



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

United States  
Department of  
Agriculture



Economic  
Research  
Service

Economic  
Research  
Report  
Number 93

February 2010

# **Rising Infant Formula Costs to the WIC Program**

## **Recent Trends in Rebates and Wholesale Prices**

Victor Oliveira  
Elizabeth Frazão  
David Smallwood



www.ers.usda.gov

## Visit Our Website To Learn More!

Find additional information about the WIC program, infant formula, and related topics at:

<http://www.ers.usda.gov/Briefing/WIC>

## National Agricultural Library Cataloging Record:

Oliveira, Victor J.

Rising infant formula costs to the WIC Program: recent trends in rebates and wholesale prices.

(Economic research report (United States. Dept. of Agriculture. Economic Research Service); no. 93)

1. Special Supplemental Nutrition Program for Women, Infants, and Children (U.S.).
  2. Infant formulas—Prices—United States.
    - I. Frazao, Elizabeth.
    - II. Smallwood, David.
    - III. United States. Dept. of Agriculture. Economic Research Service.
    - IV. Title.
- HV699

Photo credit: Shutterstock

---

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and, where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.



United States  
Department  
of Agriculture

Economic  
Research  
Report  
Number 93

February 2010



A Report from the Economic Research Service

[www.ers.usda.gov](http://www.ers.usda.gov)

# Rising Infant Formula Costs to the WIC Program

## Recent Trends in Rebates and Wholesale Prices

**Victor Oliveira**, [victoro@ers.usda.gov](mailto:victoro@ers.usda.gov)

**Elizabeth Frazão**, [efraza@ers.usda.gov](mailto:efraza@ers.usda.gov)

**David Smallwood**, [dsmallwd@ers.usda.gov](mailto:dsmallwd@ers.usda.gov)

### Abstract

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides participating infants with free infant formula. This study estimated that between 57 and 68 percent of all infant formula sold in the United States was purchased through WIC, based on 2004-06 data, and that formula costs to the WIC program have increased. Typically, WIC State agencies receive substantial rebates from manufacturers for each can of formula provided through the program. Each WIC State agency, or group of agencies, awards a contract to the manufacturer offering the lowest net wholesale price, defined as the difference between the manufacturer's wholesale price and the State agency's rebate. After adjusting for inflation, net wholesale prices increased by an average 73 percent for 26 fluid ounces of reconstituted formula between States' contracts in effect in December 2008 and the States' previous contracts. Most (72 percent) of the increase in real net wholesale prices was due to higher wholesale prices, the rest (28 percent) was due to lower rebates. As a result of the increase in real net wholesale prices, WIC paid about \$127 million more for infant formula over the course of a year.

**Keywords:** Infant formula; Special Supplemental Nutrition Program for Women, Infants, and Children; WIC; infant formula maximum daily allowance; ERS; Economic Research Service; U.S. Department of Agriculture; USDA

### Acknowledgments

The authors thank Ruowei (Rosie) Li and Jian Chen of the Centers for Disease Control and Prevention for providing us with data from the National Immunization Survey (NIS), as well as Priscilla Smith and Wynnicce Pointer-Napper for editorial and design support.

# Contents

- Summary . . . . . iii
- Definitions . . . . . v
- Introduction . . . . . 1
- WIC Program Overview . . . . . 4
- The Infant Formula Market . . . . . 6
  - Characteristics of the Infant Formula Market . . . . . 6
  - Wholesale Prices of Infant Formula . . . . . 9
- WIC’s Infant Formula Rebate Program . . . . . 13
  - How the Contracts Work . . . . . 13
  - Recent Legislative Developments . . . . . 15
- Trends in Infant Formula Rebate Contracts . . . . . 18
  - Trends in Net Wholesale Price . . . . . 18
  - Examination of DHA/ARA Supplementation
    - on Net Wholesale Price . . . . . 20
  - Impact of Higher Net Wholesale Price on Infant Formula Costs . . . . . 22
- Changes in WIC’s Market Share Could Impact Net Wholesale Price Trends . . . . . 24
  - Economic Conditions Affect the Number of Infants Eligible for WIC . . . . . 25
  - Food Package Revisions May Impact WIC’s Share of Infant Formula . . . . . 26
- Conclusions . . . . . 28
- References . . . . . 29
- Appendix A—Estimating WIC’s Share of the Infant Formula Market . . . . . 31
- Appendix B—Start Dates of Current and Previous Rebate Contracts by State . . . . . 34
- Appendix C—Analysis of the Change in Real Net Wholesale Price of Milk-Based Infant Formula in Liquid Concentrate Form . . . . . 35
- Appendix D—Estimated Change in Infant Formula Use by WIC Under the New Food Packages . . . . . 37

Recommended citation format for this publication:

Oliveira, Victor, Elizabeth Frazão, and David Smallwood. *Rising Infant Formula Costs to the WIC Program: Recent Trends in Rebates and Wholesale Prices*, ERR-93, U.S. Department of Agriculture, Economic Research Service, February 2010.

## Summary

USDA's Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides participating infants with free infant formula. Federal law requires that WIC State agencies enter into cost-containment contracts with infant formula manufacturers, with agencies typically receiving substantial discounts (rebates) from manufacturers for each can of formula purchased through the program. Each WIC State agency or group of agencies awards a contract to the manufacturer offering the lowest net wholesale price, defined as the difference between the manufacturer's wholesale price and the rebate. In exchange for the rebate, a manufacturer is given an exclusive right to provide its infant formula to WIC participants in the State. In fiscal 2008, infant formula rebates totaled \$2.0 billion, compared with total WIC expenditures (after rebates) of \$6.2 billion.

### What Is the Issue?

Because of the large volume of infant formula purchased through WIC, even small increases in net wholesale price can result in large increases in total costs to the program. WIC is a discretionary grant program funded annually by appropriations law. The number of participants who can be served within a fixed budget depends heavily on the program's food package costs, which in turn are significantly affected by rebates and the cost of infant formula.

### What Did the Study Find?

This study found that between 57 and 68 percent of all infant formula sold in the United States in 2004-06 was purchased through WIC. Nearly all WIC State agencies paid more for milk-based powdered formula (the primary type of infant formula) in their rebate contracts that were in effect in December 2008 than in their previous contracts, even after adjusting for inflation. Excluding Mississippi and Vermont, which do not distribute WIC foods through retail foodstores, 45 of 48 States, the District of Columbia, and 5 U.S. territories saw an increase in their real net wholesale price (December 2008 dollars). Across WIC State agencies, real net wholesale prices increased by an average 21 cents for 26 fluid ounces of reconstituted formula (WIC's maximum daily allowance during the study period) between States' previous and current rebate contracts (i.e., those in effect in December 2008). As a result of the increase in real net wholesale prices, WIC State agencies paid about \$127 million more for infant formula over the course of a year. This was equivalent to the cost of supporting 134,200 persons in WIC for a year or about 2 percent of all women, infants, and children participating in WIC in fiscal 2008.

Seventy-two percent of the increase in real net wholesale price was due to an increase in the real wholesale price of infant formula. All rebate contracts in effect in December 2008 were based on formulas supplemented with the fatty acids docosahexaenoic acid (DHA) and arachidonic acid (ARA), whereas most of the previous contracts were based on unsupplemented formulas. Because wholesale prices of DHA/ARA-supplemented formulas are higher than wholesale prices of unsupplemented formulas, wholesale prices of infant formula increased more in States that switched

to the more expensive DHA/ARA-supplemented formula in their contracts that were in effect in December 2008.

The remaining 28 percent of the increase in real net wholesale price was due to a decrease in real rebates. The average percentage discount (i.e., the rebate as a percentage of the wholesale price) in the previous contracts was 91 percent. In other words, WIC on average paid only 9 percent of the wholesale price for formula (plus the retailer's markup). The average percentage discount in the contracts in effect in December 2008 fell to 85 percent, indicating that WIC State agencies were paying a greater percentage of the wholesale price than previously.

Several recent developments, such as the country's economic condition and revisions to the WIC food packages, have the potential to affect the net wholesale price to WIC in the future.

### **How Was the Study Conducted?**

In order to examine trends or changes in net wholesale price over time, this report compared the real net wholesale price in a State's contract that was in effect in December 2008 to that of its previous contract. The analysis was based primarily on data on infant formula rebate contracts provided by USDA's Food and Nutrition Service and infant formula wholesale prices as reported in the formula manufacturers' price list catalogs. Proprietary data on infant formula sales obtained from the Nielsen Company were used to examine the characteristics of the infant formula market.

## Definitions

**Contract brand**—all the infant formula, other than exempt infant formulas, that is produced by the manufacturer awarded the WIC contract. All contract brand formulas are covered by rebate contracts.

**Current contract**—the contract term (i.e., the period during which the infant formula rebate contract is in effect) varies across WIC State agencies (or multistate alliances). In this report, “current contract” refers to an infant formula rebate contract that was in effect in December 2008.

**Exempt infant formula**—defined in the Federal Food, Drug, and Cosmetic Act as any infant formula that is represented and labeled for use by an infant who has an inborn error of metabolism or a low birth weight, or who otherwise has an unusual medical or dietary problem (21 U.S. Code 350a). Exempt infant formulas require prescriptions for use in the WIC program and are not covered by rebate contracts.

**Infant formula**—defined in the Federal Food, Drug, and Cosmetic Act as a food that purports to be or is represented for special dietary use solely as a food for infants by reason of its simulation of human milk or its suitability as a complete or partial substitute for human milk (21 U.S. Code 321 (z)).

**Multistate alliance**—two or more WIC State agencies that join together for the purpose of procuring infant formula by soliciting competitive bids for infant formula.

**Net wholesale price**—the difference between an infant formula manufacturer’s lowest national wholesale price per unit for a full truckload of infant formula and the rebate level or the discount offered or provided by the manufacturer under an infant formula cost containment contract with a WIC State agency.

**New WIC food package**—the WIC food package in effect upon implementation of the changes described in the interim rule published December 6, 2007 (*72 Federal Register 68966-69032*). WIC State agencies were required to implement the new provisions by October 1, 2009. The new food package for infants provides different maximum allowances for infant formula, depending on infant’s age and breastfeeding status (fully formula-fed, partially breastfed, or fully breastfed).

**Old WIC food package**—the WIC food package in effect prior to implementation of the new regulations described in the interim rule published December 6, 2007 (*72 Federal Register 68966-69032*). Under the old WIC food package, the maximum allowance of formula was the same for all infants, although amounts could be tailored to meet infants’ needs.

**Percentage discount**—the rebate as a percentage of the manufacturer’s lowest national wholesale price per unit, as of the date of the bid opening, for a full truckload of the infant formula.

**Previous contract**—an infant formula rebate contract that was in effect immediately prior to the current contract.



**Primary contract infant formula**—the specific infant formula for which a manufacturer submits a bid to a WIC State agency in response to a rebate solicitation and for which a contract is awarded by the WIC State agency as a result of that bid.

**Rebate**—the amount of money refunded under cost-containment procedures to any WIC State agency from the manufacturer of the particular food product as the result of the purchase of the supplemental food with a voucher or other purchase instrument by a participant in each State agency’s program. Such rebates shall be payments made subsequent to the exchange of a food instrument for food.

**Retail markup**—the difference between the retail price and the wholesale price.

**Wholesale price**—all wholesale prices cited in this report represent the infant formula manufacturers’ lowest national wholesale price per unit for a full truck-load of infant formula as reported in each manufacturer’s price list catalog.

## Introduction

USDA’s Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides participating infants with free infant formula. This study estimates that between 57 and 68 percent of all infant formula sold in the United States in 2004-06 was purchased through WIC (see appendix A for information on how WIC’s share of the infant formula market was estimated). As a result, infant formula accounts for a large share of WIC’s program costs.

WIC is a discretionary grant program funded annually by appropriations law.<sup>1</sup> The number of participants who can be served within a fixed budget depends heavily on the program’s food package costs, which in turn are significantly affected by the cost of infant formula. To reduce the cost of infant formula to WIC, Federal law requires that WIC State agencies enter into cost-containment contracts with the manufacturers of infant formula. In these contracts, WIC State agencies receive discounts in the form of rebates from the manufacturers for each can of formula purchased through WIC, and the manufacturer is given the exclusive right to provide its infant formula to WIC participants in that State. The rebates have been a major source of funds for WIC. In fiscal year 2008, infant formula rebates totaled \$2.0 billion compared to total program expenditures (after rebates) of \$6.2 billion. The savings generated by rebates are used to provide benefits to more participants within the same total budget. Since the mid-1990s, rebates have supported about one-quarter of all WIC participants (fig. 1).

WIC infant formula rebate contracts are awarded to the manufacturer offering the WIC State agency the lowest net wholesale price (the difference between the manufacturer’s wholesale price and the rebate).<sup>2</sup> Because wholesale prices differ across manufacturers and manufacturers offer different rebates to different States, net wholesale prices vary widely across States (fig. 2).

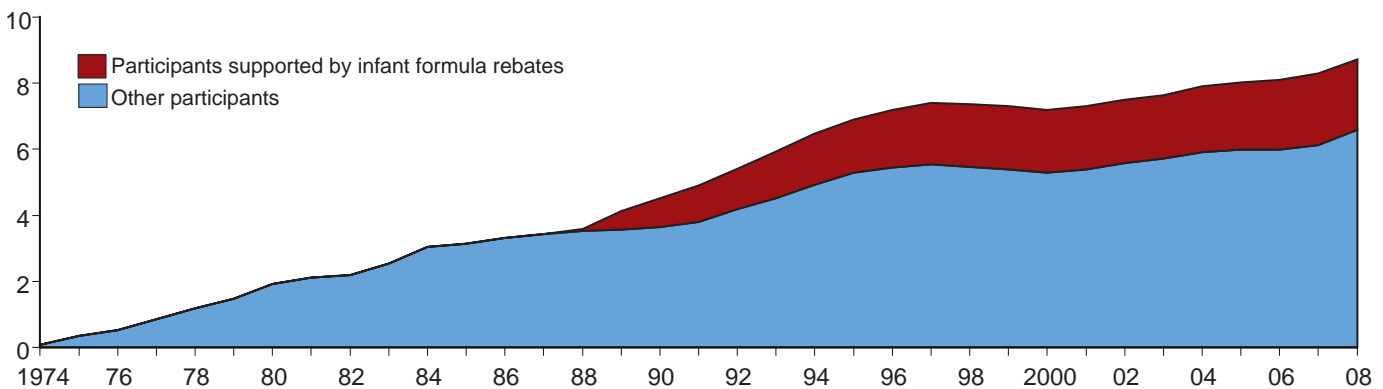
Net wholesale price is only one of the costs that WIC pays for infant formula. Most WIC participants purchase infant formula from authorized retail vendors using a WIC voucher or coupon. The WIC State agency then reimburses

<sup>1</sup>In contrast, USDA’s Supplemental Nutrition Assistance Program (SNAP)—formerly the Food Stamp Program—is an entitlement program, whereby everyone who meets the eligibility criteria may receive benefits if he or she so chooses.

