

# WIC Increases the Nutrient Intake of Children

Victor Oliveira  
(202) 694-5434  
victoro@ers.usda.gov

Craig Gundersen  
(202) 694-5425  
cggunder@ers.usda.gov

**U**SDA's Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is designed to improve the health of low-income, nutritionally at-risk infants; children; and pregnant, postpartum, and breastfeeding women by providing supplemental food, nutrition education, and health care referrals. WIC is based on the premise that early intervention during critical times of growth and development can help prevent medical and developmental problems later in life.

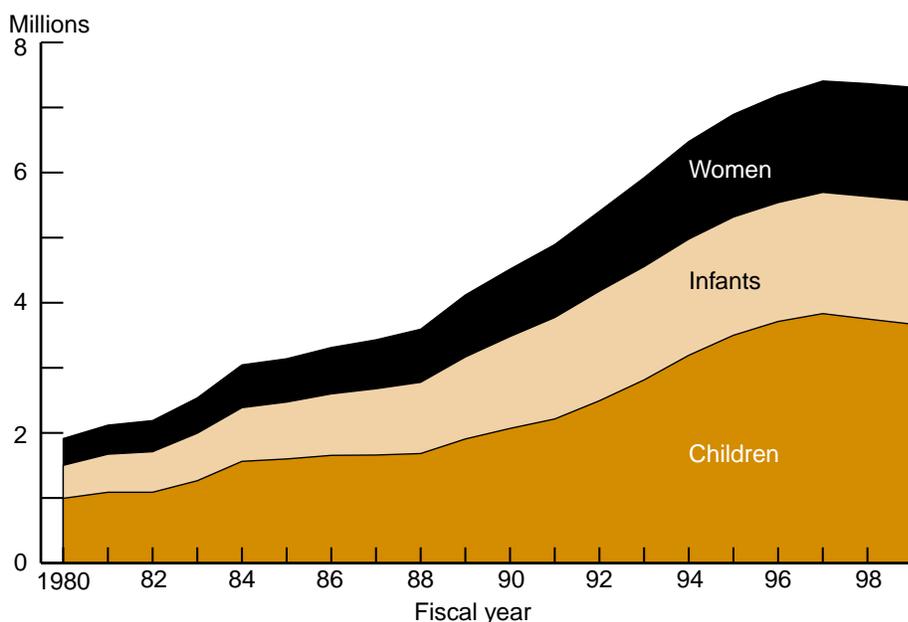
WIC is a central component of the Nation's food assistance system. In fiscal 1999, WIC served an average of 7.3 million participants per month, half of whom were children. About half of all infants and almost one-quarter of all children 1-4 years of age in the United States now participate in WIC. Federal program costs totaled \$3.9 billion in fiscal 1999, making WIC the country's third-largest food assistance program in terms of total expenditures, trailing only the Food Stamp Program (\$17.7 billion) and the National School Lunch Program (\$6 billion). WIC accounts for almost 12 percent of total Federal Government expenditures for food and nutrition assistance.

The number of women, infants, and children who can participate in WIC each year depends on the annual appropriation by Congress and the cost of operating the program. Funding for WIC increased substantially during most of the 1990's, which allowed the program to serve more people. Between fiscal 1990 and fiscal 1997, the year in which WIC participation peaked at an average 7.4 million participants per month, the number of WIC participants increased almost 64 percent (fig. 1). Children experienced the greatest increase (85 percent), followed by women (65 percent), and

infants (32 percent). In recent years, WIC has been fully funded—all eligible people who applied to the program have been able to participate.

The increase in congressional funding during the past decade was fueled largely by evaluations of the program that showed WIC to be successful and cost-effective. For example, an influential 1990 five-State study concluded that every \$1 WIC spent on pregnant women saved up to \$3.13 in Medicaid costs over the first 60 days after birth. The study also found that a woman's participation in WIC while pregnant was associated with increased

Figure 1  
**Participation in WIC Increased During Most of the 1990's**



The authors are agricultural economists with the Food and Rural Economics Division, Economic Research Service, USDA.

birthweight, less chance of a preterm birth, and a longer gestational period.

