeeding at six months among WIC recipients climbed steadily throughout the 1990s, from 8.6 percent in 1990 to 20.3 percent in 2000 (Haider, Jacknowitz, and Schoeni 2003, Table 1).

4 Information from Representative Maloney's website, see U.S. House of Representatives (2011).

In 2005, at the request of the United States Department of Agriculture (USDA), the National Academies Institute of Medicine's Committee to Review the WIC Food Packages recommended new guidelines for WIC food packages. In addition to revising all the packages to include a greater quantity of nutritious foods such as whole wheat bread and fresh fruits and vegetables, the committee also recommended enriching the food packages provided to breastfeeding mothers and their infants. In addition, the committee advised the scaling back of the amount of infant formula provided to infants who were either partially breastfed or not breastfed (Committee to Review the WIC Food Packages 2005). In 2007, the USDA issued new guidelines for WIC food packages reflecting the National Academy's recommendations. The new food packages were introduced nationwide by 2009 (USDA FNS 2011a; Oliveira, Frazão, and Smallwood 2010).

The importance of the new food packages to breastfeeding promotion efforts should not be underestimated. On the one hand, the new packages eliminated the provision of free formula to mothers who were exclusively breastfeeding. This action reduced the probability that these mothers would supplement breast milk with formula, a practice that would result in the mothers' reduced production of breast milk and increased reliance upon formula. On the other hand, the quantities of infant formula were reduced in most food packages, including those for exclusive formula-feeding.⁵ It has been estimated that the shift to the new food packages, holding all else constant, will reduce WIC purchases of infant formula by 20 percent (Oliveira, Frazão, and Smallwood 2010, 26).

Most recently, reauthorization of WIC in 2010 included intensive efforts to promote breastfeeding, including replacing language regarding the "nutrition education" component of WIC with "nutrition education and breastfeeding support," adding requirements that state and local WIC agencies measure and report on the extent of breastfeeding among WIC recipients, adding funding to research best practices to support breastfeeding among WIC recipients, and adding funding to reward states that effectively promote breastfeeding (Healthy Hunger-Free Kids Act of 2010 (Public Law No. 111-296)).

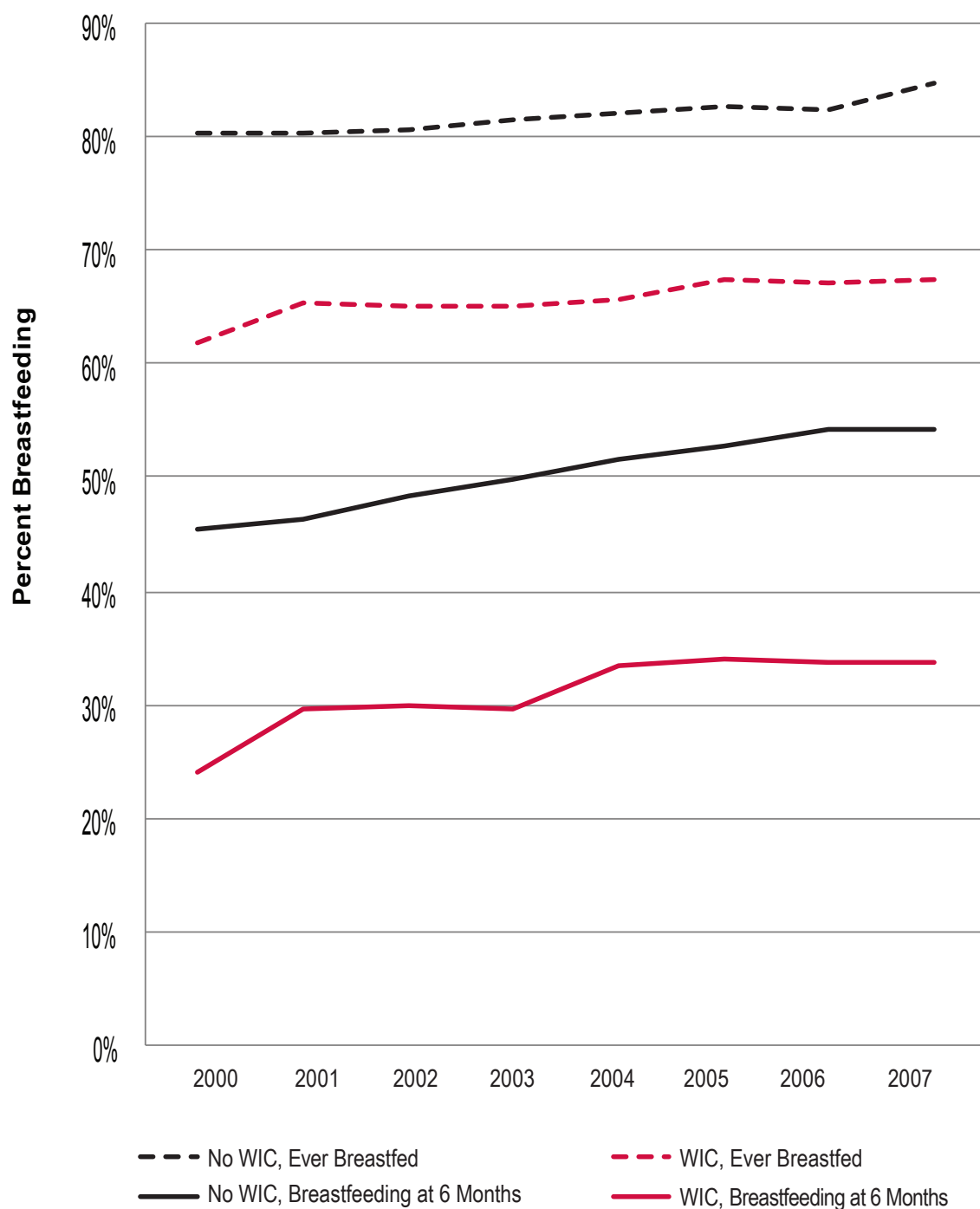
We cannot yet know precisely how successful recent breastfeeding promotion efforts among WIC recipients will be. According to the most recent data available, we do know that WIC recipients breastfeed at relatively low rates. Figure 1 provides evidence of a "WIC gap" in rates of breastfeeding. Among mothers who did not receive WIC, the rates of any breastfeeding at six months were above 50 percent between 2000 and 2007, a goal of the Healthy Families 2010 initiative (DHHS 2000). The mothers participating in WIC exhibited rates of breastfeeding at six months well below 40 percent. For all groups (including the ever breastfed)⁶ rates rose over this period.