<sup>2</sup>The term “net wholesale price” used in this report is equivalent to the term “net price” referred to in WIC regulations (7 *Code of Federal Regulations* (CFR) 246.2). We chose to use this term to highlight the fact that net wholesale price is only one component of the cost of infant formula to WIC and does not include the cost associated with the retail markup.

Figure 1  
Average monthly number of WIC participants, FY 1974-2008

Million people



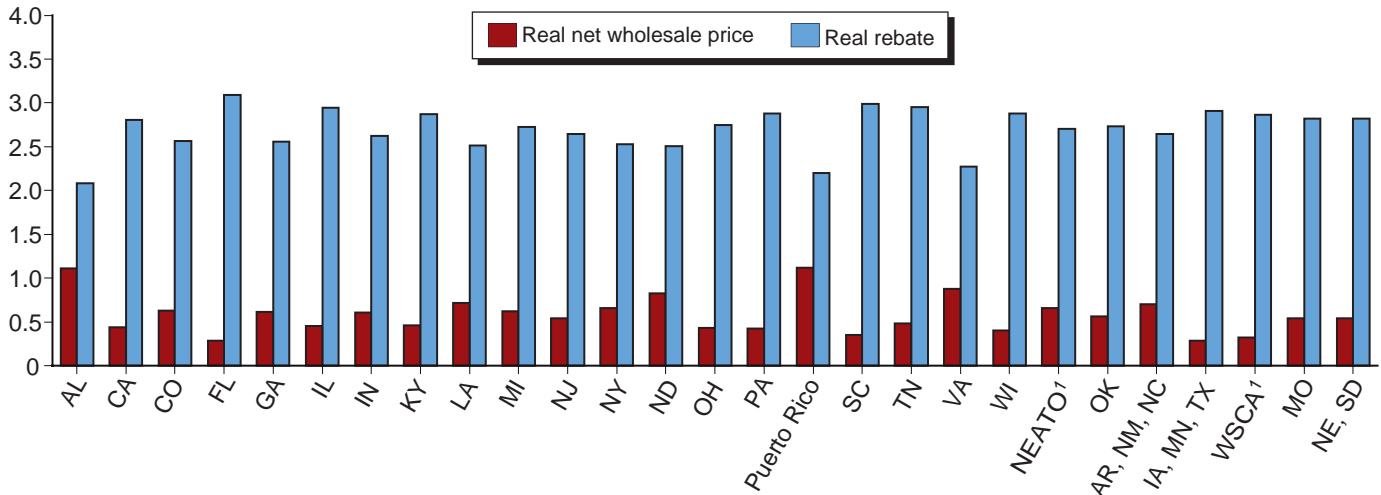
Note: The number of WIC participants supported by infant formula rebates was calculated by multiplying the total number of WIC participants by rebates share of total program expenditures and rebates.

Source: USDA, Economic Research Service calculations based on USDA, Food and Nutrition Service data.

Figure 2

**Infant formula rebates and net wholesale prices of milk-based powder by State for contracts in effect in December 2008**

Dollars per 26 reconstituted ounces (Dec. 2008 dollars)



Note: Rebates and net wholesale prices reflect real prices as of the date the State's contract became effective.

<sup>1</sup>NEATO and WSCA are multistate alliances. For a list of members of each alliance, see box, "Multistate Alliances," p.14.

Source: USDA, Economic Research Service calculations based on USDA, Food and Nutrition Service data.

the vendor for the full retail price (equivalent to the wholesale price plus the retail markup) for the formula purchased by WIC participants. The manufacturer then issues a rebate to the State agency. Thus, the cost to WIC for each can of infant formula sold through the program can be expressed as:

$$\text{Cost to WIC} = \text{Net Wholesale Price} + \text{Retail Markup},$$

where

$$\text{Net Wholesale Price} = \text{Wholesale Price} - \text{Rebate}$$

and

$$\text{Retail Markup} = \text{Retail Price} - \text{Wholesale Price}$$

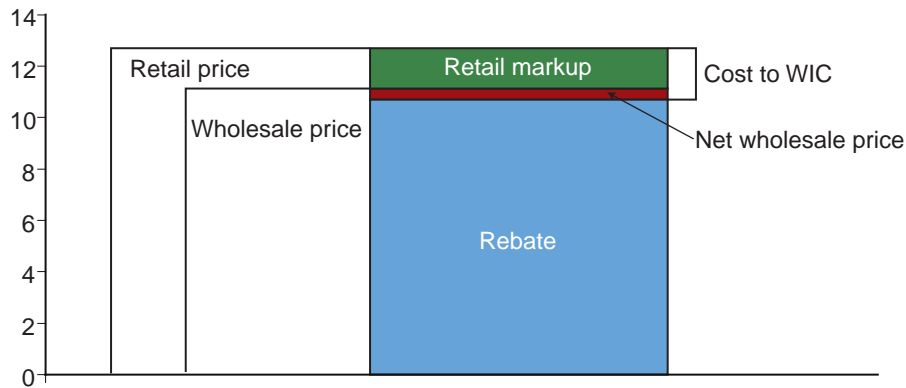
The cost of formula to WIC can also be expressed as the retail price minus the manufacturer's rebate. Although this is a simpler way of expressing infant formula's costs to WIC, this report retains the fuller expression in order to emphasize that costs to WIC are established by two different market agents—infant formula manufacturers and foodstore retailers.

Figure 3 illustrates the various cost components of a can of infant formula provided through the WIC program. An earlier Economic Research Service analysis based on 2004 data found that, in most States, the retail markup—not the net wholesale price—was the largest component of infant formula costs to WIC (Oliveira and Davis, 2006). However, the relatively small net wholesale prices are a reflection of the effectiveness of the rebate program. Rebates are generally large—averaging about 85 percent of the wholesale price in recent contracts—and the increase in WIC program costs, if the rebates were to decrease, could potentially dwarf the effect of the retail markup. For example, without the rebates, infant formula would be the single most expensive food item provided by WIC, accounting for 44 percent of

Figure 3

### Cost components for can of infant formula in WIC

Dollars per can



Note: Example based on a 12.9-oz can of Ross Similac with iron (milk-based powder) in the California WIC program during the 2nd quarter of 2004.

Source: Oliveira and Davis, 2006.

all food costs in fiscal 2005, compared to only 17 percent after taking into account the savings from rebates (USDA, 2007).

This report examines recent trends in infant formula rebates in terms of net wholesale price (ERS is conducting a separate study that examines the retail markup of the infant formula purchased through WIC). Four major questions are addressed:

1. What are the recent trends in the infant formula rebates in terms of net wholesale price?
2. What are the factors behind the trends?
3. What effect do the recent trends have on infant formula costs to WIC?
4. What factors may impact the costs of infant formula to WIC in the future?

Several different sources of data were utilized in the study. The analysis of changes in net wholesale price was based primarily on data on rebate contracts compiled by USDA's Food and Nutrition Service (FNS), the agency responsible for administering the WIC program, supplemented with data on infant formula rebates compiled by David Davis at South Dakota State University (Davis, 2008). Information from infant formula manufacturers' wholesale price lists was used to examine trends in the wholesale price of infant formula. Information on the characteristics of the infant formula market was based on unpublished scanner-based proprietary data from the Nielsen Company.

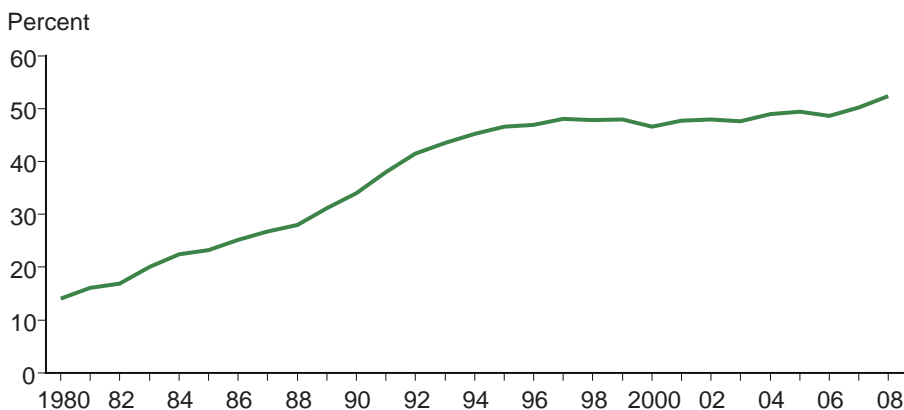
The next three chapters provide readers with background information on WIC, the infant formula market, and the infant formula rebate program. Readers familiar with these topics may want to skip those chapters and pick up again in the chapter on "Trends in Infant Formula Rebate Contracts." The remaining chapters discuss how changes in WIC's share of the infant formula market could impact net wholesale price trends and the conclusions.

## WIC Program Overview

WIC's mission is to safeguard the health of low-income women, infants, and children ages 1-4 who are at nutritional risk by providing supplemental foods, nutrition education, and referrals to health care and other social services. WIC is based on the premise that early intervention programs during critical times of growth and development can help prevent future medical and developmental problems. Administered by USDA's Food and Nutrition Service, the program provides grants for food benefits, nutrition services, and administration to 90 WIC State agencies, including the 50 States, the District of Columbia, 5 U.S. territories—Guam, the U.S. Virgin Islands, American Samoa, the Commonwealth of Puerto Rico, and the Commonwealth of the Northern Mariana Islands—and 34 Indian Tribal Organizations. Each State agency is responsible for program operations within its jurisdiction, including negotiating rebate contracts with infant formula manufacturers. In fiscal year 2008, an average 8.7 million persons participated in WIC each month, including 2.2 million infants (USDA, 2009a). Over half of all infants born in the United States participate in WIC (fig. 4).

To qualify for WIC, a family's income must be at or below 185 percent of the Federal poverty guidelines. For a family of four who lived in the 48 contiguous States as of July 1, 2009, that would be an annual income of \$40,793 or lower. Applicants for the WIC program who participate in or who have certain family members who participate in the Supplemental Nutrition Assistance Program (SNAP, formerly the Food Stamp Program), Medicaid, or Temporary Assistance Program for Needy Families (TANF) are deemed to meet the income eligibility criterion automatically. Applicants must also be nutritionally at risk, as determined by a health professional such as a physician, nutritionist, or nurse. A report by the Institute of Medicine (2002) concluded that because nearly all U.S. women and children meet at least one of the nutritional risk criteria established by WIC (e.g., failure to meet the Dietary Guidelines for Americans), the criteria have little effect on restricting program participation.

Figure 4  
**WIC infants as a share of all U.S. infants, FY 1980-2008**



Note: Share was calculated by dividing the average monthly number of infants in WIC (USDA, various years) in a fiscal year by the total number of births in the corresponding calendar year (Hamilton, et al., 2009; and Martin, et al., 2009; and Tejada-Vera and Sutton, 2009). Fiscal years run from October 1 through September 30.

Source: USDA, Economic Research Service calculations.

Program participants are prescribed one of seven food packages according to participant category. During the 1998-2008 study period, the WIC food package for infants less than 1 year of age provided up to a monthly maximum allowance of 806 reconstituted fluid ounces of infant formula, equivalent to 26 reconstituted fluid ounces per day.<sup>3</sup> Infant participants are eligible to receive benefits for a 6-month period, but they can be certified up to the infant's first birthday at the WIC State agency's option. According to USDA's Food and Nutrition Service, most States certify infants up to the infant's first birthday.

To provide program participants with supplemental food packages, States may use any one of three types of food delivery systems (or any combination of the three):

- Retail—participants obtain supplemental food free of charge by exchanging a voucher, check, or electronic benefits transfer (EBT) card at authorized retail vendors.
- Home—supplemental foods are delivered to the participant's home.
- Direct distribution—participants pick up supplemental foods from storage facilities operated by the State or local agency.

All States except Vermont and Mississippi distribute WIC foods via the retail food delivery system.<sup>4</sup> Under the retail food delivery system, participants "purchase" the WIC food items from retail food stores using a food instrument (i.e., voucher, check, or electronic benefits transfer (EBT) card) that specifies the types and amounts of foods that can be purchased. In the case of infant formula, the food instrument also specifies the brand of formula to be purchased. Only those vendors (usually supermarkets, grocery stores, or pharmacies) authorized by the WIC State agency may transact and redeem food instruments. At the end of fiscal year 2005 (the latest data available), there were 44,458 authorized WIC vendors nationwide (USDA, 2008).

Generally, vendors submit the food instruments to their bank, which submits them to the WIC State agency's bank. That bank pays the vendors the full retail price (i.e., shelf price) of the WIC food items with funds provided by the WIC State agency in a manner set forth in the State agency's contract with the bank. The WIC State agency bills the infant formula manufacturer for the rebate. The formula manufacturer then issues a rebate to the State.

In the event that WIC does not have the funds to enroll all eligible applicants, WIC has a priority system to ensure that those at the greatest nutritional risk and most likely to benefit from WIC intervention receive program benefits. In general, priority is given to people demonstrating medically based nutritional risks over dietary-based nutritional risks, to infants and pregnant and breastfeeding women over children, and to children over postpartum women. Increases in funding and savings from infant formula rebates during the 1990s allowed a greater number of lower priority applicants, such as children ages 1 to 4, to participate. Anecdotal evidence indicates that funding in recent years has been sufficient to provide benefits to all eligible people seeking to enroll in the program, including those at the lowest priority levels.

<sup>3</sup>The WIC food packages were revised in December 2007. WIC State agencies were required to implement the new provisions by October 1, 2009. All States implemented the new food packages after December 2008, which was the end of the time period examined in this report.

<sup>4</sup>Vermont uses a home delivery system, while Mississippi, parts of Chicago, IL, and two Indian Tribal Organizations' State agencies use direct distribution.

# The Infant Formula Market

This chapter looks at the characteristics of the U.S. infant formula market and trends in the wholesale prices of infant formula (see box, “Infant Formulas,” p. 8).

## Characteristics of the Infant Formula Market

Our analyses of retail sales data obtained from the Nielsen Company show that infant formula accounted for about \$3.5 billion in sales in 2007 (see section on “Method based on Nielsen market sales data” in appendix A for information on the Nielsen data). This was about the same as the previous year, and up slightly from 2004 and 2005 (fig. 5). This small increase in dollar sales was solely the result of price increases as infant formula sales by volume (in reconstituted ounces) actually has declined in recent years (fig. 6). For example, between 2004 and 2007, volume sales fell about 5 percent. This is a continuation of a trend found in an earlier ERS analysis of 1994-2000 data (Oliveira, et al., 2004).