Most research on the effectiveness of WIC has focused on birth outcomes, while relatively few studies have examined the program's effect on children, despite the fact that children now comprise over half of all participants in WIC. The few WIC studies that focused on children were based on data collected before the dramatic expansion of the child component of the WIC program during the 1990's. Therefore, the results of these earlier studies may not be applicable to the current situation.

To address this lack of recent research on children, USDA's Economic Research Service (ERS) recently undertook a study that examined WIC's effect on the nutrient intake of children participating in the program. An underlying assumption was that improved diets will lead to better health of children in the long run. The study found that participation in WIC leads to increased intake of iron, vitamin B<sub>6</sub>, and folate.

## Overview of the WIC Program

The WIC program, administered by USDA's Food and Nutrition Service, was established in 1972 and made permanent in 1974. WIC operates in all 50 States and the District of Columbia, as well as in Guam, the U.S. Virgin Islands, American Samoa, the Commonwealth of Puerto Rico, and on 33 Indian reservations. WIC limits eligibility to pregnant women, women up to 6 months postpartum who are not breastfeeding, breastfeeding women up to 12 months postpartum, infants up to 1 year of age, and children up to their fifth birthday.

To be eligible, a person's family income must fall below 185 percent of the poverty guideline for that family size. Persons who participate

in the Food Stamp Program, Medicaid, or Temporary Assistance for Needy Families (TANF) automatically meet the income eligibility criteria (the TANF program replaced Aid to Families With Dependent Children (AFDC) in 1997). WIC recipients must also be individually determined to be at "nutritional risk" by a health professional (see box).

Most WIC recipients receive checks, vouchers, or electronic benefits transfer (EBT) cards each month that allow them to purchase a monthly food package designed to supplement their diets. The checks, vouchers, or EBT cards are redeemable at authorized retail food stores. The WIC food package is not intended to meet the total nutritional needs of the participants.

Rather, WIC educates participants on ways to obtain the balance of the necessary nutrients from other food sources. WIC provides foods that are high in five target nutrients—protein, calcium, iron, and vitamins A and C. These nutrients are frequently lacking in the diets of low-income women, infants, and children, which may result in adverse health consequences. The food package for children 1-4 years old consists of milk or cheese, iron-fortified cereal, 100-percent fruit and/or vegetable juice, eggs, and peanut butter or dry beans/peas (children with special dietary needs may receive a different food package). WIC also offers recipients nutrition education as well as referrals to other social services and needed health care, such as immunizations.

### What Constitutes "Nutritional Risk"?

To participate in the WIC program, all applicants must demonstrate nutritional risk as determined by a health professional, such as a physician, nutritionist, or nurse. The nutritional risk assessment is free to all applicants and, at a minimum, includes a height and weight assessment and a hematological test (blood test) for anemia (hematological tests are not required, but are permitted, for infants less than 9 months of age). Federal regulations recognize five major types of nutritional risk for WIC eligibility: (1) detrimental or abnormal nutritional conditions detectable by biochemical or anthropometric measurements (such as anemia and inadequate growth in children); (2) other documented nutritionally related medical conditions (such as nutrient deficiency diseases and food allergies); (3) dietary deficiencies that impair or endanger health (such as highly restrictive diets, inadequate diets, and inappropriate infant feeding); (4) conditions that directly affect the nutritional health of a person, including maternal smoking; and (5) conditions that predispose

persons to inadequate nutritional patterns or nutritionally related medical conditions, including, but not limited to, homelessness and migrancy.

When funds are not sufficient to serve all eligible persons, WIC uses a seven-point priority system to ensure that those persons at the greatest nutritional risk receive benefits. In general, priority is given to persons demonstrating medically based nutritional risks over dietary-based nutritional risks, to pregnant and breastfeeding women and infants over children, and to children over postpartum women.

The nutritional risks reported most frequently for WIC women in 1996 were general obstetrical risks and inadequate or inappropriate nutrient intake. Three-quarters of WIC infants were at risk because their mothers were WIC-eligible or because their mothers were at risk during pregnancy. For children, inappropriate or inadequate nutrient intake and anthropometric risks (for example, low weight for height) were the predominant risks reported.