Estimates by the USDA for rates of any breastfeeding among WIC participants are lower than those among non-WIC participants, but demonstrate the same upward trend, rising steadily from 41.5 percent in 1998 to 59.0 percent in 2008 (USDA FNS 2010, Exhibit 6.2).

5 An exception exists for exclusively formula-fed infants aged 4–5.9 months, for whom an increase in the quantity of formula was provided.

6 The group of infants 'ever breastfed' includes those who are currently breastfeeding or have been breastfed at any point, regardless of the duration of the breastfeeding period.

Figure 1. Rates of Breastfeeding, Ever and at 6 Months, by WIC Program Participation Status, 2000–2007



Source: IWPR compilation of data from the National Immunization Survey, Centers for Disease Control and Prevention (CDC), 2000–2007.

The Role of Infant Formula in the WIC Cost Structure

Until 1987, the WIC program paid full retail price for formula, just as it does for other food available through the program. That year, the state of Tennessee requested that formula producers bid for an exclusive contract to supply infant formula to the state's WIC program. In exchange for the exclusive contract, the state received a rebate from the producers for each unit of formula sold through WIC. A growing number of state WIC programs followed suit and began bargaining with formula producers for sole-source contracts (Oliveira et al. 2002, 8). By 1996, the average WIC program was receiving rebates such that WIC paid 15 percent of the wholesale price for infant formula plus the retail mark-up (GAO 1998, 5). By the mid-2000's, the rebates were such that WIC programs receiving the rebates paid an average of nine percent of the wholesale price (Oliveira, Frazão, and Smallwood 2010, 19), plus the retail mark-up.⁷

From the standpoint of the USDA, the formula rebates result in cost containment (e.g., Oliveira, et al. 2002, 6). For WIC participants, the market value of food packages, including infant formula, will be above levels relevant to an analysis of costs to the program (this is discussed further below).

Understanding the asymmetry regarding breastfeeding and formula use is crucial for, in turn, understanding how WIC food packages are used and their resulting costs: mothers who stop breastfeeding a child at any point are not likely to breast-feed that child again.⁸ This fact does not imply that exclusively-breastfeeding mothers who at some point supplement breast milk with formula never return to exclusive breastfeeding (no relevant studies of this possibility exist at this time). This fact does imply, however, that if a new mother participating in WIC does not initiate breastfeeding or stops in the first few weeks, she is unlikely to initiate breastfeeding after that time. Similarly, any mother participating in WIC who initiates breastfeeding but stops at any point during the infant's first year is unlikely to return to breastfeeding that child. As a result, the proportion of mothers of infants participating in WIC who select food packages including infant formula will tend to rise between the time a child is born and the time at which the child reaches one year of age.

Regarding price increases, most WIC infant formula contracts hold for four-year periods with prices constant for the period. According to a 2010 report from the USDA that compares prices in contracts effective in December 2008 to those in prior state contracts, real net wholesale prices of infant formula have increased by 73 percent (Oliveira, Frazão, and Smallwood 2010, 28).⁹

7 To see how the process works in practice, suppose a producer charges a retail distributor of WIC formula a wholesale price of \$5 for a can of formula, and the retailer charges \$11 for the good to all consumers including WIC participants. The state WIC program would reimburse the retailer \$11 and if, for example, the rebate were 80 percent, the program would receive a \$4 rebate from the formula producer.

8 For example, the longitudinal study of Fein and Roe (1998) implicitly assumes that breastfeeding duration for an infant has a single starting and ending point.

9 The 73-percent net increase in real wholesale prices of infant formula was calculated by comparing prices from the 2008 state contracts with infant formula manufacturers to the previous contracts that individual states had with manufacturers; therefore, the comparison years for the states' prior contracts range from 2003 to 2008 (Oliveira, Frazão, and Smallwood 2010).

Findings: Estimated Costs for WIC of Increasing Breastfeeding

Estimated Cost of the WIC Food Packages

The 2010 cost of WIC food packages is estimated using 2006 prices and food prescription amounts from the USDA Food and Nutrition Service, which are corrected for inflation using the 2007–2010 food item-specific annual CPI-U,¹⁰ with three exceptions. In terms of prescription amounts, during implementation of the new food packages, it was decided that all mothers of infants (and not just those who are exclusively breastfeeding) would receive a \$10 voucher for fruits and vegetables and that the maximum allowable amounts of formula would be reduced slightly.¹¹ In addition, the current cost of infant formula to WIC is treated differently for the analysis. As noted in the previous section, when compared to the cost of infant formula in prior state contracts with infant formula manufacturers, the real net wholesale price of infant formula to WIC increased by 73 percent for newer contracts in effect during December 2008. However, infant formula costs to WIC include both the wholesale price post-rebate and a retail mark-up. To avoid overstating the inflationary effects of the increase in real net wholesale prices, it is assumed that they accounted for only 30 percent of formula costs to WIC as of 2006.¹² Further, part of the 73-percent increase had already occurred by 2006, so the increase is reduced to 50 percent for the analysis (Oliveira, Frazão, and Smallwood 2010, Figure 13). Under these assumptions, the 2006 price of formula to WIC is inflated by a factor of 15 percent to generate 2010 figures. Note that the 15-percent figure is cautious, because it does not account for any increase in the retail mark-up during the period.¹³

The estimated 2010 cost of WIC food packages for mother/infant pairs is provided in Table 1.¹⁴ Although slightly inaccurate, the terms applied here to the different food packages are “exclusive formula use,” “partial breastfeeding,” and “exclusive breastfeeding.” The inaccuracy stems from the fact that, for months 6–11.9, all infant packages are supplemented with foods in addition to formula and breast milk.¹⁵ The most expensive package combinations are for exclusive breastfeeding during

10 The food item-specific CPI-U inflation rates used were those that applied to the following categories (relevant WIC food package item noted in parentheses): non-frozen, noncarbonated juices & drinks (juice); baby food (infant cereal); baby food (baby food and vegetables); bananas (bananas); dried beans, peas, lentils (beans, dried); canned vegetables (beans, canned); peanut butter (peanut butter); canned fish and seafood/shelf-stable fish and seafood (canned fish – tuna, salmon); fresh vegetables (carrots); bread, other than white (whole grain bread); and rice, pasta, cornmeal (other grains/brown rice).

11 Figures from USDA FNS (2007a) were used for prescription amounts, with these two exceptions (i.e., compare USDA FNS 2007a with USDA FNS Undated).

12 The 30-percent figure seems reasonably cautious given state-level figures presented in Table 5 of Oliveira and Davis (2006). Note that all cost calculations are for powdered infant formula, which is reasonable given that both liquid, milk-based formula, and soy-based formula are small and shrinking components of the WIC program (Oliveira, Frazão, and Smallwood 2010).