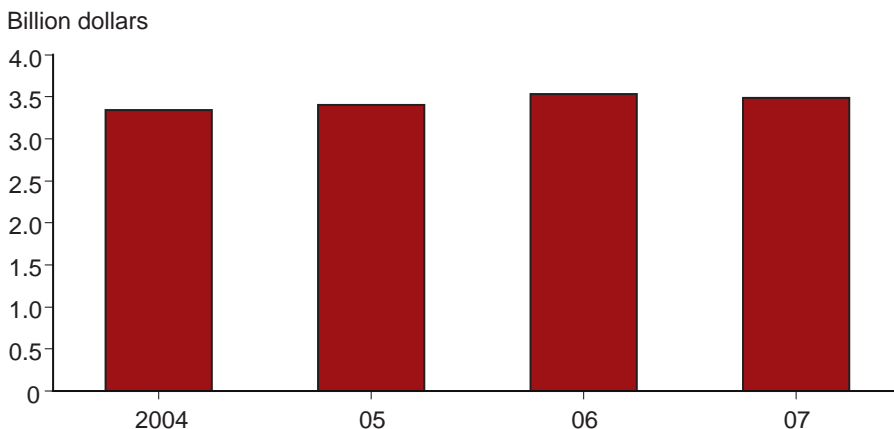
The infant formula market is highly concentrated. In 2008, three manufacturers accounted for 98 percent of all dollar sales (fig. 7). Abbott (43 percent) and Mead Johnson (40 percent) accounted for the bulk of dollar sales, while Nestlé accounted for another 15 percent. Most of the remaining 2 percent of infant formula sales were accounted for by PBM Nutritionals, producer of the Bright Beginnings line of infant formulas, as well as private-label or store-brand formulas.

Most of the infant formula sold in this country is in powder form. In a continuation of a long-term trend, the share of infant formula dollar sales in powder form increased from 71 percent in 2004 to 83 percent in 2008 (fig. 8). During the same period, sales of liquid concentrate fell from 20 percent to only 10 percent of all formula sales, and ready-to-feed fell from 9 percent to 7 percent.

Powder is about 14 percent less expensive than liquid concentrate on a per-reconstituted-fluid-ounce basis.<sup>5</sup> Unlike liquid concentrate, powdered formula can be mixed in small quantities and the unmixed product keeps without refrigeration. The increased use of powdered formula has been attributed in

<sup>5</sup>The price comparison was based on the relative prices of Mead Johnson’s Enfamil LIPIL, Abbott’s Similac Advance, and Nestlé’s Good Start Supreme DHA/ARA in powder and liquid concentrate as of September 2007.

Figure 5  
**Infant formula dollar sales, 2004-07**

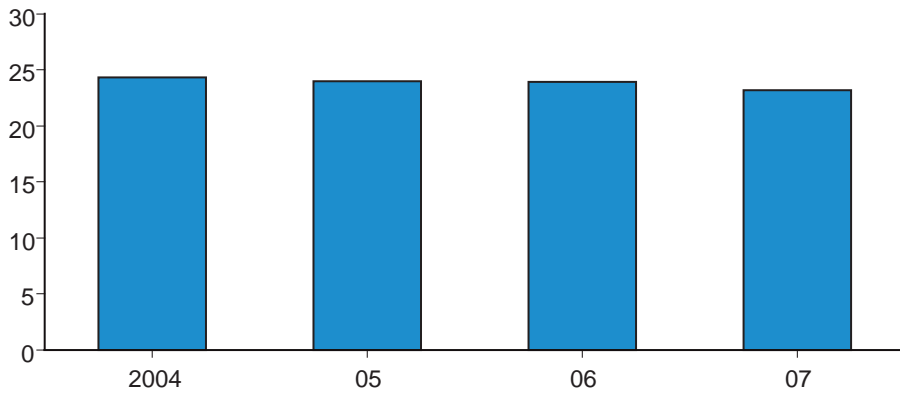


Source: USDA, Economic Research Service calculations based on Nielsen data.

Figure 6

**Estimated total infant formula sales by volume, 2004-07**

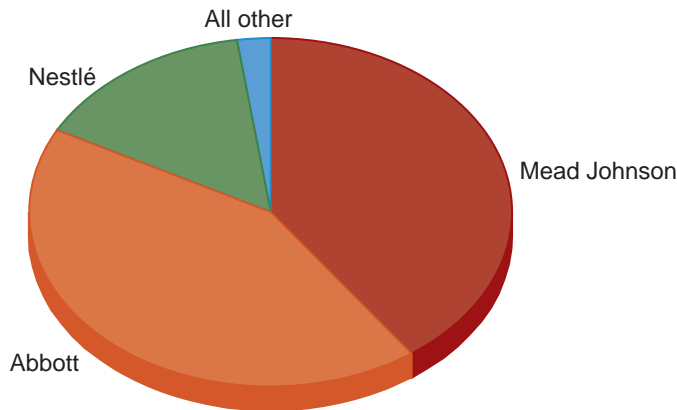
Billion reconstituted ounces



Source: USDA, Economic Research Service calculations based on Nielsen data.

Figure 7

**Share of infant formula dollar sales by manufacturer, 2008**



Note: Sales figures for 2008 were annualized based on data for the first 6 months of the year.

Source: USDA, Economic Research Service calculations based on Nielsen data (excludes Walmart).

part to the increase in breastfeeding. Powdered formulas “are commonly used to make up an occasional formula feeding for breastfed infants and many mothers may have continued to use powdered formulas after the cessation of breastfeeding” (Fomon, 2001). The Institute of Medicine (2005) recommends powdered formula for partially breastfed infants in WIC “because the amount of formula prepared can be tailored closely to the amount needed. This may help to reduce waste, food safety concerns, and/or overfeeding of formula to breastfed infants.”

A change in the WIC regulations also may have contributed to the increased use of powder. Federal regulations dictate the maximum allowance of infant formula in the WIC food packages. Prior to 2004, the amount that participants could redeem in powder form was determined in part by can size. Since participants cannot purchase partial cans, if the number of dry ounces in a can did not evenly divide into the maximum monthly allowance, participants were not able to redeem the full allotment. The Child Nutrition and WIC



## Infant Formulas

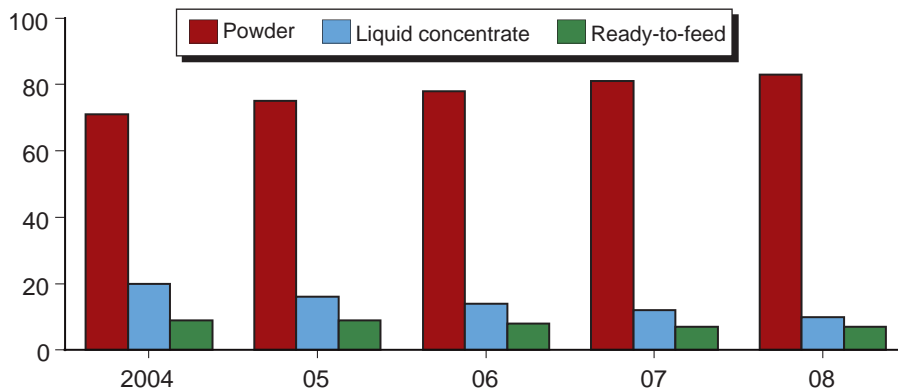
There are two basic types of infant formula available for routine infant feeding. Milk-based infant formula, containing lactose and cow's milk proteins, is the most widely used formula. Soy-based formula, made with soy protein and free of lactose, provides an alternative protein source for infants with milk-based allergies or with symptoms of lactose intolerance and also is used by parents seeking a vegetarian diet for their infants.

In addition to the standard milk- and soy-based formulas, there are a wide range of infant formulas designed for infants with unique nutritional needs. For example, milk-based, lactose-free formulas are available for infants sensitive to lactose. Hypoallergenic formulas, including protein hydrolysate formulas, are available for infants with food protein allergies. Other types of specialized formula in the marketplace include organic formula, prebiotic formula, formulas marketed to older infants (e.g., age 9 to 24 months), as well as formulas to reduce colic, diarrhea, spit-up, fussiness, and gas. Infant formulas are also available for infants with other special nutritional needs (e.g., low birth weight and premature infants) and medical disorders, such as phenylketonuria (PKU). Most formulas are now supplemented with the fatty acids docosahexaenoic acid (DHA) and arachidonic acid (ARA).

Infant formula comes in three forms: powder (the least expensive form per reconstituted ounce), liquid concentrate, and ready-to-feed (the most expensive form per reconstituted ounce). Formulas are also available in a wide range of package sizes and in two different iron levels: added iron and low iron. The American Academy of Pediatrics (1999) recommends that formula-fed infants receive an iron-fortified formula as a way of reducing the prevalence of iron deficiency anemia. Iron-fortified infant formula is routinely issued in WIC; all low-iron infant formula issued through WIC requires medical documentation.

Figure 8  
**Share of infant formula dollar sales by form, 2004-08**

Share of total sales



Note: Sales figures for 2008 were annualized based on data for the first 6 months of the year.

Source: USDA, Economic Research Service calculations based on Nielsen data (excludes Walmart).

Reauthorization Act of 2004 (Public Law (P.L.) 108-265) gave WIC State agencies—for contracts awarded on or after October 1, 2004—the option to round up to the next whole can of infant formula in order to allow all participants to receive the full authorized amount of infant formula, even if this rounding-up option results in participants obtaining more powdered infant formula than the maximum monthly allowance. WIC staff in States utilizing this option may be more likely to prescribe formula in powder than in liquid concentrate form because the powder form yields more reconstituted formula.

Most formula is milk-based—80 percent of dollar sales in 2008, up from 76 percent in 2004. Soy-based formula accounted for 14 percent of all dollar sales in 2008 compared to 17 percent in 2004. Other formula bases—primarily protein hydrolysate—accounted for 6 to 7 percent of all 2004-08 sales.<sup>6</sup>

One of the most important developments in the infant formula market in recent years was the introduction of formulas supplemented with the fatty acids docosahexaenoic acid (DHA) and arachidonic acid (ARA), which some studies have linked to improved vision and cognitive development in infants.<sup>7</sup> Abbott first introduced these formulas into their U.S. product lines in 2002, with Mead Johnson and Nestlé following in 2003. Sales of DHA/ARA-supplemented formulas increased rapidly, and by 2004 they accounted for 69 percent of all sales. By 2008, DHA/ARA-supplemented formulas accounted for 98 percent of all formula sales (fig. 9).

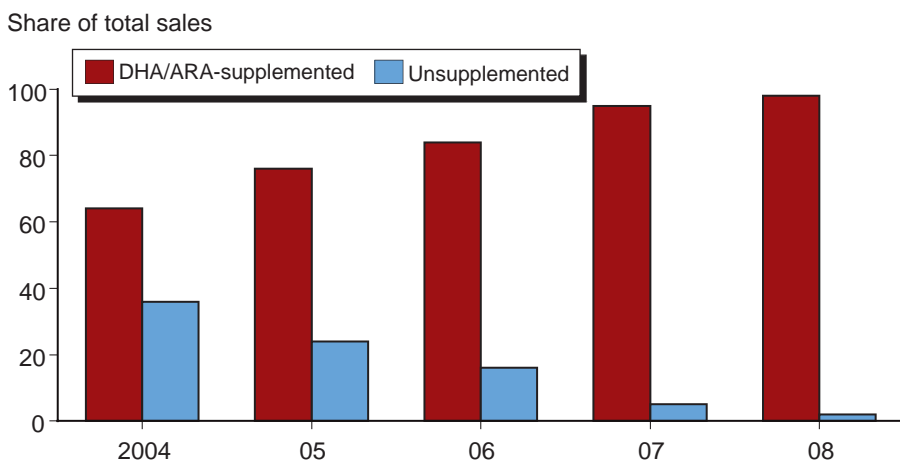
## Wholesale Prices of Infant Formula

Infant formula manufacturers publish a wholesale price list for their products. The listed prices are set at the national level and vary only by volume. Larger volume purchases—up to a truckload of formula—receive a bulk discount. This section examines the national wholesale prices for a full truckload of infant formula produced by the three major manufacturers—Mead Johnson, Abbott, and Nestlé. These three manufacturers currently hold all of the WIC infant formula rebate contracts. Because both the can sizes and reconstitution

<sup>6</sup>Protein hydrolysate formulas make milk proteins more digestible and less allergenic and thereby provide alternative sources of protein to children who are allergic to milk and soy proteins.

<sup>7</sup>The U.S. Food and Drug Administration (FDA) claims that the scientific evidence on whether the addition of DHA and ARA to infant formulas is beneficial is mixed (U.S. Department of Health and Human Services, 2006). FDA states that “Some studies in infants suggest that including these fatty acids in infant formulas may have positive effects on visual function and neural development over the short term. Other studies in infants do not confirm these benefits. There are no currently available published reports from clinical studies that address whether any long-term beneficial effects exist.”

Figure 9  
**Share of infant formula dollar sales by supplement status, 2004-08**



Note: Sales figures for 2008 were annualized based on data for the first 6 months of the year.

Source: USDA, Economic Research Service calculations based on Nielsen data (excludes Walmart).

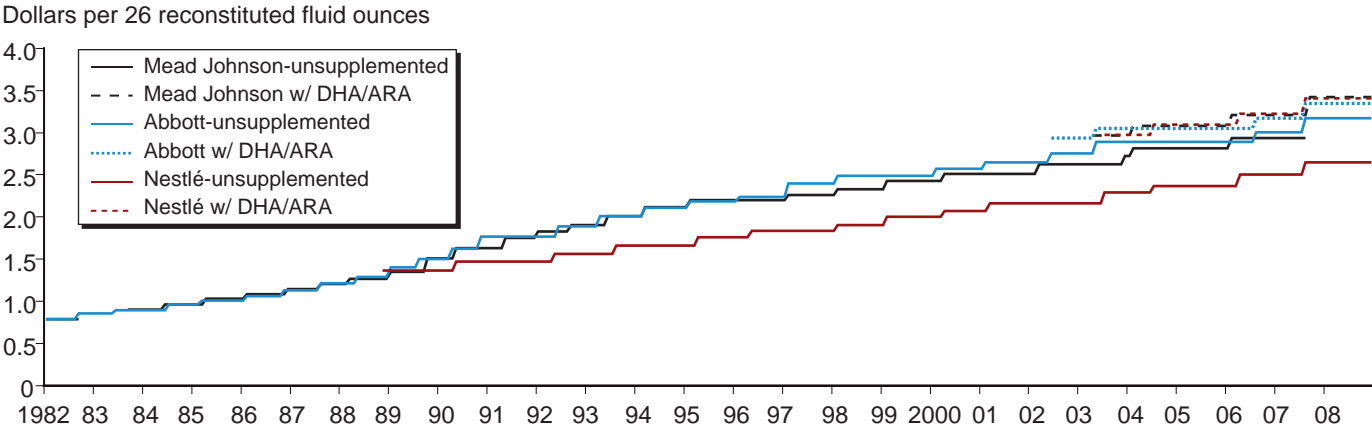
factors for formula in powder form differ across the three manufacturers (and over time in the case of can size), all wholesale prices cited in this report were converted to a standard unit—26 fluid ounces of reconstituted formula. This volume was chosen because it represents WIC’s daily maximum allowance during the study period. This conversion allows for an easy comparison of prices across different package sizes and product forms.