## Data Set Reflects More Children in WIC During the 1990's

The ERS study used data from the 1994-96 Continuing Survey of Food Intake by Individuals (CSFII) conducted by USDA's Agricultural Research Service. Survey respondents were interviewed in person on 2 nonconsecutive days and asked to recall all the food and beverages they had consumed in the last 24 hours. Adult proxies (usually the persons preparing the meals) provided the data for children. Respondents described both the types and the amounts of food and beverages consumed, and a nutrient database converted this information into total nutrient intake. Because the surveys were conducted at the tail end of the program's growth period, the data are comparable to the current situation in which the WIC program is more widely available to children.

Only children 1-4 years of age who had 2 days of data were included in the ERS analyses. Because the CSFII data set did not allow ERS researchers to determine which children were at nutritional risk, WIC eligibility for children not participating in the program was determined by annual household income. Past research suggests that WIC income-eligibility estimates using 185 percent of the poverty guideline may understate actual income eligibility for WIC. To ensure that we did not exclude eligible children, we included all children in households with annual incomes at or below 200 percent of the poverty guideline. Because they are categorically eligible, we also included children who were authorized to receive food stamps or who lived in households that received income from AFDC. These criteria follow the convention used in earlier work on WIC's impact on nutrient intake.

The study focused on eight nutrients, the five targeted by the WIC

program, as well as folate, vitamin B<sub>6</sub>, and zinc, additional nutrients of concern for some low-income populations. In addition, the study examined food energy to determine if changes in nutrient intake were due to changes in nutrient density or to changes in energy intake of WIC recipients. In other words, were WIC recipients eating more food or food that was more nutrient dense?

## Study Compares WIC Children With Eligible Nonparticipants

The ERS study determined the effect of WIC participation on children by comparing the nutrient intake of children participating in WIC with the intake of income-eligible children not participating in the program. To make this comparison, researchers must carefully consider both observable and unobservable differences between the groups. For example, an observable difference between WIC participants and eligible nonparticipants is household income. WIC participants may have lower household incomes than eligible nonparticipants, and a lack of money could restrict their purchase of nutritious foods. In the absence of WIC, children now on WIC may have had significantly lower nutrient intake than the group of income-eligible nonparticipants.

To control for observable differences between participants and nonparticipants, we used a statistical model employing multiple regression techniques. The model included a number of socioeconomic characteristics thought to influence nutrient intake as independent variables, including the main variable of interest—whether or not the child participated in the WIC program. Other independent variables included the age, sex, and race/ethnicity of the child, and household characteristics, such as annual income, homeownership,



Children participating in WIC showed significant increases in intake of key nutrients, including iron, vitamin B<sub>6</sub>, and folate.

Credit: USDA.

cash assets, geographic region, and years of schooling of the household head. A variable based on the year of the survey accounted for the increase in the participation of children in WIC due partly to increased congressional funding between 1994 and 1996.

While observable differences can be controlled for with statistical methods, unobservable differences between WIC recipients and income-eligible nonparticipants can be a problem when these unobservable differences influence nutrient intake. These unobservable differences, the result of either self-selection or rationing, may bias the estimates of WIC's effect on nutrient intake. These biases may be upward, that is, overstating WIC's effectiveness, or downward, that is, understating WIC's effect on nutrient intakes. Self-selection bias may occur if parents who are more concerned and/or knowledgeable about their child's nutrition choose to enroll their child in WIC to a greater degree than less nutritionally aware parents. Even in the absence of WIC, children with more concerned and motivated parents would probably demonstrate higher nutrient intakes.

Because the data do not allow us to observe differences in motivation and awareness between participants and nonparticipants, we controlled for self-selection bias by including only eligible children from households in which a pregnant woman, a breastfeeding or postpartum mother, or an infant was participating in WIC. As these households already participate in WIC, the parents (or guardians) presumably are aware of the program and are concerned and motivated to improve their family's nutrition. Thus, the model controls for self-selection bias.