13 The closest CPI-U category for infant formula is for “baby food,” which experienced an increase of 9.3 percent between 2006 and 2010, suggesting that the retail mark-up did in fact rise and add costs to the WIC program for infant formula, in addition to the increases discussed above.

14 Food package 3, prescribed as a result of certain medical conditions, is ignored in this analysis, following the practice of the Committee to Review the WIC Food Packages (2005, 126).

15 The USDA uses the term “full” instead of “exclusively” to describe the packages (see, e.g., USDA FNS 2011c). The “exclusive” terminology is used in the medical literature on breastfeeding (see, e.g., Bartick and Reinhold 2010). It would be most accurate to define the packages negatively, as in “non-formula” or “non-breastfeeding,” but this terminology seems awkward at best.

infant months 6–11.9 and for partial breastfeeding during months 6–11.9. The least expensive packages are for exclusive formula use across months 6–11.9 and for exclusive breastfeeding during months 0–5.9.

Table 1. Monthly Cost of WIC Food Packages for Infant/Mother Pairs

	Exclusive Formula	Partial Breastfeeding	Exclusive Breastfeeding
Mother + Infant 0–3.9 Months	\$60.84	\$50.52*	\$48.31
Mother + Infant 4–5.9 Months	\$63.80	\$55.94	\$48.31
Mother + Infant 6–11.9 Months	\$38.92	\$66.27	\$108.27

Source: IWPR calculations using 2006 food package prescription and food item costs from the U.S. Department of Agriculture Food and Nutrition Service (USDA FNS 2007a, 2007b) and 2007–2010 CPI-U inflation rates from the U.S. Bureau of Labor Statistics (BLS 2007–2010).

*Note that infant formula is restricted for partial breastfeeding infants during month zero, bringing the cost down to \$43.12 during that time.

These patterns are driven mainly by three aspects of the food packages. First, infant formula accounts for more than half the cost of the exclusive formula packages, rising from \$31.98 in months 0–3.9 to \$35.35 in months 4–5.9 before declining to \$24.92 in months 6–11.9. Second, mothers who do not breastfeed receive no food package during months 6–11.9, generating the large decline in the cost of exclusive formula packages when the child achieves the age of six months. Third, although breast milk provides all necessary nutrients for an infant in the first six months, there are insufficient quantities of iron and zinc for infants beyond that age (Committee to Review the WIC Food Packages 2006, 47). In response, infant food packages for months 6–11.9 are supplemented for the exclusively breastfeeding infant’s WIC package in the amount of \$28.72 worth of meat and an additional \$16.00 worth of fruits and vegetables, relative to the package provided to infants who are exclusively using formula.

Breastfeeding and Formula Use Among WIC Participants

The USDA has projected that a total of 1.2 million mothers of infants and 2.2 million infants participated in WIC during FY2010 (Table 2).¹⁶ Although the estimate is for the fiscal year starting October 1, 2009, and ending one year later, it is important to note that the projections were generated for a report released in 2007, meaning the figures do not account for any subsequent shift in breastfeeding behavior—including any changes generated by the introduction of the new WIC food packages.

16 In fact, the number of infants participating in WIC, projected at 2,194,724 in the 2007 publication, is less than one percent away from the realized FY2010 figure of 2,174,232 (USDA FNS 2011a). Because the more recent figures do not break down participants by the types of food packages used and are so close to the earlier projections, there is little reason to use the new data.

Table 2. Distribution of Mothers of Infants and Infants by Breastfeeding and Formula Use

	Mothers	Infants	% All Infant Participants
Exclusive Formula	669,054	1,616,233	73.6%
Partial Breastfeeding	195,305	209,213	9.5%
Exclusive Breastfeeding	344,730	369,278	16.8%
Totals	1,209,089	2,194,724	100%

Source: USDA FNS enrollment projections for FY2010 (USDA FNS 2007a).

Although CDC and USDA data suggest that more than half of WIC mothers engage in breastfeeding at some point, the asymmetry discussed earlier means that many of these mothers will shift to infant formula over time. As a result, it is not surprising that just under three-quarters of participating infants receive the exclusive formula package and just under 17 percent of participating infants receive the exclusive breastfeeding package. Seen differently, more than half (54 percent) of infants receiving the exclusive formula package are in the age range 6–11.9 months of age, consistent with mothers shifting away from breastfeeding as the child ages (compare Table 2 figures with those in Appendix Table B). For partial and exclusive breastfeeding, the numbers of participating mothers are similar to, although slightly lower than, the numbers of infants.¹⁷ However, for full formula packages, the participation figures for mothers are less than half as large as for infants because they are not provided with a mother package¹⁸ beyond 5.9 months.

Monthly Costs and Simulations for Changes in Breastfeeding Behavior

The information on per-participant cost provided in Table 1 can be combined with projected monthly participation figures in Table 2 to obtain total monthly WIC costs for mother/infant pairs, as in Table 3.¹⁹

The largest source of expenditures is for infants aged 6–11.9 months who are exclusively formula-fed—at over \$34 million per month—which is partly a function of the large age range included (six months) as well as the large number of infants on the exclusive formula package at that time. The smallest figure is for partially-breastfed infants aged 4–5.9 months, which is partly a function of the small age range included (two months) and the small proportion of infants receiving the package.

¹⁷ It is possible for low-income single fathers to enroll in WIC. However, it would seem reasonable for them to select the exclusive formula packages, leaving the difference between mother and infant enrollment with partial or exclusive breastfeeding an open question. It may be that accounting errors are involved, or that some mothers (perhaps with limited literacy) believe that their infant qualifies but that they, themselves, do not.

¹⁸ WIC packages for mothers and infants are allocated separately; for example, a pregnant mother can receive a WIC food package though her unborn child would not receive a WIC package. The term “mother-infant package” assumes that both the mother and her infant are receiving the appropriate WIC food packages simultaneously.

¹⁹ See the Technical Appendix for detailed information about these calculations.

Table 3. Monthly WIC Food Costs for Mother/Infant Pairs

Monthly Food Cost	Infants 0–3.9 Months	Infants 4–5.9 Months	Infants 6–11.9 Months	Total by Feeding Method
Exclusive Formula	\$25,773,744.65	\$17,989,227.19	\$34,086,564.12	\$77,849,535.96
Partial Breastfeeding	\$5,632,760.57	\$1,754,436.63	\$3,740,508.85	\$11,127,706.05
Exclusive Breastfeeding	\$9,398,945.94	\$2,644,038.42	\$10,741,292.31	\$22,784,276.66
Total				\$111,761,518.67

Source: IWPR calculations using USDA FNS FY 2010 projected enrollment data, food package prescriptions and 2006 cost estimates (USDA FNS 2007a, 2007b), and CPI-U inflation rates (BLS 2007–2010).