Figure 10 shows the wholesale price of the three major infant formula manufacturers’ milk-based powder in nominal terms (i.e., not adjusted for inflation) from January 1982 through December 2008 for both the unsupplemented formulas and the DHA/ARA-supplemented formulas (see box, “Infant Formula Products Used in This Analysis,” p. 11). In general, wholesale prices for Mead Johnson and Abbott unsupplemented formulas were similar, while Nestlé priced its unsupplemented formula substantially lower. However, the wholesale price of the DHA/ARA-supplemented formulas was comparable among the three companies.

For all three manufacturers, the wholesale price of DHA/ARA-supplemented formulas was substantially higher than the prices of unsupplemented formulas. For example, in January 2006, the wholesale price of the DHA/ARA-supplemented version of Enfamil was 9.4 percent greater than the wholesale price of the unsupplemented version of Enfamil (fig. 11). The difference in wholesale price between the DHA/ARA-supplemented and unsupplemented formula for Similac and Good Start was 5.5 percent and 30.6 percent, respectively.

Each manufacturer has raised the national wholesale price of their unsupplemented and DHA/ARA-supplemented formula numerous times since the early 1980s. Figure 12 shows the wholesale price of infant formula in real terms (adjusted for inflation using the most widely-used measure of general price changes, the Consumer Price Index for All Items (CPI-U)). Note that before each increase in price, the national wholesale price is constant in nominal terms, and the inflation-adjusted real wholesale price declines

Figure 10  
**Nominal wholesale price of infant formula by brand, 1982-2008**



Note: Wholesale prices represent the manufacturers’ lowest national wholesale price per unit for a full truckload of infant formula as reported in each manufacturer’s price list catalog.

Source: Infant formula manufacturers’ product list catalogs.

## Infant Formula Products Used in This Analysis

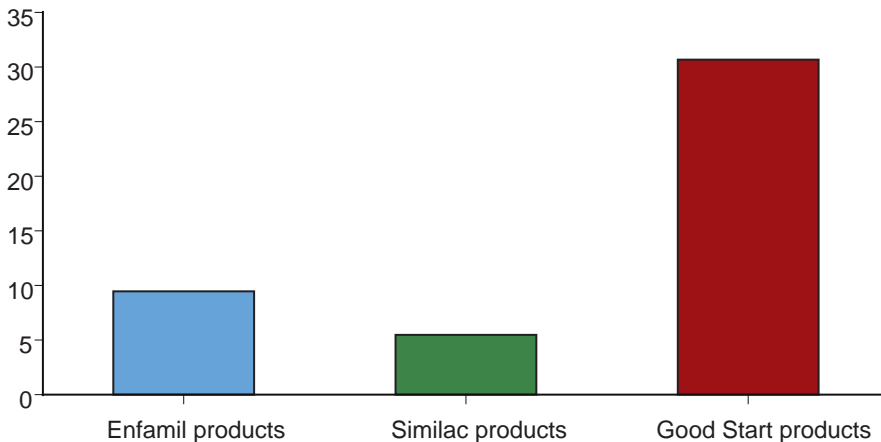
From 1998 to 2008, each of the three manufacturers submitted rebate bids based on one of two milk-based infant formulas with iron in their product line, depending on whether or not the formula was supplemented with DHA and ARA (manufacturers began basing their bids on supplemented formulas in 2003). All analyses described in this report are based on these same formulas, shown below:

Unsupplemented formulas:	Powder can size as of January 2007 <sup>1</sup>
Mead Johnson—Enfamil	14.3 oz.
Abbott—Similac	12.9 oz.
Nestlé—Good Start Supreme	12.0 oz.
Supplemented formulas:	
Mead Johnson—Enfamil LIPIL	12.9 oz.
Abbott—Similac Advance	12.9 oz.
Nestlé—Good Start Supreme DHA/ARA	12.0 oz.

<sup>1</sup>In March 2002, the can size of Enfamil unsupplemented changed from 16 ounces to 14.3 ounces. In October 2003, the can size of Similac unsupplemented changed from 14.1 ounces to 12.9 ounces. In 2007, Mead Johnson discontinued Enfamil unsupplemented formula.

Figure 11  
**Difference between the wholesale price of supplemented formula and unsupplemented formula by product line, January 2006**

Percentage difference per 26 reconstituted fluid ounces



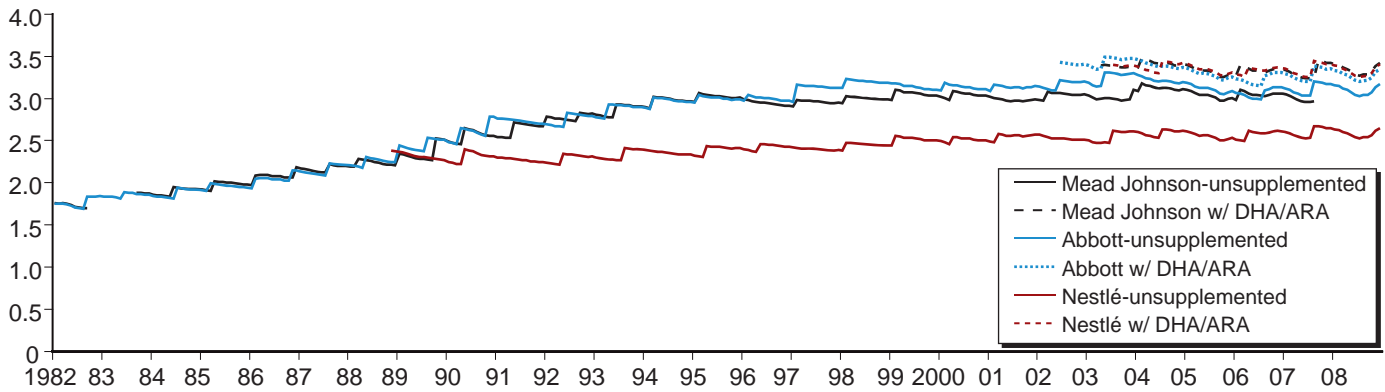
Note: This analysis is based on difference between Enfamil (14.3 oz.) and Enfamil Lipil (12.9 oz.); Similac (12.9 oz.) and Similac Advance (12.9 oz.); and Good Start Supreme (12 oz.) and Good Start Supreme DHA/ARA (12 oz.).

Source: USDA Economic Research Service calculations based on infant formula manufacturers' product list catalogs.

Figure 12

**Real wholesale price of infant formula by brand, 1982-2008 (December 2008 dollars)**

Dollars per 26 reconstituted fluid ounces



Source: USDA, Economic Research Service calculations of real wholesale prices based on infant formula manufacturers' product list catalogs adjusted by U.S. Department of Labor, Bureau of Labor Statistics' Consumer Price Index for All Urban Consumers for All Items.

over time, as inflation erodes the nominal price. Consequently, when manufacturers raise their national wholesale price, the real wholesale price then increases sharply.<sup>8</sup> As indicated by their upward slopes, the real price of the Mead Johnson and Abbott unsupplemented formula rose much faster than the rate of inflation from the early 1980s to the mid-1990s—by over 70 percent—whereas the real wholesale price of Nestlé formula increased only slightly faster than the rate of inflation. (For example, from November 1988—when Nestlé entered the U.S. formula market—to January 1996, the real wholesale price of Nestlé’s formula increased by less than 1 percent compared to increases of 35 percent and 32 percent for Mead Johnson’s and Abbott’s formula). Since about 1998, the real wholesale price of formula for all three brands has remained relatively stable except for the increase associated with the more expensive DHA/ARA-supplemented formulas. That is, the wholesale price of formula has kept pace with inflation in recent years, except when the product changed.

<sup>8</sup>Note that a change in the national wholesale price does not affect the net wholesale price to WIC because the WIC infant formula contracts include inflationary provisions that keep the net wholesale price of formula to a WIC State agency fixed over the entire span of the contract.

## WIC's Infant Formula Rebate Program

In the 1980s, infant formula accounted for a large and increasing share of total WIC food costs. In an effort to control costs, Tennessee and Oregon implemented rebate programs with manufacturers of infant formula in 1987 and other States soon followed. As a result of the cost savings realized from these rebate programs, Public Law 101-147 was enacted in 1989 requiring that all WIC State agencies—except those States with home delivery/direct distribution or Indian State agencies with 1,000 or fewer participants—enter into cost-containment contracts for the procurement of infant formula.

### How the Contracts Work

Current Federal regulations specify that those WIC State agencies required to operate a cost-containment system for infant formula must use a single supplier (i.e., sole-source) competitive system unless an alternative system provides equal or greater savings (7 CFR 246.16a). Under the sole-source competitive system, a WIC State agency (or a group of WIC State agencies) uses competitive bidding to award a contract to a manufacturer of infant formula in exchange for a rebate for each can of infant formula issued to WIC participants (see box, “Multistate Alliances,” p. 14). As a result, the brand of infant formula provided by WIC will vary by State depending on which manufacturer holds the contract for that State.

Solicitation for bids under the sole-source competitive system can take one of two forms—single solicitation or separate solicitations:

- **Under single solicitation**, the winning bidder is required to supply and provide a rebate on all infant formulas it produces that the State agency chooses to issue (except exempt infant formulas). Bidders that do not produce a soy-based infant formula are required to subcontract with another manufacturer to supply a soy-based infant formula. All of these infant formulas are referred to as contract brand infant formulas. The request for bids is for a single iron-fortified, milk-based infant formula that is suitable for routine issuance to most generally healthy, full-term infants. This formula is referred to as the primary contract brand infant formula, and must be offered in all physical forms—liquid concentrate, powder, and ready-to-feed.<sup>9</sup>
- **Under separate solicitations**, bids are issued separately for milk-based and soy-based infant formulas. All relevant infant formulas issued under each contract are considered contract brand infant formulas. The primary contract brand is the milk-based infant formula for which the rebate is being specified (for the milk-based contract) or the soy-based infant formula for which the rebate is being specified (for the soy-based contract).

The sole-source contract is awarded to the bidder offering the lowest total monthly net wholesale price, as determined by the submission of sealed bids, for a specified amount of the primary contract brand infant formula by each of the three forms—powder, liquid concentrate, and ready-to-feed. The amount of the rebate on these contract brand infant formulas is based on the same percentage discount (i.e., the amount of the rebate as a percentage of the wholesale price) for the particular physical form of the primary

<sup>9</sup>Although the WIC program usually issues formula in powdered or liquid concentrate forms, formula may be issued in ready-to-feed form in special situations, such as when the participant's household has an unsanitary or restricted water supply or poor refrigeration, or if the person caring for the infant may have difficulty in correctly diluting concentrated forms or reconstituting powdered forms (7 CFR 246.10).

## Multistate Alliances

States can either hold an individual contract for infant formula or be part of a multistate group contract (alliance) whereby WIC State agencies join in a single rebate agreement to obtain infant formula. In this way, WIC State agencies with fewer clients can pool their buying power to leverage higher rebates. In 2004, Congress limited the use of this cost-saving practice. Public Law 108-265 prohibits the formation of multistate alliances for the purchase of infant formula if the total number of infants served by the States exceeds 100,000 (except alliances that had 100,000 or more infants as of October 2003). Any alliance in existence as of October 2003 may expand to serve more than 100,000 infants, but may not expand to include any additional WIC State agencies (an exception is made if the WIC State agency to be added served fewer than 5,000 infants as of October 2003).

The rationale behind this regulation—which grew out of concern that not all infant formula manufacturers would be able to compete for the larger multistate contracts due to production capacity and/or distribution issues—is that it will help maintain competition among the infant formula manufacturers by helping to ensure that all manufacturers can compete for the rebate contracts (*73 Federal Register* 11308). On the other hand, some view the cap as protecting infant formula manufacturers from extreme rebates. In their 2009 WIC reauthorization legislative agenda, the National WIC Association (2009) recommended that WIC State agencies retain the option to form contracting alliances without limits on the number of participants.

Of the 48 States, the District of Columbia, and the 5 territories operating a competitive sole-source rebate system in conjunction with a retail food delivery system as of December 2008, 34 were part of 1 of 6 multistate alliances:

- The Western States Contracting Alliance (WSCA) is comprised of Alaska, Arizona, Delaware, Hawaii, Idaho, Kansas, Maryland, Montana, Nevada, Oregon, Utah, Washington, the District of Columbia, West Virginia, and Wyoming, as well as American Samoa, Guam, Virgin Islands, the Commonwealth of the Northern Mariana Islands, and three Indian Tribal Organizations (ITOs).
- The New England and Tribal Organization (NEATO) is comprised of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and two ITOs.
- The Mountain Plains Region is comprised of Missouri, Nebraska, and South Dakota.
- The Southwest/Southeast Region is comprised of Arkansas, New Mexico, and North Carolina.
- The Southwest/Mountain Plains/Midwest Regions is comprised of Iowa, Minnesota, Texas, and one ITO.
- The Southwest Region is comprised of Oklahoma and five ITOs.

The remaining 19 States and Puerto Rico held contracts that applied solely to their particular State.

contract-brand infant formula. For example, if the rebate offered for the primary contract brand of powdered infant formula was 85 percent of the manufacturer's wholesale price, then the rebate for all other powdered forms of the contract-brand infant formula (including soy-based powder under single solicitation) also would be 85 percent of their wholesale price.

The percentage discount is based on wholesale prices at the time of the bid opening. The contracts contain inflationary provisions. In the event of an increase (decrease) in the wholesale price after the bid opening, there is a cent-for-cent increase (decrease) in the rebate amounts. Thus, the net wholesale price of formula to a WIC State agency remains fixed over the entire span of the contract despite increases (or decreases) in the wholesale price after the contract is initiated. Although the nominal net wholesale price remains constant over time, the real (i.e., inflation-adjusted) net wholesale price will decrease over time due to general price inflation.

Any noncontract brand of formula (including exempt infant formulas and formulas not manufactured by the WIC contract manufacturer) may be issued only with medical documentation (provided by a licensed health care professional authorized to write medical prescriptions under State law) that an infant has a condition that dictates the formula's use. The only exception to this rule is that local WIC agencies may issue noncontract-brand infant formula without medical documentation in order to accommodate religious eating patterns (65 *Federal Register* 51213-51229). In 2004 (the latest data available), noncontract-brand formula was estimated to account for 8 percent of all formula provided to WIC participants (U.S. Government Accountability Office, 2006). The WIC State agency does not receive rebates from noncontract-brand infant formula.

Because each WIC State agency operates its own infant formula rebate program, the contract term (i.e., the period during which the infant formula rebate contract is in effect) will vary across States. As a result, the start dates and the expiration dates of each State's contract as well as the length of the contract may vary. Analysis of the most recently completed rebate contracts shows that most were originally for 3-year periods, though some were shorter and some longer. Most contracts were also extended for at least 1 year. As a result, the average infant formula rebate contract, including extensions, lasted 4.3 years (see appendix B).