While some eligible people may self-select out of WIC, other applicants who would like to receive WIC benefits may not be able to participate if funds are not sufficient to serve all applicants. If this rationing occurs, WIC caseworkers may limit slots to children who are judged to be most at nutritional risk. Such rationing may understate WIC's effectiveness insofar as these higher risk children have poorer nutritional status than the group they are compared with in the analysis—eligible children rationed out of the program. Although the model does not control for the biases resulting from rationing, these biases are likely to be downward and therefore the results from the analysis will be conservative, understating the effect of WIC.

The regression analysis was restricted to children age 1-4 who were income eligible for WIC (proxied by income less than 200 percent of poverty or participation in the Food Stamp or AFDC programs) in households in which some person other than a child is participating in WIC. The sample used in the analysis included a total of 180 children, 110 who participated in WIC and 70 who did not.

Children's intake of each of the eight nutrients and food energy, the dependent variables, was measured as nutrient adequacy ratios. A nutrient adequacy ratio is the nutrient intake of the child (averaged over

the 2 days) divided by the 1989 Recommended Dietary Allowance (RDA) for a child that age. RDA's are often used to compare dietary quality among population subgroups. The 1995 *Dietary Guidelines for Americans* states that RDA's "represent the amounts of nutrients that are adequate to meet the needs of most healthy people. Although people with average nutrient requirements likely eat adequately at levels below the RDA's, diets that meet RDA's are almost certain to ensure intake of enough essential nutrients by most healthy people." It is assumed that subpopulations with low nutrient adequacy ratios have a greater risk of inadequate nutrient intake.

### WIC Increased Children's Intake of Iron, Vitamin B<sub>6</sub>, and Folate

The regression analysis found that children participating in WIC increased their intake of iron by almost 21 percent of the nutrient's RDA, increased their intake of vitamin B<sub>6</sub> by 23 percent of the RDA, and increased their folate intake by 91 percent of the RDA. The findings regarding iron and vitamin B<sub>6</sub> are especially important since a large percentage of children, regardless of WIC status, failed to meet the RDA for those nutrients. Low intake of iron, which may lead to anemia, is considered to be a current public health issue, while low intake of vitamin B<sub>6</sub>, which is associated with neurologic abnormalities, dermatitis, impaired immune function, and anemia, is considered to be a potential health issue.

WIC's effect on the intake of vitamin C, vitamin A, and protein was positive but not statistically significant. These results occurred despite a probable downward bias against WIC due to the effect of rationing, which makes finding positive statistical significance more difficult. That is, the fact that children who are

nutritionally better off are excluded from participating in WIC tends to underestimate the effects from participating in WIC. The expansion of the WIC program in recent years, however, has allowed a larger proportion of lower risk children to participate in the program. Thus, the results of this study might be less subject to rationing bias than if earlier years had been studied. Regression results for energy were negative and insignificant, indicating that the increase in intake of iron, vitamin B<sub>6</sub>, and folate was a result of increased nutrient density and not due to increased caloric intake.

### References

- Fraker, T., S.K. Long, and C.E. Post. *Analyses of the 1985 Continuing Survey of Food Intake by Individuals*, Vol. 1. Washington, DC: Mathematica Policy Research, Inc., 1990.
- Oliveira, Victor, and Craig Gundersen. *WIC and the Nutrient Intake of Children*. Food Assistance and Nutrition Research Report No. 5. U.S. Department of Agriculture, Economic Research Service, March 2000.
- U.S. Department of Agriculture, Food and Nutrition Service. *Annual Historical Review Fiscal Year 1997*. September 1999.
- U.S. Department of Agriculture, Food and Nutrition Service. *Program Information Report (Keydata), U.S. Summary*, September 1999. November 1999.
- U.S. Department of Agriculture, Food and Nutrition Service. *Study of WIC Participant and Program Characteristics 1996*. August 1998.
- U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis and Evaluation. *Income Variability Among Families with Pregnant Women, Infants, or Young Children*. Washington, DC: Mathematica Policy Research, Inc., 1997. ■