The column on the far right of Table 3 provides total monthly costs for the three feeding approaches. It demonstrates that more than two-thirds of WIC mother/infant pair food costs (70 percent) are associated with exclusive formula packages. The total estimated cost for all three types of mother/infant food packages is approximately \$112 million per month or \$1.3 billion annually.

Because the projected food package utilization figures were generated prior to implementation of the new food packages, it seems likely that current rates of breastfeeding will actually be higher (and relative expenditures shifted toward packages for breastfeeding infants and mothers).

Seven simulations were performed to better understand the effects of any changes in breastfeeding behavior, most of which address potential increases in breastfeeding. The first concerns the projected effects of WIC participants meeting the Healthy Families 2020 breastfeeding target rates. The next two capture the cost implications of the doubling of rates of exclusive breastfeeding among mothers of infants in either the first or second six months of life. The last four simulations address extreme cases.

Meeting the Healthy People 2020 Objectives

The most recent Healthy People objectives (for the year 2020) include five breastfeeding targets: 81.9 percent of new mothers ever breastfeeding, 60.6 percent at least partially breastfeeding at six months, 34.1 percent at least partially breastfeeding at one year, 46.2 percent exclusively breastfeeding at three months, and 25.5 percent exclusively breastfeeding at six months (DHHS 2010).

To gauge the effects of meeting these targets, monthly breastfeeding rates among WIC participants were first estimated using the simplifying assumptions that both partial and exclusive breastfeeding rates decline linearly over the first six months and are then flat for the remaining six months (see the Technical Appendix, especially Appendix Table D). The parameters were then adjusted to meet the Healthy People breastfeeding objectives, resulting in revised monthly cost figures as reported in Table 4.

Table 4. WIC Food Expenditures If Meeting the Healthy People 2020 Objectives

Monthly Food Cost	Infants 0–3.9 Months	Infants 4–5.9 Months	Infants 6–11.9 Months	Total by Feeding Method
Exclusive Formula	\$11,017,131.91	\$8,846,890.20	\$26,592,239.30	\$46,456,261.41
Partial Breastfeeding	\$9,437,246.52	\$6,891,809.24	\$15,811,853.41	\$32,140,909.17
Exclusive Breastfeeding	\$16,939,637.89	\$4,971,665.14	\$10,701,649.03	\$32,612,952.06
Total				\$111,210,122.64

Source: IWPR calculations using USDA FNS FY2010 projected enrollment data, food package prescriptions and 2006 cost estimates (USDA FNS 2007a, 2007b), CPI-U inflation rates (BLS 2007–2010), and Healthy People 2020 objectives (DHHS 2010).

The grand total is \$111 million per month or approximately \$1.3 billion per year, a figure that is virtually identical to current estimated food expenditures by WIC for mother/infant pairs (based on the data in Table 3). Behind that similarity lie dramatic reductions—by more than half—in expenditures on exclusive formula packages for the first six months, in tandem with proportionally smaller increases in expenditures on exclusive breastfeeding packages for the first six months, and an almost three-fold increase in expenditures on packages for infants partially breastfeeding for a full year.

Increased Rates of Breastfeeding

The next simulations consider the effects of an increase in exclusive breastfeeding in either the first or second six months of mother/infant participation in WIC. Rates of exclusive breastfeeding among WIC participants average 27.0 percent for months zero to three, 15.1 percent for months four and five, and 9.9 percent for months six and beyond. If the first two figures were to double to 54.0 and 30.2 percent, respectively, and the entire shift in behavior occurred among mothers who would otherwise have used the exclusive formula packages, food costs are projected to change as reported in Table 5.

Table 5. WIC Food Expenditures if Exclusive Breastfeeding Doubled in Months 0 to 5

Monthly Food Cost	Infants 0–3.9 Months	Infants 4–5.9 Months	Infants 6–11.9 Months	Total by Feeding Method
Exclusive Formula	\$13,797,609.10	\$14,515,623.39	\$34,086,564.12	\$62,399,796.61
Partial Breastfeeding	\$5,556,673.76	\$1,733,148.35	\$3,702,485.83	\$10,992,307.93
Exclusive Breastfeeding	\$18,465,149.94	\$5,194,472.46	\$10,659,674.27	\$34,319,296.67
Total				\$107,711,401.21

Source: IWPR estimates using USDA FNS FY2010 projected enrollment data, food package prescription, 2006 cost information (2007a, 2007b), and CPI-U inflation rates (BLS 2007–2010).

Relative to the baseline (Table 3), expenditures on exclusive formula packages would decline by around \$16 million per month, while expenditures on exclusive breastfeeding packages would rise by approximately \$12 million per month, resulting in monthly savings of around \$4 million. Annual savings would be on the order of \$48 million dollars.

Alternatively, a doubling of the rate of exclusive breastfeeding for months six and beyond, from 9.9 to 19.8 percent, would result in costs as found in Table 6.

Table 6. WIC Food Expenditures if Exclusive Breastfeeding Doubled in Months 6 and Later

Monthly Food Cost	Infants 0–3.9 Months	Infants 4–5.9 Months	Infants 6–11.9 Months	Total by Feeding Method
Exclusive Formula	\$25,773,744.65	\$17,989,227.19	\$30,107,344.40	\$73,870,316.24
Partial Breastfeeding	\$5,632,760.57	\$1,754,436.63	\$3,740,497.02	\$11,127,694.22
Exclusive Breastfeeding	\$9,398,945.94	\$2,644,038.42	\$21,482,540.00	\$33,525,524.35
Total				\$118,523,594.81

Source: IWPR estimates using USDA FNS FY2010 projected enrollment data, food package prescription, 2006 cost information (USDA FNS 2007a, 2007b), and CPI-U inflation rates (BLS 2007–2010).

Because the food package costs for exclusive breastfeeding in this age range are so high (\$108, see Table 1), even a relatively modest shift in behavior—moving slightly more than 100,000 mother/infant pairs from exclusive formula to exclusive breastfeeding—results in sizeable cost increases. The total monthly food cost rises from \$112 million (Table 3) to \$119 million, or by just under six percent, and annual costs are projected to expand by \$78 million.