## Recent Legislative Developments

Section 203 of the Child Nutrition and WIC Reauthorization Act of 2004 (P.L. 108-265) made two important changes to the infant formula rebate program.

First, the new law required State agencies or multistate alliances that serve a monthly average of more than 100,000 infants (during the preceding 12-month period) to use separate solicitations in soliciting bids from infant formula manufacturers (except where the Secretary of Agriculture determines that such solicitation procedures are not in the best interest of the program). Among contracts in effect in December 2008, only three States had solicited separate bids for milk-based and soy-based infant formula: California, Florida, and New York. Mead Johnson was awarded both contracts in California, and Nestlé was awarded both contracts in Florida. The only case



in which two different manufacturers held infant formula contracts in a single State was in New York, where Mead Johnson was awarded the milk-based contract and Nestlé was awarded the soy-based contract. As a result of the 2004 law, more States or multistate alliances may be soliciting separate bids in the future. For example, three multistate alliances served a monthly average of over 100,000 infants in fiscal 2008: the Southwest/Mountain Plains/Midwest Region (285,000 infants), the Western States Contracting Alliance (WSCA) (266,000 infants), and the Southwest/Southeast Region (110,000 infants) (USDA, 2009b).

The rationale behind this new provision was that separate solicitations might increase competition for WIC contracts by allowing new or smaller infant formula manufacturers with a limited product line to bid on contracts (65 *Federal Register* 51213-51229). However, concern has been raised that separate solicitations may increase administrative costs. The National WIC Association argues that since all U.S. infant formula manufacturers now produce both soy-based and milk-based formula products, the separate solicitations requirement is no longer warranted and should be eliminated (National WIC Association, 2009).

Second, the law also requires WIC State agencies to issue the primary contract infant formula—determined by the manufacturer—as the first choice of issuance for all WIC infants, with all other infant formulas issued as an alternative to the primary contract infant formula. This was not an issue in the past when infant formula manufacturers produced only one milk-based infant formula that was suitable for the routine issuance to the majority of generally healthy, full-term infants. Since other options generally were not available, manufacturers submitted bids for this single formula in response to bid solicitations for infant formula rebate contracts, and WIC State agencies issued this formula to infants as the formula of first choice. However, manufacturers now produce a variety of milk-based infant formulas—with varying prices—that are eligible to be bid on in response to a solicitation. A report from the U.S. Senate Committee on Agriculture, Nutrition, and Forestry (2004) stated that “In response to the increased variety of milk-based infant formula, the Committee believes that manufacturers, State agencies, and participants should have a common understanding of the infant formula product that will serve as the primary contract infant formula in each State. To ensure that the competitive bidding process can be effectively carried out, the Committee believes that the infant formula bid in response to a solicitation should be the primary contract infant formula issued to infants.”

Prior to the 2004 law, WIC State agencies could select the specific infant formula products in the contract-winning manufacturer’s product line to be provided to WIC infants in that State. For example, the WIC State agency could select a less expensive formula product than the primary contract brand and decide not to offer the primary contract brand. However, all contracts resulting from bid solicitations issued on or after October 1, 2004, require that WIC State agencies use the primary contract brand as the first choice of issuance. As a result, it is possible that the primary contract infant formula will not be the least expensive formula produced by the winning manufacturer.<sup>10</sup> (The State agency may continue to issue contract brand and noncontract brand alternatives to the primary contract infant formula, if the alternatives better meet an infant’s individual nutritional needs.)

<sup>10</sup>The California WIC Association (2009) has expressed concerns that Federal law requiring WIC to accept bids for higher priced infant formulas containing additives “with no demonstrable health benefits” may be the beginning of a trend whereby WIC pays more for new formula product lines.

By requiring that States issue the primary contract infant formula—determined by the manufacturer—as the first choice of issuance, the 2004 law may have contributed to the rapid growth of DHA/ARA supplemented formulas and the near-disappearance of unsupplemented formulas from the marketplace (see box, “Did Federal Regulations Expedite the Demise of Unsupplemented Infant Formula?”)

### **Did Federal Legislation Expedite the Demise of Unsupplemented Infant Formula?**

The Child Nutrition and WIC Reauthorization Act of 2004 (P.L. 108-265) contained provisions that changed the procedures for determining which infant formulas are provided to WIC participants. The legislation in effect guaranteed large sales volumes for DHA/ARA-supplemented formula products.

Prior to 2004, infant formula manufacturers could submit a bid for the WIC rebate contract based on any product in their product line as long as it was suitable for routine issuance to the majority of generally healthy, full-term infants. WIC State agencies were responsible for identifying the specific infant formula products in the winning manufacturer’s product line to be used in the State’s WIC program. Consequently, the contract formulas provided to WIC participants in a particular State would not necessarily include the primary contract-brand product specified in the manufacturer’s bid. For example, even though some of the winning bids submitted by the formula manufacturers after February 2003 identified the new DHA/ARA-supplemented formulas as the primary contract brand, some States chose not to offer them to their participants.

As a result of P.L. 108-265, for all contracts based on solicitations issued after September 2004, State agencies must now use the primary contract infant formula for which the manufacturer submitted its bid (and for which the contract was awarded) as the first choice of issuance (by physical form), with all other infant formulas issued as an alternative. Therefore, if the winning bid is based on a DHA/ARA-supplemented formula, then the WIC State agency is required to offer that formula to the participants in the State.

After the legislation was enacted, nearly all the bids submitted by the formula manufacturers identified DHA/ARA-supplemented formulas as the primary contract infant formula. As a result, all WIC State Agencies now offer DHA/ARA-supplemented formulas to their WIC recipients. Since WIC accounts for most of the infant formula sales in the United States, the result of the legislation was to ensure large sales volumes for these newly introduced products while increasing their visibility to non-WIC consumers. In addition, making DHA/ARA-supplemented formulas the primary WIC brand of formula may have given some non-WIC consumers the impression the new supplemented formulas had the endorsement of the WIC program. While these factors may have helped these more expensive supplemented formulas gain shares in the market, it should be noted that not providing WIC participants with these supplemented formulas would have opened WIC up to criticism that it was providing WIC infants with a cheaper, inferior product.

## Trends in Infant Formula Rebate Contracts

This chapter looks at recent trends in net wholesale price for milk-based infant formula in powdered form—the primary type of formula provided through WIC. Because net wholesale price is determined by the wholesale price and the rebate, trends in these two factors also are examined. In addition, the impact of recent changes in net wholesale price on total infant formula costs to the WIC program is estimated. The analyses exclude Mississippi and Vermont, which do not use retail food delivery systems, as well as those Indian Tribal Organizations that are not part of a multistate alliance.

### Trends in Net Wholesale Price

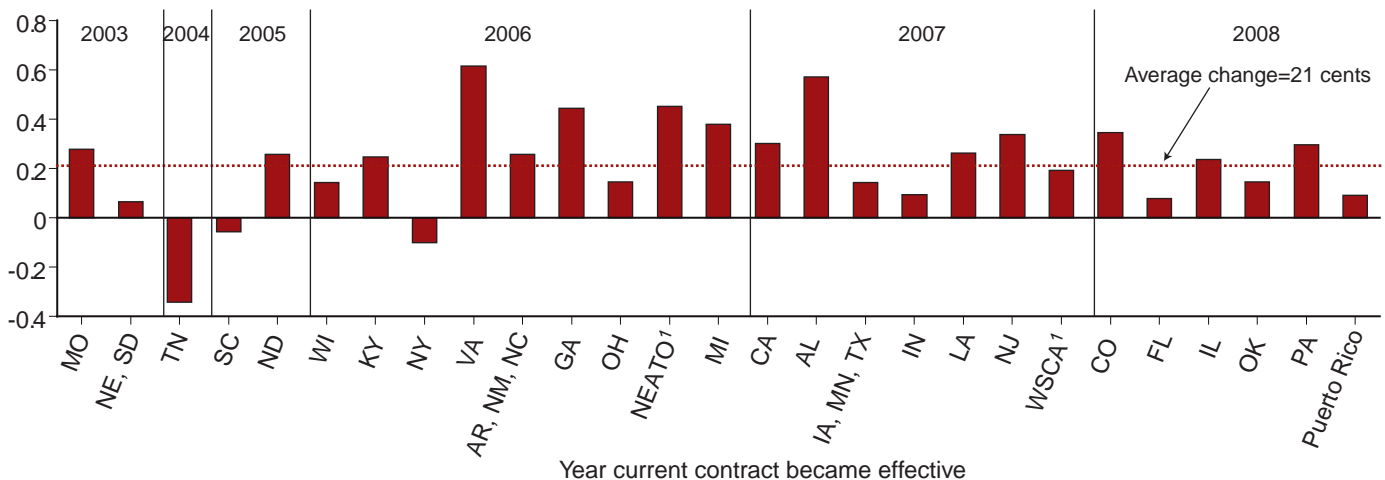
In order to examine the changes in net wholesale price over time, we compared the real net wholesale price in a State's current contract—defined as the contract that was in effect in December 2008—to that of its previous contract.<sup>11</sup> Although net wholesale price remains constant over the life of the contract in nominal terms, the real net wholesale price will decrease over time due to inflation. To control for the erosion in the real net wholesale price over the length of a contract, we examined the real net wholesale prices for the two contracts at the time each contract became effective (see appendix B for the date in which each State's contract became effective).

Real net wholesale price increased in 24 of the 27 contracts (fig. 13). Some of the contracts in effect in December 2008 are part of multistate alliances and therefore represent more than one State. Excluding Mississippi and Vermont,

<sup>11</sup>The previous rebate for New York that took effect in July 2003 specified a rebate that was 65 percent of its wholesale price. In January 2004, a contract amendment changed the rebate to 75 percent of its wholesale price. The data for New York used in this study reflect the net wholesale price in effect after the 2004 amendment.

Figure 13  
**Change in real net wholesale price between current and previous contracts, by State (December 2008 dollars)**

Dollars per 26 reconstituted fluid ounces



Note: Current contracts refer to contracts that were in effect as of December 2008. Previous contracts refer to contracts that were in effect immediately prior to the current contract. Average change in net price was calculated by weighing the change in real net price for each contract by the number of WIC infants served under the contract.

<sup>1</sup>NEATO and WSCA are multistate alliances. For a list of members of each alliance, see box, "Multistate Alliances," p.14.

Source: USDA, Economic Research Service calculations of changes in real net price based on USDA, Food and Nutrition Service estimates of net prices adjusted by U.S. Department of Labor, Bureau of Labor Statistics' Consumer Price Index for All Urban Consumers for All Items.

45 of 48 States, the District of Columbia, and each of the 5 territories saw an increase in their net wholesale price. *This means that nearly all WIC State agencies are paying more for formula in their current contract than under their previous contract, even after adjusting for inflation.* On average, real net wholesale prices increased by an average 21 cents for 26 fluid ounces of reconstituted formula (WIC's maximum daily allowance during the study period) between States' previous and current rebate contracts.<sup>12</sup> This represented a 73-percent increase in real net wholesale prices.

Examination of the factors determining real net wholesale price indicates that changes in both real wholesale price and real rebates have contributed to the increase in real net wholesale price. On average, real wholesale prices increased by 5 percent (real wholesale price increased in 18 of the 27 current contracts compared to their previous contracts). This increase in real wholesale prices accounted for almost three-quarters (72 percent) of the overall increase in real net wholesale price between States' previous and current rebate contracts.

At the same time that real wholesale prices increased, the average real rebate (for 26 reconstituted ounces) fell 2 percent (real rebates declined in 15 of the 27 current contracts compared to their previous contracts). This decrease in rebates accounted for 28 percent of the overall increase in real net wholesale price.

The effect of the decline in real rebates is magnified when combined with the increase in real wholesale prices. In order to examine the trends in real rebates in relative terms (i.e., to control for changes in the wholesale price), we examined rebates in terms of the percentage discount, defined as:

**Percentage Discount** = Rebate as a Percentage of the Wholesale Price

The average percentage discount—calculated as of the date of the bid opening—in the 27 previous contracts was 91 percent. In other words, WIC on average paid only 9 percent of the wholesale price for formula (plus the retail markup). (See box, “How Can Manufacturers Afford To Offer Such High Percentage Discounts to WIC?” p. 21).

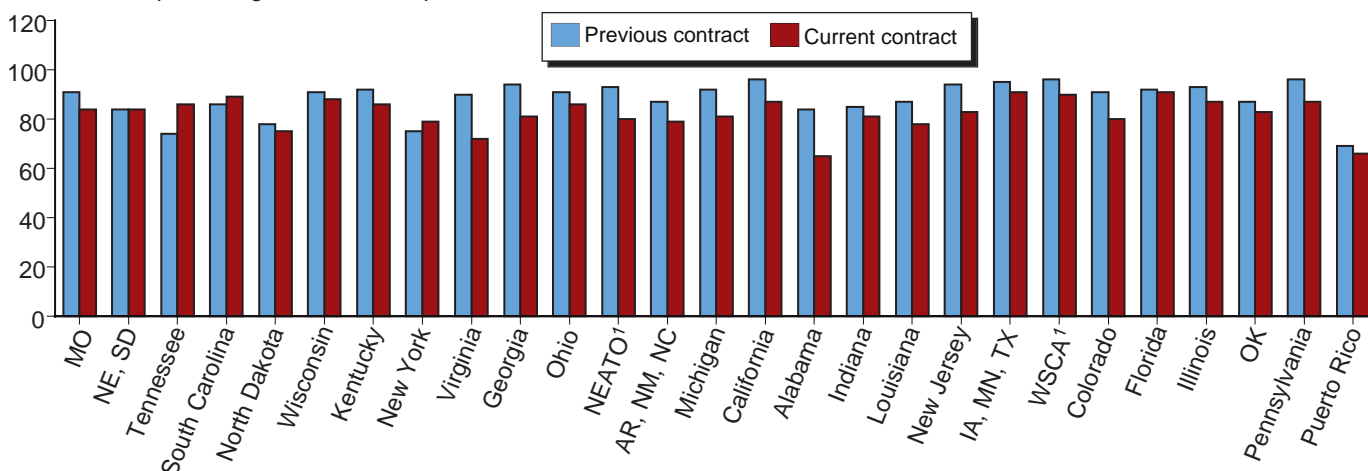
The average percentage discount in the 27 current contracts (those in effect in December 2008) fell to 85 percent, indicating that WIC State agencies are now paying a greater percentage of the wholesale price than previously. For 23 contracts (representing 43 States, the District of Columbia, and the 5 territories), the percentage discount fell between the previous and current contract (fig. 14). The percentage discount increased in only three contracts (representing three States), each of which became effective in July 2007 or earlier, and in one contract (representing a multistate alliance formed by Nebraska and South Dakota WIC State agencies and enacted in 2003), the percentage discount did not change (however, real net wholesale price increased in the current contract due to an increase in the real wholesale price). Thus, regardless of whether or not the real wholesale price of formula increased, most States experienced a decrease in the percentage discount.