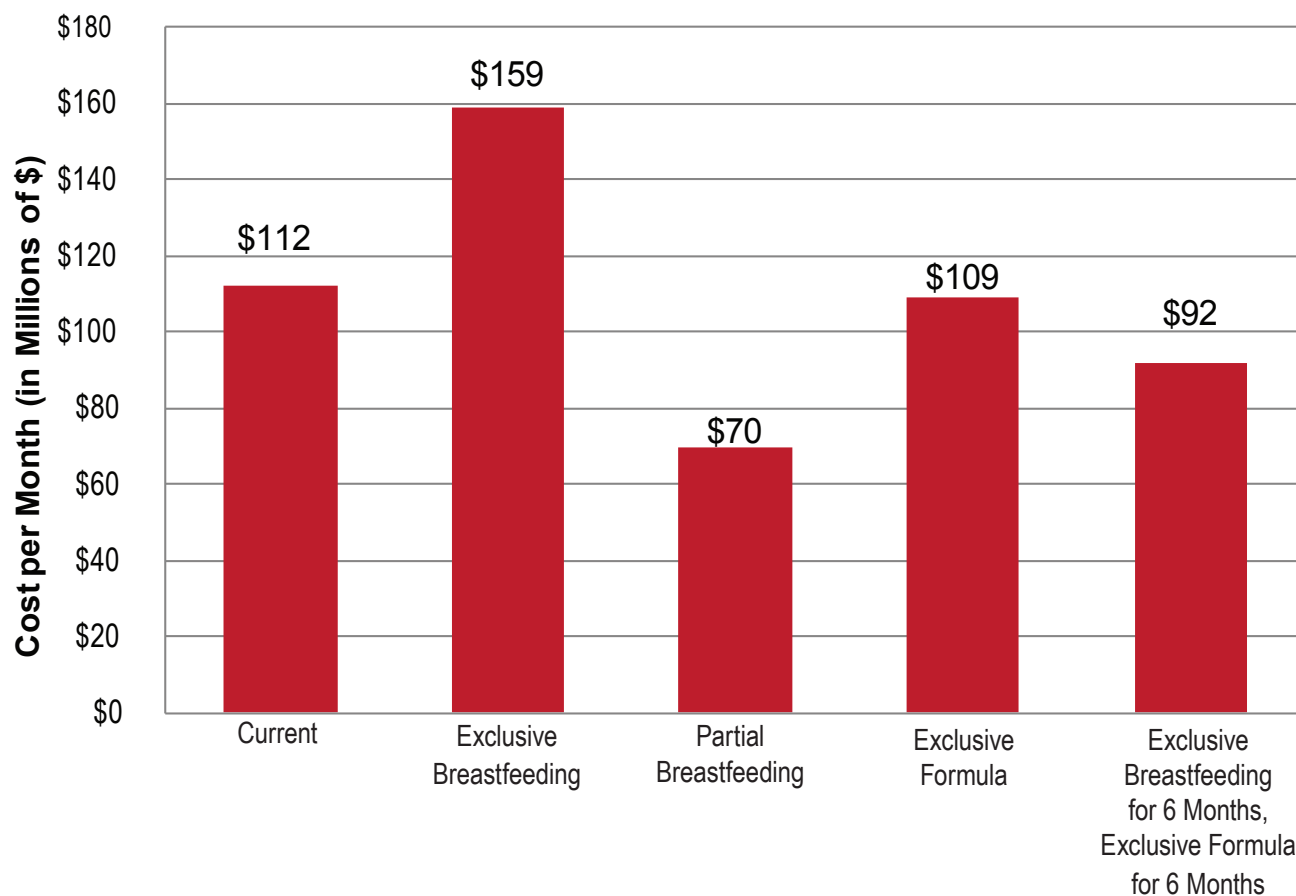
Extreme Cases

The final simulations consider cases where, alternatively, all of the mothers exclusively breastfeed, all partially breastfeed, all exclusively formula feed, or they switch from exclusive breastfeeding to exclusive formula use at six months. The resulting monthly food package costs to WIC are provided in Figure 2, which compares the extreme cases to current projected expenditures (from Table 3).

As can be seen in Figure 2, the highest cost is for exclusive breastfeeding. If all WIC mother/infant pairs were to use these packages, food costs would rise by 40 percent, adding a projected \$564 million to the annual cost of these food packages. In contrast, exclusive formula use would result in only a minimal shift in WIC food package costs. The high cost of exclusive breastfeeding is, not surprisingly, driven by the high costs for the mother/infant pair packages in the second six months; indeed, if the mothers were to use exclusive breastfeeding packages for the first six months and then switch to exclusive formula use, costs would fall to \$92 million per

month, for an 18-percent reduction or an annualized saving of \$240 million. More surprising is the finding that the low-cost option involves mothers consistently utilizing the partial breastfeeding packages. This strategy would reduce monthly costs to \$70 million, generating a 38-percent reduction in the costs of the food packages and resulting in annualized savings of \$504 million.

Figure 2. Monthly WIC Food Package Expenditures for Mother/Infant Pairs, Extreme Cases



Source: IWPR estimates using USDA FNS FY2010 projected enrollment data, food package prescription, 2006 cost information (USDA FNS 2007a, 2007b), and CPI-U inflation rates (BLS 2007–2010).

Conclusions

In the process of designing the new WIC food packages analyzed here, the National Academies Institute of Medicine committee sought to ensure that the effects of the change would be cost neutral for the WIC program (Committee to Review the WIC Food Packages 2005, 124). Given the differences in the value of the various new food packages, the committee was concerned about the cost effect of the improved breastfeeding packages through changes in rates of breastfeeding among WIC participants, and performed simulations which suggested that costs would be only minimally altered if breastfeeding rates improved (Ibid, 316–317). The findings reported here regarding the cost effects of meeting the Healthy People 2020 breastfeeding objectives within the WIC population support the claim that specific improvements in rates of breastfeeding, even when substantial, might be cost neutral for WIC.

Cost neutrality is, however, dependent upon assumptions regarding behavior that mask underlying cost differences and the way in which these might affect overall costs for the WIC program. Ignoring the partial breastfeeding packages, estimates presented here suggest that exclusively breastfeeding mother/infant pairs compared with exclusive formula-feeding pairs save \$12 per pair for each of the initial four months and \$15 for each of the next two months (see Table 1). The cost structure exhibits a dramatic shift for the next six months, with exclusive formula-feeding pairs costing \$69 less per month than exclusive breastfeeding pairs.

Not considered in the analysis above is the way in which food packages are viewed by participating mothers. If mothers were to purchase the WIC food packages in retail stores, the retail price of infant formula would drive up the value of relevant packages. For exclusive formula use, the value of the packages rises to approximately \$129 in months zero to three, \$139 in months four and five, and \$92 in months six through 11.²⁰ As a result, participating WIC mothers of infants face a choice between the exclusive formula and breastfeeding food packages, wherein the retail value of the prior is over 150 percent greater in months zero to five (compare amounts here with those in Table 1). These dramatic differences in the retail value of the WIC food packages may provide an incentive for new mothers to avoid breastfeeding.

Breastfeeding incentives during the second six months of an infant's life are quite different. At that time, the value to participants of the exclusive breastfeeding package rises above that for exclusive formula use. Even after accounting for the high retail price of infant formula, the value of the exclusive breastfeeding mother/infant packages (\$108) is \$16 above the value of the exclusive formula use package (\$92). To the extent that mothers participating in WIC are cost-conscious consumers, as seems likely given the low levels of income among the participants, the new food packages provide some incentive for mothers to request the exclusive breastfeeding package even if they continue to purchase infant formula. Costs to the WIC program would rise dramatically if such behavior became at all widespread among the large group of mothers of infants aged six through eleven months currently receiving the

20 Figures based on a retail price of \$15 for 126 fluid ounces of powdered infant formula at a Washington, DC, Safeway store (Columbia Road location), June 5, 2011.

WIC food package for exclusive formula-feeding (i.e., just under 900,000 mother/infant pairs).

Perhaps most troubling is the overall pattern in terms of the timing of WIC incentives for exclusive breastfeeding. Incentives work against exclusive breastfeeding during the initial six months, and then support exclusive breastfeeding during the second six months. It seems reasonable to believe that the marginal health benefits to mother and child from exclusively breastfeeding are substantially larger during the first six months of life than during the second six months, implying that the incentive structure is contrary to that which would most effectively promote public health.

Fortunately, the relevant incentive effects outlined above are likely modest, particularly given the historical context for the recent introduction of the new WIC food packages. That context includes the fact that rates of breastfeeding among WIC participants have been rising for decades, as mentioned above, and there is little reason to believe that trend would reverse. Additionally, the new food packages for exclusive breastfeeding are more generous than those provided previously, so the incentives to avoid breastfeeding provided by differences in the value of the food packages were reduced. Further, other components of the 2010 WIC reauthorization (e.g., expanded peer counseling) should improve rates of breastfeeding among participants, as will the 2010 Affordable Care Act provisions protecting the expression of breast milk in many workplaces.

Although it is speculative, it seems unlikely that the worst-case WIC cost scenario covered here—with heavy use of exclusive breastfeeding packages for infants 6–11.9 months—will be realized, at least in the near future. What seems more likely is that WIC will continue to witness improvements in rates of breastfeeding that are mainly limited to mothers of infants 0–5.9 months of age. That shift would save money and allow either reduced expenditures on WIC or expansion of the program to serve more of the mothers, infants, and children who are in need.

Technical Appendix

Estimates of Monthly WIC Food Costs, Utilization by Mothers and Infants, and Total Monthly Costs of WIC Food Packages

Appendix Table A. Monthly Cost of WIC Food Packages for Mothers and Infants

	Exclusive Formula	Partial Breastfeeding	Exclusive Breastfeeding
Mother with Infant 0–5.9 Months	\$30.25	\$39.17	\$48.31
Mother with Infant 6–11.9 Months	\$0.00	\$39.17	\$48.31
Infant 0–3.9 Months	\$30.59	\$11.35*	\$0.00
Infant 4–5.9 Months	\$33.55	\$16.77	\$0.00
Infant 6–11.9 Months	\$38.92	\$27.10	\$59.96

Source: IWPR estimates using USDA FNS food package prescription and cost information (USDA FNS 2007a, 2007b) and CPI-U inflation rates (BLS 2007–2010).

*The cost is \$3.95 during month zero.

Appendix Table B. Projected Infant and Mother Participants, FY2010

Infant Participants	Infants 0–3.9 Months	Infants 4–5.9 Months	Infants 6–11.9 Months
Exclusive Formula	444,956	295,466	875,811
Partial Breastfeeding	117,567	32,894	58,752
Exclusive Breastfeeding	208,409	58,628	102,241
Mother Participants			
Exclusive Formula	402,068	266,987	\$0.00
Partial Breastfeeding	109,751	30,707	54,846
Exclusive Breastfeeding	194,555	54,731	95,444

Note: Data for mothers are not disaggregated by infant age, so mothers were allocated according to proportions in the infant distribution.

Source: FY2010 projected enrollment data from USDA FNS (2007a).

Appendix Table C. Total Monthly Food Package Costs, 2010

Infant Participants	Infants 0–3.9 Months	Infants 4–5.9 Months	Infants 6–11.9 Months
Exclusive Formula	\$13,611,204.04	\$9,912,884.30	\$34,086,564.12
Partial Breastfeeding	\$1,333,797.62	\$551,632.38	\$1,592,179.20
Exclusive Breastfeeding	\$0.00	\$0.00	\$6,130,370.36
Mother Participants			
Exclusive Formula	\$12,162,540.61	\$8,076,342.89	\$0.00
Partial Breastfeeding	\$4,298,962.95	\$1,202,804.25	\$2,148,329.65
Exclusive Breastfeeding	\$9,398,945.94	\$2,644,038.42	\$4,610,921.95

Source: IWPR estimates using USDA FNS FY2010 projected enrollment data, food package prescriptions, 2006 cost information (2007a, 2007b), and CPI-U inflation rates (BLS 2007–2010).

Monthly Breastfeeding Rates for WIC Participants, Current Estimates Under the Healthy People 2020 Objectives

It is not known precisely how many infants enrolled in WIC are breastfed across each month of age, so those figures need to be estimated.²¹ CDC data for 2007 show that 25.5 percent of WIC infants are exclusively breastfed up to three months of age, a figure that falls to 9.2 percent by six months of age (CDC 2010b). At least partial breastfeeding after birth occurs at a rate of 67.5 percent among WIC participants, with the figure falling to 33.7 percent at six months, and 17.5 percent at 12 months (CDC 2010a). From the infant numbers provided in Appendix Table B, it can be estimated that 42.3 percent of infants aged 0–3.9 months engaged in at least partial breastfeeding, with the figure falling to 23.6 percent for 4–5.9 months, and to 15.5 percent for 6–11.9 months. By extension, the percentage of infants exclusively breastfed is 27.0 percent in months 0–3.9, 15.1 percent in months 4–5.9, and 9.9 percent in months 6–11.9.

For the final six months of the WIC coverage period for each infant, the figures for WIC utilization and for breastfeeding among WIC participants in the CDC data are very close. The CDC figure for exclusive breastfeeding at six months is 9.2 percent, while the comparable WIC utilization figure for months 6–11.9 is 9.9 percent. The CDC figure for at least partial breastfeeding is 17.5 percent at one year, while the comparable WIC utilization figure is 15.5 percent. Given these similarities, it is assumed that rates of partial and exclusive breastfeeding are constant over the 6–11.9 month age range.