<sup>12</sup>Throughout this report, all averages refer to weighted averages where the weights reflect the State agencies' 2008 infant caseload. That is, if one State served twice as many WIC infants as another State, that State received a weight that was twice that of the smaller State.

Figure 14

### Percentage discount rates for previous and current contracts, by State

Rebates as a percentage of wholesale price



Note: Current contracts refer to contracts that were in effect as of December 2008. Previous contracts refer to contracts that were in effect immediately prior to the current contract.

<sup>1</sup>NEATO and WSCA are multistate alliances. For a list of members of each alliance, see box, “Multistate Alliances,” p.14.

Source: Unpublished USDA, Food and Nutrition Service data.

## Examination of DHA/ARA Supplementation on Net Wholesale Price

Although all current contracts are based on the DHA/ARA-supplemented formulas, most of the previous contracts were based on the unsupplemented formulas. That is, most of the States switched from unsupplemented formulas in their previous contract to DHA/ARA-supplemented formulas in their current contract. Because the wholesale prices of DHA/ARA-supplemented formulas are greater than wholesale prices of unsupplemented formulas, it might be expected that real net wholesale prices would increase in those States that switched to the more expensive DHA/ARA-supplemented formula holding rebates constant. Therefore, we compared the change in net wholesale prices in those States in which both their previous and current contract was based on DHA/ARA-supplemented formulas (i.e., AL, AR, CA, IN, LA, NC, NJ, NM, NY, OK, PA, and Puerto Rico) to those States that switched to DHA/ARA-supplemented formulas in their current contract.<sup>13</sup> Surprisingly, the results of the analysis indicate that the average change in real net wholesale price for those States in which their last two contracts were based on the DHA/ARA-supplemented formulas (22 cents) was actually slightly greater than that in States that switched to the DHA/ARA-supplemented formulas in their current contract (20 cents).

While the average change in real net wholesale prices was similar between the two types of States, there were substantial differences in each of the two components of net wholesale price. For those States that switched to the DHA/ARA-supplemented formulas in their current contract, average real wholesale prices increased by 29 cents and average rebates increased by 9 cents (fig. 15). However, in those States that already used DHA/ARA-supplemented formula in their previous contracts, the real wholesale price decreased by 6 cents and the real rebate decreased by 28 cents. That is, States in which the real wholesale price decreased still ended up paying higher real net wholesale prices on average due to a large decrease in the amount of the manufacturers’ rebate.

<sup>13</sup>Nine of the 10 contracts in which both the current and previous contracts were based on DHA/ARA-supplemented formulas experienced an increase in real net wholesale price. The one State that experienced a decrease in net wholesale price—New York—may be a special case. Its previous contract took effect in 2003. Prior to that time, most contracts offered rebates that were over 90 percent of the wholesale price. Mead Johnson was the only manufacturer to bid on the New York contract, and therefore won despite a rebate bid that was only 65 percent of the wholesale price for milk-based powder. In January 2004, the contract was amended to increase the rebate to 75 percent of the wholesale price.

## How Can Manufacturers Afford To Offer Such High Percentage Discounts to WIC?

Both supply-side and demand-side characteristics of the infant formula market offer possible explanations about how infant formula manufacturers can afford to offer such high percentage discounts. On the supply side, the formula market is highly concentrated—there are only three major manufacturers—a factor which is often associated with higher profit margins (U.S. General Accounting Office, 1998).<sup>1</sup> This, in turn, gives manufacturers a cushion to offer high rebates.

On the demand side, WIC participants purchase over half of all infant formula, ensuring large sales for the contract-winning manufacturer. In addition, manufacturers may realize spillover benefits from winning a WIC contract. For example, retailers generally devote more shelf space and better product placement to the WIC contract brand. This results in greater product visibility, which in turn may spur sales to non-WIC consumers. Sales may also rise if hospitals and/or physicians recommend the WIC contract brand to non-WIC mothers. According to the U.S. Government Accountability Office (2006), “State WIC programs often work with physicians to educate them about the program and the requirement that most WIC participants use the contract brand of infant formula. Physicians may decide to recommend the WIC brand of infant formula to all patients to avoid having to differentiate between those enrolled and not enrolled in WIC. Similarly, some hospitals agree to provide WIC-brand infant formula to new mothers so that they won’t have to switch infant formulas after they leave the hospital. It may be easier for hospitals to provide the WIC-brand infant formula to all new mothers.”

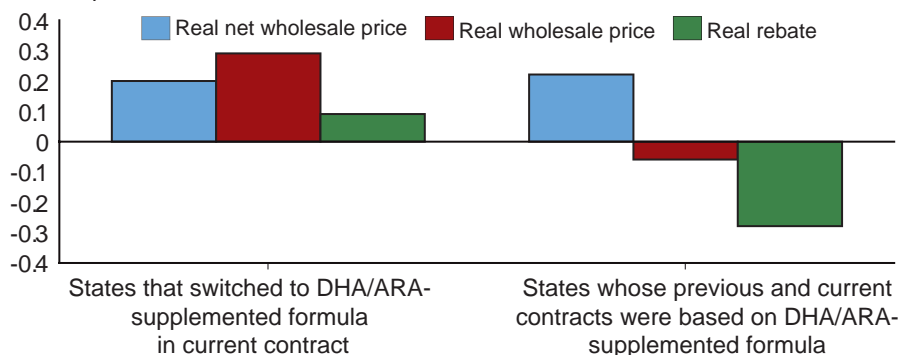
Other possible spillover effects include: WIC recipients who are satisfied with the WIC contract brand of formula may recommend the brand to non-WIC friends and family members; WIC recipients may stay with the same brand (i.e., demonstrate brand loyalty) during subsequent births even if they leave the WIC program; and, to the degree that the quantity of formula provided by WIC doesn’t meet all of their infant’s formula needs, mothers of WIC infants may be reluctant to introduce a different brand of formula to their infants and will therefore be likely to supplement the formula provided through WIC by purchasing the same brand of formula out of pocket.

<sup>1</sup>The General Accounting Office (GAO) changed its name in 2004 to the Government Accountability Office.

Figure 15

### Average change in real net wholesale price, wholesale price and rebate, by State's formula supplementation status

Dollars per 26 reconstituted fluid ounces



Source: USDA, Economic Research Service calculations based on USDA, Food and Nutrition Service data.

## Impact of Higher Net Wholesale Price on Infant Formula Costs

Estimating the impact of the increase in real net wholesale prices on total WIC infant formula costs involved five steps:

1. **Number of WIC infants receiving infant formula.** The number of WIC infants receiving infant formula was estimated on a State-by-State basis. This was done by using data from USDA's Food and Nutrition Service on the average monthly number of infants participating in WIC in 2008 by State (including the five territories and the District of Columbia and excluding Mississippi and Vermont) and multiplying them by .88—the proportion of WIC infants estimated to receive some infant formula through WIC (as reported in table A2 in USDA, 2006). By using the number of infants participating in WIC in only 1 year—2008—we ensure that the estimate of the change in total infant formula costs between previous and current contracts reported here is due solely to increases in net wholesale price and not to increases in the number of infants participating in WIC over time.
2. **Adjustment for use of noncontract formula.** Each of the State estimates of the number of WIC infants receiving formula generated in step 1 were then reduced by 8 percent to account for the estimated 8 percent of infant formula provided to WIC participants that is noncontract (as reported in U.S. Government Accountability Office, 2006) and therefore not eligible for rebate.<sup>14</sup>
3. **Average change in net wholesale price.** The number of infants receiving WIC infant formula subject to rebates by State from step 2 was multiplied by the average change in net wholesale price for 26 reconstituted ounces (the daily maximum allowance of infant formula provided by WIC per infant during the study period) between the previous and current contracts for each State as estimated by ERS.
4. **Adjustment for the amount of formula provided in the WIC packages.** To account for the fact that some WIC infants do not receive the Federal maximum amount of 806 reconstituted ounces of formula per month allowable in WIC (for example, partially breast-fed infants may be prescribed smaller amounts of formula), the State estimates resulting from step 3 were multiplied by .94—the estimated average amount of formula prescribed to WIC infants as a share of the Federal maximum allowed as reported in USDA, 2006. This resulted in an estimate of the impact of the change in net wholesale price per infant per day.
5. **Annualized cost estimate.** The daily State estimates derived in step 4 were multiplied by 365 (the number of days in a year) and summed across States to derive a national annual estimate of the impact of the change in real net wholesale price.

This analysis resulted in an estimated annual cost to WIC attributed to the change in real net wholesale price between the current and previous contracts of \$126.7 million. This was equivalent to the cost of supporting 134,200 persons in WIC for a year, or about 2 percent of all women, infants, and children

<sup>14</sup>This is the latest data available and there is no information suggesting that it may have increased or decreased.

participating in WIC in fiscal 2008.<sup>15</sup> It is important to note that the effect of an increase in net wholesale price between the previous and current contracts lasts for the entire length of the contract (i.e., over 4 years on average based on previous contracts), until the next contract becomes effective. As States implement new contracts, the estimate of the total impact of changes in real net wholesale price to WIC will change due to changes in the mix of current contracts.

While the majority of formula-fed infants in WIC receive milk-based powder, the estimate of the annual increase in infant formula costs reported here assumes that all formula-fed infants in WIC receive milk-based powder formula. However, analysis of changes in the net wholesale prices of milk-based liquid concentrate found similar results: real net wholesale prices increased by an average \$.20 for 26 fluid ounces of reconstituted formula (appendix C examines recent trends in net wholesale price for milk-based formula in liquid concentrate form). If all WIC infants received milk-based formula in liquid concentrate form instead of powder, annual costs to WIC would have increased by an estimated \$123.3 million (i.e., about the same as if all WIC infants received milk-based formula in powder form). Data were not available to estimate the impact of changes in real net wholesale price based on soy-based infant formula.

<sup>15</sup>To estimate the number of WIC participants supported by \$126.7 million, we divided the \$126.7 million by the sum of total WIC costs in fiscal 2008 (\$6.209 billion) and the amount of the rebate in fiscal 2008 (\$2.008 billion) and multiplied the result by the average monthly number of participants in fiscal 2008 (costs and participation figures based on USDA, 2009a).



## Changes in WIC's Market Share Could Impact Net Wholesale Price Trends

The results of this analysis indicate that net wholesale prices have increased in recent years, even after adjusting for inflation. Although the exact reasons why manufacturers increased net wholesale price (or stated another way, why rebates decreased relative to wholesale prices) are not known, several hypotheses link the increase in net wholesale price to the increased proportion of infants in the U.S. population who are served by WIC.

It is generally accepted that formula manufacturers are willing to offer such high rebates for the WIC contract in part because the WIC brand of formula has greater market presence (through increased product visibility and better product placement), which results in increased sales to non-WIC customers.<sup>16</sup> However, over time, the share of infants in WIC has increased so that by 2008, over half of all infants born in this country participated in the program (see fig. 4). Because WIC mothers are less likely than non-WIC mothers to breastfeed their infants, the share of the formula market attributed to WIC is even greater (Centers for Disease Control and Prevention, 2009).

This study estimated WIC's share of the infant formula market for 2004-06, using two different methods. The first method, utilizing data on breastfeeding and formula-feeding practices, was based on estimates of formula needs of WIC infants relative to the formula needs of all infants. The second method compared the costs of the infant formula purchased through WIC to total infant formula sales. Results of these analyses indicate that between 57 and 68 percent of all infant formula sold in the United States is purchased through WIC (see appendix A for information on how WIC's share of the infant formula market was estimated).

WIC's share of the infant formula market may impact rebate levels directly as well as indirectly. The direct-effect hypothesis holds that as WIC's share of the infant formula market increases, manufacturers have less to gain from the greater market presence resulting from winning the WIC contract because the relative size of the non-WIC segment—that pays full price for their formula—has decreased. As a result, manufacturers are likely to respond by decreasing the amount of the rebate, resulting in higher net wholesale prices for WIC. Besharov and Call (2009) suggest that as the percentage of American infants in WIC increases, “the financial viability of the rebate system declines.” Thus, it might be that the high percentage discount received in previous contracts will decline as WIC's share of the formula market increases.

The indirect-effect hypothesis holds that the proportion of infants who are in WIC may affect retail markups, which, in turn, affect rebate levels. Since WIC recipients do not pay for their WIC formula from their personal funds, they are not sensitive to the prices that a store charges for infant formula. An earlier ERS analysis of retail infant formula prices found a positive association between formula identified as the WIC-designated brand and its retail price, especially in areas with a high percentage of WIC infants (Oliveira et al., 2004). That is, as the percentage of infants in WIC increases, so does the retail markup (since there are proportionately more price-insensitive customers), which will result in higher retail prices for the WIC brand of formula.

<sup>16</sup>The U.S. Government Accountability Office (2006) interviewed the formula manufacturers participating in WIC's rebate program and reported that all three “manufacturers noted the importance of shelf space and product placement to their marketing strategies.”

However, price-sensitive non-WIC consumers, who pay for formula out of pocket, will respond to the higher price of the WIC contract brand by switching to a lower priced brand, resulting in fewer sales of the WIC contract brand in the non-WIC market. There is now less to gain for manufacturers in the non-WIC market by winning the WIC contract, so they will respond by offering lower rebates to WIC State agencies.

In addition, other reasons for the increase in net wholesale prices have been suggested that are not related to WIC's market share. The U.S. Government Accountability Office (2006) suggests that the increase may be related to the increase in the share of formula provided through WIC that is in powdered form. If liquid concentrate formula is more profitable to the manufacturers, the shift to powder could reduce the rebates they offer to the States. Neuberger and Greenstein (2004) suggest that some of the increase in net wholesale price may be related to the growth in the number of WIC-only stores (defined as stores that stock only WIC foods and serve only WIC customers) in the early 2000s. Since shelf space in WIC-only stores does not promote sales to non-WIC customers, as more WIC participants purchase their formula in WIC-only stores, sales of the contract brand of formula to WIC customers in traditional retail food stores decrease. Retail stores likely would respond by stocking less of the WIC contract brand and/or giving it less shelf space. Infant formula manufacturers then may lower their rebate bids as a result of the reduced opportunity to attract non-WIC customers to their products. Since the publication of the Neuberger and Greenstein report, Federal legislation has been enacted to control the growth of WIC-only stores (Oliveira and Frazão, 2009).

Several recent developments have the potential to affect the share of the formula market attributed to WIC infants—either positively or negatively—and, therefore, the net wholesale price to WIC. These factors include the country's economic conditions and recent revisions to the WIC food packages.

## **Economic Conditions Affect the Number of Infants Eligible for WIC**

The number of persons eligible for WIC is largely a function of economic conditions. A weak economy, as indicated by a rising unemployment rate and an increase in the number of persons in poverty, could affect WIC participation in two ways: (1) by increasing the size of the eligible population (i.e., more infants may meet WIC's income eligibility criteria); and (2) by impacting the rate of participation among eligible people. That is, during an economic downturn, families of WIC-eligible infants may be more likely to perceive their economic situation as being serious and long-term and worth the time and effort it takes to apply for WIC benefits.

However, since WIC is a discretionary program, an increase in the demand for WIC services will only translate into an increase in the number of program participants if congressional appropriations are sufficient to cover the costs associated with increased participation. Throughout its history, WIC has received strong congressional support resulting in almost continual annual increases in funding. Even after adjusting for inflation, expenditures for WIC increased each year—except for 1989—up to FY 1997 (Oliveira and Frazao, 2009). As the program reached full funding (whereby every eligible person

who applied for WIC was accepted into the program), congressional appropriations flattened out and the increase in real expenditures slowed. In recent years, the program has been able to serve all eligible people who applied for the program.

Poor economic conditions could further increase WIC's share of the formula market by affecting breastfeeding rates among non-WIC population. Since they pay for formula out-of-pocket, more non-WIC mothers may decide to breastfeed their infants instead of paying for formula.

## Food Package Revisions May Impact WIC's Share of Infant Formula

In December 2007, program regulations governing the WIC food packages were revised to better reflect advances in nutrition science and dietary recommendations and to address current supplemental nutritional needs of WIC participants (72 *Federal Register* 68965-69032). WIC State agencies were required to implement the new provisions by October 1, 2009.

WIC's food package revisions have the potential to impact WIC's share of the infant formula market in two ways. First, some revisions were specifically designed to strengthen WIC's breastfeeding promotion efforts and provide additional incentives for mothers to initiate and continue to breastfeed. For example, WIC mothers who fully breastfeed their infants are offered greater quantities of a larger selection of foods in an effort to encourage both breastfeeding initiation and duration. Simultaneously, related revisions aim to minimize early supplementation with infant formula, to facilitate the successful establishment of the mothers' milk supply and increase breastfeeding duration, and to encourage mothers who feed their infants both breastmilk and formula to increase the intensity and duration of their breastfeeding.

Second, in an effort to promote and increase duration of breastfeeding, the new WIC food packages provide different amounts of infant formula depending on the infant's age and "feeding method." Among fully formula-fed infants, those younger than 4 months of age receive the same amount of formula under the new food package as under the old food package. However, infants 4-5 months of age receive greater amounts of formula than before, while infants 6-11 months of age receive smaller amounts of infant formula under the new food package than under the old food package.<sup>17</sup>

We used data provided in the interim rule revising the WIC food packages (72 *Federal Register* 68965-69032) on the projected number of fully formula-feeding, partially breastfeeding, and fully breastfeeding infants, by age, and amounts of infant formula in each food package, to estimate changes in infant formula use. We estimate that the new food package would result in a 20-percent reduction in the amount of infant formula purchased through the WIC program, assuming the same number of fully formula-feeding, partially breastfeeding, and fully breastfeeding infants (see appendix D). A reduction in infant formula use by WIC would decrease the WIC share of the infant formula market and, as hypothesized above, may lead manufacturers to offer larger rebates to WIC State agencies.

<sup>17</sup>In all cases, the revised food packages aim to balance the reduced amounts of formula with greater amounts and varieties of foods to the infants' mothers, as well as to older infants.

It is not clear what impact these revisions will have on breastfeeding initiation, intensity, and duration among WIC mothers and, therefore, infant formula use. For example, the reduced amount of infant formula that partially breastfed infants may now receive—only about half the amount that is prescribed to fully formula-fed infants—could lead some WIC mothers to choose to breastfeed even less—or not at all—in order to qualify for the full amount of infant formula.

If the food package revisions are effective in increasing breastfeeding rates among WIC mothers, WIC's share of the infant formula market is likely to decrease. Manufacturers might respond by offering higher rebates, resulting in lower net wholesale prices for WIC. Additionally, retailers may respond by lowering the retail price of the WIC contract brand, which also could lower WIC's formula costs.

## Conclusions

Results from this study indicate that nearly all WIC State agencies were paying more for milk-based powdered formula (the primary type of infant formula) in their current rebate contracts (those in effect in December 2008) than under their previous contracts, even after adjusting for inflation. On average, real net wholesale prices increased by 73 percent or 21 cents for 26 fluid ounces of reconstituted formula (WIC's maximum daily allowance during the study period). Higher wholesale prices accounted for 72 percent of this increase; smaller rebates accounted for the remaining 28 percent. As a result of the increase in real net wholesale prices, WIC paid about \$127 million more for infant formula over the course of a year.<sup>18</sup> This was equivalent to the cost of supporting 134,200 persons in WIC for a year, or about 2 percent of all women, infants, and children participating in WIC in fiscal 2008.

This trend of increasing real net wholesale prices, if it continues, will cost the program even more in the future as current contracts expire and WIC State agencies negotiate new contracts. The share of the infant formula market going to WIC may be an important factor in determining if this trend of increasing net wholesale prices will continue. As the WIC share of the infant formula market increases, manufacturers have less to gain from the additional shelf space that results from winning the WIC contract and are likely to respond by reducing their rebates and increasing the net wholesale price offered to WIC. Conversely, if WIC's share of the infant formula market decreases, manufacturers may respond by increasing their rebates and decreasing the net wholesale price offered to WIC.

Weak economic conditions have the potential to increase WIC's share of the formula market if sufficient funding allows the program to meet the increased demand for WIC services. On the other hand, the new food packages have the potential to decrease the relative size of the WIC infant formula market by reducing the total amount of infant formula that formula-fed infants receive over a year, and by possibly increasing breastfeeding rates among WIC mothers. The extent to which these factors affect WIC's share of the infant formula market may play a major role in determining future infant formula costs to the WIC program.

<sup>18</sup>As discussed in appendix B, if all the formula provided to WIC infants were milk-based liquid concentrate instead of powder, the estimate of the increase in real net wholesale price would have been about \$123 million.

## References

- American Academy of Pediatrics. "Iron Fortification of Infant Formula (RE9865), Policy Statement of the American Academy of Pediatrics," *Pediatrics*, Vol. 104 (1), July 1999.
- Besharov, D., and D. Call. *The Expansion of WIC Eligibility and Enrollment, Good Intentions, Uncontrolled Local Discretion, and Compliant Federal Officials*, AEI working paper, March 5, 2009.
- California WIC Association. "Concerns about Infant Formula Marketing and Additives," Unpublished paper, March 2009.
- Centers for Disease Control and Prevention (CDC). "Breastfeeding Among U.S. Children Born 1999-2005, CDC National Immunization Survey." [http://www.cdc.gov/breastfeeding/data/NIS\\_data/](http://www.cdc.gov/breastfeeding/data/NIS_data/), accessed March 23, 2009.
- Davis, David. Unpublished Dataset on WIC Infant Formula Rebates (Preliminary), South Dakota State University, 2008.
- Fomon, S. "Infant Feeding in the 20th Century: Formula and Beikost," *The Journal of Nutrition (Supplement)*, Vol. 131, 2001.
- Hamilton, B., J. Martin, and S. Ventura. *Births: Preliminary Data for 2007*. National Vital Statistics Reports, Vol. 57, No. 12, National Center for Health Statistics. March 18, 2009.
- Institute of Medicine, Food and Nutrition Board. *Dietary Risk Assessment in the WIC Program*, National Academy Press, 2002.
- Institute of Medicine, Food and Nutrition Board. *WIC Food Packages: Time for a Change*, The National Academies Press, 2005.
- Martin, J., Hamilton, B., Sutton, P., and S. Ventura. *Births: Final Data for 2006*. National Vital Statistics Reports, Vol. 57, No. 7. National Center for Health Statistics, January 2009.
- National WIC Association. *2009 WIC Reauthorization Legislative Agenda*, February 2009.
- Neuberger, Z., and R. Greenstein. *WIC-Only Stores and Competitive Pricing in the WIC Program*, Center on Budget and Policy Priorities, May 2004.
- Nielsen Company. Unpublished data provided to USDA's Economic Research Service. 2008.
- Oliveira, V., and D. Davis. *Recent Trends and Economic Issues in the WIC Infant Formula Rebate Program*, Economic Research Report No. 22, U.S. Department of Agriculture, Economic Research Service, August 2006.
- Oliveira, V. and E. Frazao. *The WIC Program: Background, Trends, and Economic Issues*, Economic Research Report No. 73, U.S. Department of Agriculture, Economic Research Service, April 2009.

- Oliveira, V., M. Prell, D. Smallwood, and E. Frazão. *WIC and the Retail Price of Infant Formula*, Food Assistance and Nutrition Research Report No. 39, U.S. Department of Agriculture, Economic Research Service, June 2004.
- Tejada-Vera, B., and P. Sutton. *Births, Marriages, Divorces, and Deaths: Provisional Data for 2008*, National Vital Statistics Reports; Vol. 57, No 19, National Center for Health Statistics, 2009.
- U.S. Department of Agriculture, Food and Nutrition Service, Budget Division. *Program Information Report (Keydata), U.S. Summary, March 2009*, May 2009a.
- U.S. Department of Agriculture, Food and Nutrition Service, Office of Research and Analysis. Personal communication, February 2009b.
- U.S. Department of Agriculture, Food and Nutrition Service, Budget Division. *Program Information Report (Keydata), U.S. Summary*. Various years.
- USDA, Food and Nutrition Service, Office of Analysis, Nutrition, and Evaluation. *Analysis of WIC Food Package Prescriptions, 1998-2002*, Special Nutrition Program Report Series, No. WIC-06-PCFP, April 2006.
- U.S. Department of Agriculture, Food and Nutrition Service, Supplemental Food Programs Division. *The Integrity Profile (TIP) Report, Fiscal Year 2005*. Available at <http://www.fns.usda.gov/wic/tip/tipreport2005.htm>.
- U.S. Department of Agriculture, Food and Nutrition Service. *WIC Food Package Costs and Rebates Summary: Fiscal Year 2005*, September 2007.
- U.S. Department of Health and Human Services, U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition. Website on “Infant Formula: Frequently Asked Questions,” accessed on April 7, 2009 at <http://www.cfsan.fda.gov/~dms/inf-faq.html> (updated April 3, 2006).
- U.S. General Accounting Office. *Food Assistance: Information on WIC Sole-Source Rebates and Infant Formula Prices*, GAO/RCED-98-146, May 1998.
- U.S. Government Accountability Office. *Food Assistance: FNS Could Take Additional Steps to Contain WIC Formula Costs*, GAO-06-380, March 2006.
- U.S. Senate, Committee on Agriculture, Nutrition, and Forestry. 2nd Session 108-279, Report to Accompany S. 2507. June 7, 2004.

## Appendix A—Estimating WIC’s Share of the Infant Formula Market

We estimated WIC’s share of the infant formula market using two different methods. The first method was based on formula needs of infants, the second was based on market sales data.

### *Method based on formula needs among infants*

This method is based on estimates of formula needs of WIC infants relative to the formula needs by both WIC and non-WIC infants. The analysis uses data from the National Immunization Survey (NIS) on breastfeeding and formula-feeding practices for WIC and non-WIC infants.

The NIS, conducted by the Centers for Disease Control and Prevention (CDC), uses random-digit dialing to survey households with children aged 19-35 months. CDC provided ERS with data for the 2006-07 survey, which includes infants born between January 2003 and July 2006. The survey categorized infants by whether (a) the infant received WIC; (b) the infant was eligible for WIC but did not receive it; or (c) the infant was not eligible for WIC. We combined the two latter categories into a “non-WIC” category using a simple weighted average.

The household telephone survey asks three questions about breastfeeding:

1. Was [child] ever breastfed or fed breast milk?
2. How old was [child’s name] when [child’s name] completely stopped breastfeeding or being fed breast milk?
3. How old was [child’s name] when (he/she) was first fed formula?

We converted data on monthly breastfeeding rates (the proportion of children that were breastfed at each month) into formula-feeding rates by subtracting the breastfeeding rate from 100, under the assumption that infants who were not breastfeeding received infant formula (and only infant formula, with no breastmilk). For example, if the data showed that 66 percent of the WIC infants were ever breastfed, we assumed that the remaining 34 percent of WIC infants received formula from birth.

We assumed that once infants started receiving infant formula they continued receiving it for the remainder of their first year of life. Therefore, infants who started receiving formula at birth received formula for a total of 12 months, infants who started receiving formula at 1 month received formula for a total of 11 months, and so forth. Therefore, the estimated formula-feeding rates are cumulative, in that each month’s rate includes all infants that received formula the previous month (table A1).

To simplify the analysis, we also assumed that all infants consumed the same amount of formula regardless of WIC status, age, weight, etc. We further assumed that the amount of formula provided by WIC was sufficient to meet the infants’ formula needs over the first year of life (so WIC families did not have to purchase formula with their own funds).<sup>1</sup>

<sup>1</sup>On average, the amount of formula provided by WIC is sufficient to meet all of the infant’s energy needs, particularly since the number of cans of powdered formula necessary to provide the full authorized nutritional benefit actually provides more than that amount (see discussion of the rounding-up option in the chapter on “Characteristics of the Infant Formula Market”). For those older infants who consume more than the monthly allotment of WIC formula, parents may be able to stock excess WIC formula provided during the first few months—when the infant’s energy requirements are likely less than the amount of formula provided by WIC—for use in later months.



We estimate that an average of 63 percent of WIC infants are formula-fed (without any breastmilk) over the first year, compared with an average of 46 percent among non-WIC infants. Given that WIC infants account for half of all infants in the United States, and assuming that all infants are fed equal amounts of formula regardless of WIC status, age, or weight, this results in formula-fed WIC infants accounting for an estimated 58 percent of the total formula used by both WIC and non-WIC infants (table A1).

Since some WIC participants are likely to purchase some formula out of pocket, the assumption that WIC families do not purchase any formula with their own funds may result in an overestimate of the WIC formula share. However, this is likely offset by the fact that the analysis also underestimates formula use, since it only measures formula use among infants who are not breastfed. NIS data show that a large proportion of breastfed infants also receive some formula (table A1). In fact, nearly 25 percent of all breastfed infants received some formula supplementation within 2 days of birth, and 31 percent of all breastfed infants received some formula at 1 month of age. The NIS data indicate that a higher proportion of breastfed WIC infants receive formula supplementation than do non-WIC infants each month. If we assume that supplemented breastfed infants receive equal amounts of formula regardless of WIC status or age, the higher proportion of formula supplementation among WIC infants suggests that the underestimate may be larger for WIC infants than for non-WIC infants. In addition, one might expect that breastfed infants on WIC receive greater amounts of formula than those not on WIC, since infants on WIC receive formula for free. This would further increase the underestimate of formula use among WIC infants relative to non-WIC infants. Therefore, our estimate that WIC infants account for 58 percent of total infant formula use should be considered a lower-bound estimate.