Given that the CDC data find a marked fall-off in breastfeeding rates between birth and three months (and six months), it is not reasonable to assume rates are constant across these months. Instead it is assumed that there is a linear, negative relationship between the infant's age and rates of breastfeeding through month five. Given the mean rate of exclusive breastfeeding is 27.0 during months 0–3 and 15.1 in months 4–5, rates per month can be estimated by substituting in those figures as mean rates for months 1.5 and 4.5, respectively, to solve the following equation:

²¹ Implicitly, this analysis assumes that food package choices reflect breastfeeding behaviors.

Breastfeeding rate = Constant – X(Months of Age). For exclusive breastfeeding the constant term is 32.96, the slope X is 3.97 (implying that rates of exclusive breastfeeding decline by around 4 percent per month), yielding the exclusive breastfeeding figures in the table below.

Appendix Table D. Estimated Monthly Breastfeeding Rates, 2010

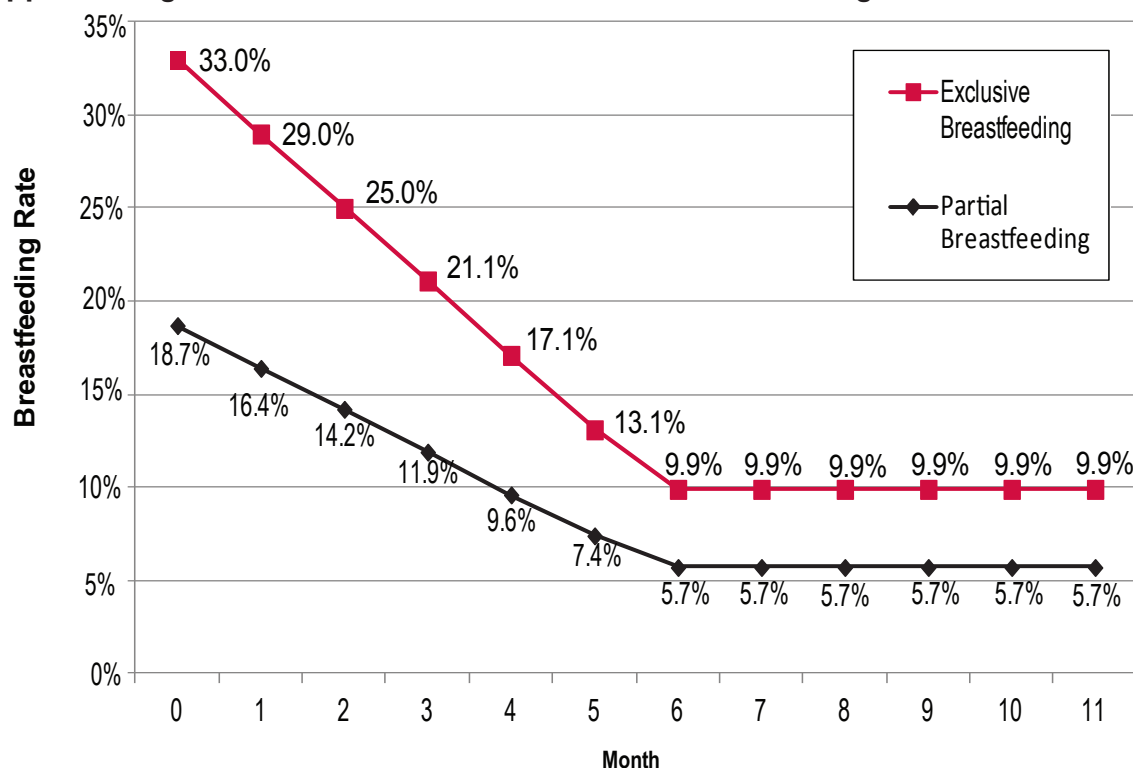
	Month 0	Month 1	Month 2	Month 3	Month 4	Month 5	Months 6–11
Exclusive Formula	48.3%	54.6%	60.8%	67.0%	73.3%	79.5%	84.5%
Partial Breastfeeding	18.7%	16.4%	14.2%	11.9%	9.6%	7.4%	5.7%
Exclusive Breastfeeding	33.0%	29.0%	25.0%	21.1%	17.1%	13.1%	9.9%

Source: IWPR estimates using USDA FNS FY2010 projected enrollment data (USDA FNS 2007a) and CDC breastfeeding rates (CDC 2010b).

Partial breastfeeding rates can be estimated in the same fashion, using the fact that 15.3 percent of infants are partially breastfed during months zero through three, and 8.5 percent are during months four and five. In the partial breastfeeding equation, the constant is then 18.7, the slope X is 2.27, and the equation yields partial breastfeeding rates as shown in Appendix Table D.

Rates of exclusive formula use are estimated as the remainder after accounting for partial and exclusive breastfeeding. Rates of partial and exclusive breastfeeding are described graphically in Appendix Figure 1.

Appendix Figure 1. Estimated Current Rates of Breastfeeding, 2010



Source: IWPR estimates using USDA FNS FY2010 projected enrollment data (2007a) and CDC breastfeeding rates (CDC 2010b).

The Healthy People 2020 objectives for breastfeeding (DHHS 2010), include breastfeeding initiation rates of 81.9 percent, and at least partial breastfeeding at the rates of 60.6 percent at six months and 34.1 percent at one year. Targets for exclusive breastfeeding are 46.2 percent at three months and 25.5 percent at six months. For exclusive breastfeeding, the three-month figure can be applied to month two of WIC, and the six-month figure to month five. Plugging these into the breastfeeding rate equation for months zero through five yields a constant term of 60 and a slope X of 6.9 which, in turn, yields exclusive breastfeeding targets (as shown in Appendix Table E).

To achieve the target for at least partial breastfeeding at a rate of 81.9 percent in the first month, the sum of partial and exclusive breastfeeding (the latter is 60 percent) must equal the 81.9 percent figure, yielding a target partial breastfeeding rate of 21.9 percent in month zero. Similarly the target at six months (applying to WIC month five) for any breastfeeding of 60.6 percent requires that partial breastfeeding occur at a rate of 35.1 percent. Note that it is reasonable to suppose there is a rising rate of partial breastfeeding, since mothers who were exclusively breastfeeding may tend to switch to partial breastfeeding over time.