### ***Method based on Nielsen market sales data***

The Food and Nutrition Service reports that WIC paid \$2,333.5 million for infant formula before rebates in fiscal 2005 (USDA, 2007). Unpublished proprietary data that the Nielsen Company prepared for ERS indicate that total infant formula sales in 2005 totaled \$3,404.6 million (Nielsen, 2008). Dividing WIC's infant formula costs by total infant formula sales results in an estimate of WIC's share of the infant formula market of 68.5 percent.

The Nielsen data collection occurs at both the store and household level. The primary source is from Nielsen Scantrack, which collects scanner-based retail sales information (i.e., point-of-sale information) from a sample of grocery stores with annual sales over \$2 million, drug stores, and mass merchandiser stores (excluding Walmart). This data is supplemented with Nielsen Homescan data that provides food-purchase information from additional outlets from a panel of U.S. households (food-at-home purchases from all individuals in the household are captured using a scanning device in the home). However, since the Homescan data may underrepresent infant formula sales from some sources—such as toy stores and Internet sales—that are not included in the Scantrack data, the Nielsen data may underestimate total infant formula sales in the United States. As a result, the 68.5 percent should be considered an upper bound estimate of WIC's share of infant formula sales.

Table A1

**Rates of breastfeeding, formula feeding, and formula supplementation**

Initiation/duration of breastfeeding (time length)	Breastfeeding rates		Formula feeding rates		Rates of formula supplementation among breastfed infants	
	<i>Percent</i>					
	WIC	Non-WIC	WIC	Non-WIC	WIC	Ineligibles <sup>1</sup>
Ever	66.1	81.5	33.9	18.5		
Within 2 days of birth					28.5	18.8
1 month	59.2	76.0	40.8	24.0	34.7	27.9
2 months	52.7	70.4	47.3	29.6	37.9	30.9
3 months	46.9	66.3	53.1	33.7	42.1	34.6
4 months	39.9	60.5	60.1	39.5	45.8	38.7
5 months	35.4	55.5	64.6	44.5	48.2	41.5
6 months	33.1	52.0	66.9	48.0	49.6	43.0
7 months	26.8	43.8	73.2	56.2	52.5	47.9
8 months	24.5	40.5	75.5	59.5	52.8	48.3
9 months	21.8	36.3	78.2	63.7	53.2	48.8
10 months	19.0	32.0	81.0	68.0	53.4	48.7
11 months	17.7	28.5	82.3	71.5	54.5	49.2
Average rate			63.1	46.4	46.1	39.9
Share of total			0.58	0.42	0.54	0.46

<sup>1</sup>Due to lack of information on sample sizes, it was not possible to combine the data for "eligible but not on WIC" and "not eligible for WIC" in order to estimate a weighted average for a "non-WIC" category. The data presented in this column on infants ineligible for the program account for about 90 percent of infants not receiving any WIC benefits. Rates of formula supplementation for infants eligible but not receiving WIC were fairly similar to rates of formula supplementation among infants ineligible for the program.

Source: USDA, Economic Research Service calculations based on 2006-07 National Immunization Survey (NIS) data from U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

## Appendix B—Start Dates of Current and Previous Rebate Contracts by State

State or multistate alliance	Start date of most recently completed contract	Length of original contract	Length of extension	Total length of contract	Start date of current contract
		Years			
AL	10/1/2004	3	0	3	10/1/2007
CA	8/1/2003	3	1	4	8/1/2007
CO	1/1/2003	3	1	4	1/1/2008
FL	2/1/2002	3	2	5	2/1/2008
GA	10/1/2002	3	1	4	10/1/2006
IL	2/1/2001	5	2	7	2/1/2008
IN	10/1/2003	2	2	4	10/1/2007
KY	7/1/2001	2	3	5	7/1/2006
LA	10/1/2004	3	0	3	10/1/2007
MI	11/1/2001	3	2	5	11/1/2006
NJ	10/1/2004	3	0	3	10/1/2007
NY	7/1/2003	3	0	3	7/1/2006
ND	7/1/2001	2	2	4	7/1/2005
OH	10/1/2002	3	1	4	10/1/2006
PA	10/1/2003	5	0	5	10/1/2008
Puerto Rico	2/1/2004	3.67	0.33	4	10/1/2008
SC	4/7/2000	2	3	5	4/7/2005
TN	7/1/1999	1	4	5	7/1/2004
VA	6/29/2001	2	3	5	7/1/2006
WI	1/1/2001	3	2	5	1/1/2006
NEATO <sup>1</sup>	10/1/2001	3	0	3	10/1/2006
OK	10/1/2005	1	2	3	10/1/2008
AR, NM, NC	10/1/2003	3	0	3	10/1/2006
IA, MN, TX,	10/1/2002	3	2	5	10/1/2007
WSCA <sup>1</sup>	10/1/2001	3	3	6	10/1/2007
MO	10/1/1998	3	2	5	10/1/2003
NE, SD	10/1/1999	3	1	4	10/1/2003
Average		2.8	1.5	4.3	

Note: Current contracts are those in effect in December 2008. Most recently completed contracts (i.e., previous contracts) are those that were in effect immediately prior to the current contract.

<sup>1</sup>NEATO and WSCA are multistate alliances. For a list of members of each alliance, see box, "Multistate Alliances," p. 14.

Source: USDA, Economic Research Service calculations based on USDA, Food and Nutrition Service data.

## Appendix C—Analysis of the Change in Real Net Wholesale Price of Milk-Based Infant Formula in Liquid Concentrate Form

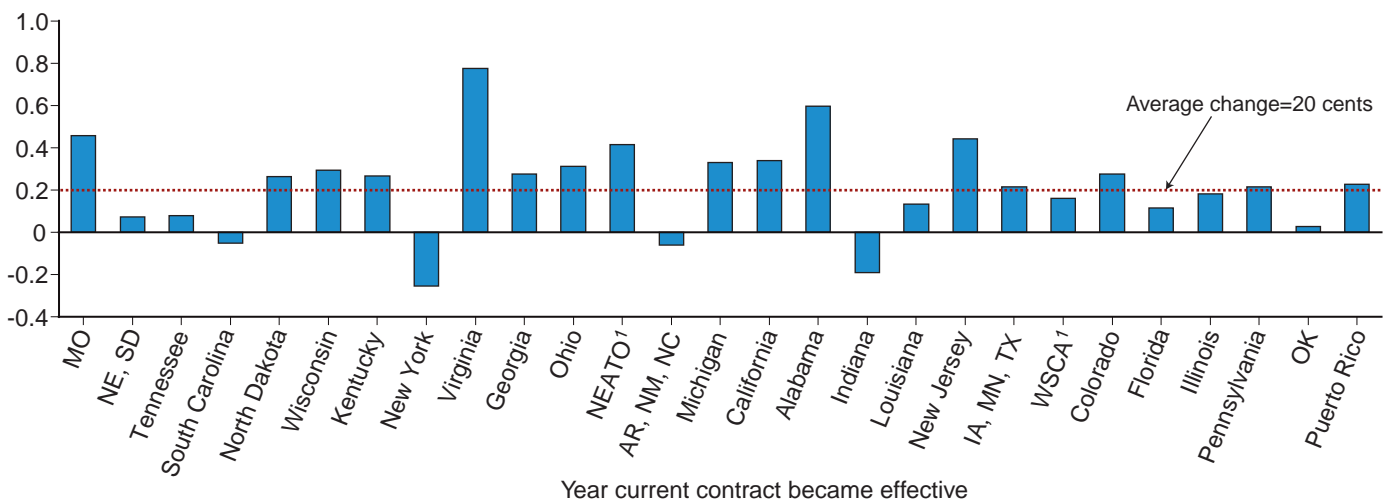
Although powdered formula is now the predominant form of formula provided through WIC, in previous years most WIC formula was provided in concentrated liquid form. For example, a study by the U.S. Government Accountability Office (2006) of 29 States, found that concentrated liquid accounted for 55 percent of all WIC formula in 2000, but only a third of all WIC formula by 2004. This section examines the change in real net wholesale price of milk-based infant formula in liquid concentrate form. In general, the change in real net wholesale prices of milk-based infant formula in liquid concentrate form mirrored the changes in real net wholesale prices of milk-based powder.

Comparison of the previous and current infant formula rebate contracts for milk-based formula in liquid concentrate form indicate that the real net wholesale price increased in 23 of the 27 contracts (fig. C1). Some of these contracts reflect multistate alliances. Excluding Mississippi and Vermont, which do not distribute WIC foods through retail stores, 42 of 48 States, the District of Columbia, and the 5 territories saw an increase in their net wholesale price. Among those States in which both the current and previous contracts were based on DHA/ARA-supplemented formula, 7 of the 10 contracts experienced an increase in real net wholesale price.

The average percentage discount (weighted using the State agencies 2008 infant caseload) for the liquid concentrate formulas decreased from 93

Figure C1  
**Change in real net wholesale price between current and previous contracts, by State (Liquid concentrate, December 2008 dollars)**

Dollars per 26 reconstituted fluid ounces



Note: Current contracts refer to contracts that were in effect as of December 2008. Previous contracts refer to contracts that were in effect immediately prior to the current contract. Average change in net price was calculated by weighing the change in real net price for each contract by the number of WIC infants served under the contract.

<sup>1</sup>NEATO and WSCA are multistate alliances. For a list of members of each alliance, see box, "Multistate Alliances," p.14.

Source: USDA, Economic Research Service calculations of changes in real net price based on USDA, Food and Nutrition Service estimates of net prices adjusted by U.S. Department of Labor, Bureau of Labor Statistics' Consumer Price Index for All Urban Consumers for All Items.

percent for the previous contracts to 88 percent for the current contracts. In 20 contracts, the discount rate for the current contract was less than the discount rate for the previous contract. The discount rate increased in three contracts (representing five States) and in four contracts (representing five States), the discount rate did not change.

On average, real net wholesale prices increased by an average 20 cents for 26 fluid ounces of reconstituted formula between States' previous and current rebate contracts.<sup>1</sup> If all WIC infants received milk-based formula in liquid concentrate form, this increase of 20 cents for 26 fluid ounces of reconstituted formula would result in increased annual costs to WIC of \$123.3 million.

This estimated increase in real net wholesale prices of 20 cents for 26 fluid ounces of reconstituted formula was based on the current and previous contracts for all the States (except Vermont and Mississippi). Some of these States switched from unsupplemented formula in their previous contract to DHA/ARA-supplemented formula in their current contract. Estimating the change in net wholesale price in only those 10 States (or multistate alliances) whose previous and current contract were based on DHA/ARA-supplemented formula (that is, controlling for the higher wholesale prices of the DHA/ARA-supplemented formulas) resulted in an average increase of 18 cents for 26 reconstituted ounces.

<sup>1</sup>Unlike the results based on milk-based powder, the average change in real net wholesale price of milk-based liquid concentrate in those States in which their last two contracts were based on the DHA/ARA supplemented formulas (15 cents) was less than that in States that switched to the DHA/ARA supplemented formulas in their current contract (23 cents).

## Appendix D—Estimated Change in Infant Formula Use by WIC Under the New Food Packages

The WIC food package revisions change the maximum monthly allowances for infant formula for some infants, depending on the infants' age and feeding method. We estimated total infant formula use by WIC infants under the old food package (which was totally phased out as of October 1, 2009) and under the new food packages using data provided in the Interim Rule (USDA, 2007). For both the old and the new food packages, we multiplied the number of infants projected to be participating in WIC in 2008, by age and feeding method (fully formula-feeding, partially breastfeeding, or fully breastfeeding) by the estimated average amount of formula prescribed by WIC for a given age and feeding method, and summed across age and feeding methods to obtain the estimated quantity of infant formula used under each of the two packages (table D1).<sup>1</sup> The results show that the total quantity prescribed under the new food package is about 20 percent smaller than the quantity prescribed under the old food package. Reductions in infant formula use are observed across most age and feeding methods. Fully formula-fed infants 4-5 months of age are the only group where infant formula use is higher under the new food package than under the old food package.

<sup>1</sup>Although WIC has a maximum allowance of 806 fluid ounces of reconstituted infant formula, some infants can actually receive more, since the number of cans of powdered formula necessary to provide 806 fluid reconstituted ounces provide more than that. On the other hand, mothers of breastfed infants may choose to receive less formula. Rather than using the maximum allowances we use the average estimated prescribed amounts as our measure of the amount provided by WIC (USDA, 2007).

Table D1

**Estimated monthly infant formula use under the old and new food packages<sup>1</sup>**

Infant's age	Estimated number of infants (FY 2008)	Old food package		New food package		Difference
		Estimated average prescribed amount per infant	Total quantity	Estimated average prescribed amount per infant	Total quantity	
<i>Reconstituted fluid ounces</i>						
<b>Fully formula-fed</b>						
0-3 months	426,994	906.33	386,997,472	842.65	359,806,494	-27,190,978
4-5 months	283,539	906.33	256,979,902	931.37	264,079,718	7,099,817
6-11 months	840,456	906.33	761,730,486	656.66	551,893,837	-209,836,650
Subtotal	1,550,989		1,405,707,860		1,175,780,049	-229,927,811
Percent reduction						-0.16
<b>Partially breastfed<sup>2</sup></b>						
newborn (0 months)	28,205	546.55	15,415,443	0.00	0	-15,415,443
1-3 months	84,616	546.55	46,246,875	390.14	33,012,086	-13,234,789
4-5 months	31,566	613.76	19,373,948	470.66	14,856,854	-4,517,095
6-11 months	56,380	637.89	35,964,238	355.32	20,032,942	-15,931,297
Subtotal	200,767	2,344.75	117,000,504		67,901,881	-49,098,623
Percent reduction						-0.42
<b>Fully breastfed</b>						
0-3 months	199,996	79.58	15,915,682	0.00	0	-15,915,682
4-5 months	56,262	77.38	4,353,554	0.00	0	-4,353,554
6-11 months	98,114	77.12	7,566,552	0.00	0	-7,566,552
Subtotal	354,372		27,835,787		0	-27,835,787
Percent reduction						-1.00
<b>TOTAL</b>	<b>2,106,128</b>		<b>1,550,544,151</b>		<b>1,243,681,931</b>	<b>-306,862,220</b>
<b>Percent reduction in total formula use</b>						<b>-20</b>

<sup>1</sup>These estimates assume that the number of infants in each category does not change.

<sup>2</sup>FNS interim rules provide data on 0-3 month old infants (n=112,821). We assume that one-fourth of these are newborns (n= 28,205) and three-fourths are 1-3 months olds (n= 84,616).

Source: USDA, Food and Nutrition Service. Special Supplemental Nutrition Program for Women, Infants, and Children (WIC): Revisions in the WIC Food Packages; Interim Rule (7 CFR Part 246); *Federal Register*, December 6, 2007 (table 4, p. 69018, and table 5, p. 69020, for estimated average prescribed amounts; table D, p. 69031, and table E, p. 69032, for projected participation in the WIC Program by food package type.

(For more detailed information, see <http://www.fns.usda.gov/wic/regspublished/wicfoodpkginterimrulepdf.pdf>)