Appendix Table E. Target Monthly Breastfeeding Rates, Healthy People 2020 Objectives

	Month 0	Month 1	Month 2	Month 3	Month 4	Month 5	Months 6–11
Exclusive Formula	18.1%	22.4%	26.6%	30.9%	35.1%	39.4%	65.9%
Partial Breastfeeding	21.9%	24.5%	27.2%	29.8%	32.5%	35.1%	24.2%
Exclusive Breastfeeding	60.0%	53.1%	46.2%	39.3%	32.4%	25.5%	9.9%

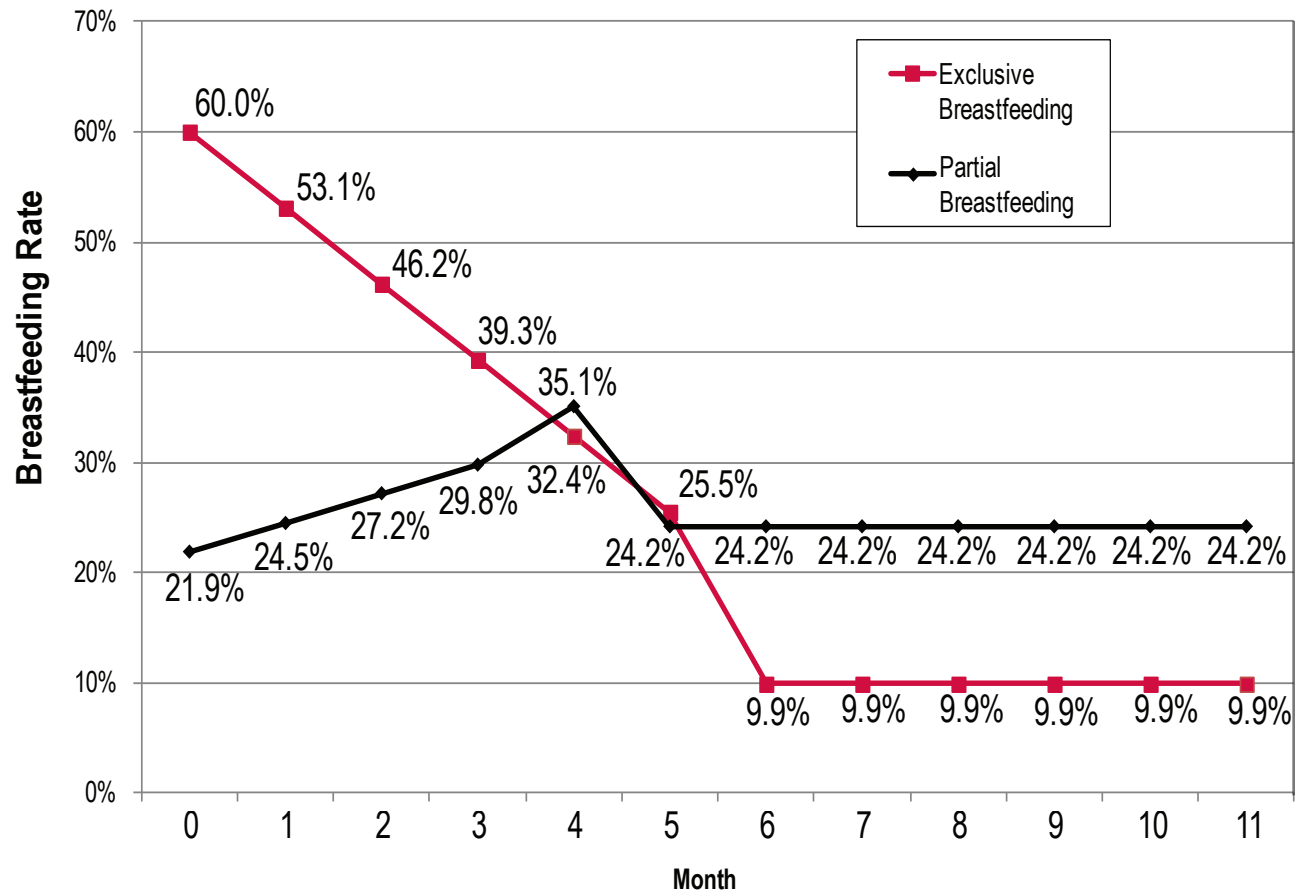
Source: IWPR estimates using USDA FNS FY2010 projected enrollment data (USDA FNS 2007a) and CDC breastfeeding rates (CDC 2010b).

Applying those figures to the breastfeeding equation yields a constant of 21.9 and a slope X of -2.64, and the partial breastfeeding figures in Appendix Table E for months zero through five. To achieve the target of 34.1 percent for at least partial breastfeeding by the end of the first year, again assuming a uniform distribution of breastfeeding between months six and eleven, the partial breastfeeding rate would need to be 24.2 percent.

As before, the exclusive formula use figures are the remainder after accounting for partial and exclusive breastfeeding. Target rates of partial and exclusive breastfeeding are shown in Appendix Figure 2.

To translate the target breastfeeding rates into food costs requires taking the monthly averages from Appendix Table E for the three relevant infant age groups (0–3.9, 4–5.9, and 6–11.9). Doing so results in the breastfeeding rates shown in Appendix Table F.

Appendix Figure 2. Rates of Breastfeeding Meeting the Healthy People 2020 Goals



Source: IWPR estimates using USDA FNS FY2010 projected enrollment data (2007a) and CDC breastfeeding rates (CDC 2010b).

Appendix Table F. Target Breastfeeding Rates and WIC Food Package Utilization

	Months 0–3.9	Months 4–5.9	Months 6–11.9
Exclusive Formula	24.5%	37.3%	65.9%
Partial Breastfeeding	25.9%	33.8%	24.2%
Exclusive Breastfeeding	49.6%	29.0%	9.9%

Note: Figures may not sum to 100 percent due to rounding.

Source: IWPR estimates using USDA FNS FY2010 projected enrollment data (USDA FNS 2007a) and CDC breastfeeding rates (CDC 2010b).

Next, current WIC participant infants and mothers are reallocated according to the targets, using totals for each age group from Table B, resulting in the following participant estimates by age of infant and type of food package.

Appendix Table G. Target Infant and Mother Participants, 2010

Infants	0–3.9 Months	4–5.9 Months	6–11.9 Months
Exclusive Formula	188,878.3	144,346.5	683,253.8
Partial Breastfeeding	199,671.4	130,801.9	250,906.6
Exclusive Breastfeeding	382,382.3	112,226.5	102,643.6
Mothers			
Exclusive Formula	173,201.4	132,365.8	0.0
Partial Breastfeeding	183,098.7	119,945.4	230,081.3
Exclusive Breastfeeding	350,644.5	102,911.7	941,24.18

Source: IWPR estimates using Healthy People 2020 objectives (DHHS 2010), USDA FNS FY2010 projected enrollment data (USDA FNS 2007a), and CDC breastfeeding rates (CDC 2010b).

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