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Report to Congressional Requesters

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EARLY INTERVENTION

Federal Investments Like WIC Can Produce Savings

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The Honorable Tom Harkin
Chairman, Subcommittee on Labor,
Health and Human Services,
Education, and Related Agencies
Committee on Appropriations
United States Senate

The Honorable Dale Bumpers
United States Senate

This report, prepared at your request, develops a framework to estimate potential savings in providing early intervention services to children. Using a case study, it estimates the savings to Medicaid and other federal programs from providing WIC services to pregnant women in 1990.

The report contains a matter for consideration by and a recommendation to the Congress and recommendations to the Secretaries of Agriculture, Education, and Health and Human Services.

As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from its issue date. At that time, we will send copies to the Secretaries of Agriculture, Education, and Health and Human Services and to interested parties and make copies available to others upon their request.

This report was prepared under the direction of Gregory J. McDonald, Director, Human Services Policy and Management Issues, who may be reached at (202) 512-7225 if you or your staff have any questions. Other major contributors are listed in appendix IX.

Lawrence H. Thompson

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Executive Summary

Purpose

Early intervention programs for children and their families can help prevent costly problems—such as being born at low birthweight or dying from vaccine-preventable disease. Low birthweight (less than 2,500 grams, or 5.5 pounds) is the leading cause of U.S. infant death and contributes to later health and developmental problems, such as mental retardation, cerebral palsy, and blindness.

The Senate Appropriations Committee's Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, and Senator Dale Bumpers asked GAO to (1) develop a framework to estimate the cost-savings potential of early intervention programs, such as the Special Supplemental Food Program for Women, Infants, and Children (WIC) and the Childhood Immunization Program, and (2) estimate the extent to which these programs can reduce the costs of other federally funded programs, such as Medicaid. The requesters later agreed that GAO should confine its analysis to the WIC program, due to a lack of needed data on the Childhood Immunization Program.

Background

WIC is administered by the Food and Nutrition Service, Department of Agriculture. WIC provides supplementary food, nutrition and health education, and referral to other health and social services to eligible pregnant, breastfeeding, and postpartum women, infants, and children up to age 5. To be eligible for WIC, participants must have family incomes at or below 185 percent of the federal poverty level and be at nutritional risk, as judged by a competent professional.

Both funding and number of participants have increased in recent years. The fiscal year 1990 WIC appropriation was $2.1 billion. By fiscal year 1992 it had increased to $2.6 billion, and the President's fiscal year 1993 budget has proposed an increase to $2.8 billion.

Results in Brief

Legislators and other policymakers may recognize that early intervention can reduce the need for later, publicly financed care. However, when the value of prevention is not quantified, legislators cannot easily factor it into their budgetary decisionmaking. To help quantify the value of prevention, GAO developed and tested a framework to analyze the costs and benefits associated with early intervention efforts.

Using WIC as a test case, GAO concludes that providing WIC benefits to pregnant women more than pays for itself within a year. GAO estimates that

1990 prenatal WIC benefits cost the federal government $296 million, but avoided over $472 million in expected first year federal and state Medicaid expenditures. Over an 18-year period, an estimated $1.036 billion in federal, state, local, and private payer expenditures could be averted.[1]

GAO also found that the formula used to distribute WIC funds to the states does not adequately consider the number of eligible persons in states. As a result, given limited federal funding, some states cannot enroll all eligible pregnant women, while others enroll infants and children whom the Food and Nutrition Service considers less in need of services.

Principal Findings

Evaluating Programs for Cost Savings Requires Specific Types of Data

GAO developed a four-step framework to analyze the costs and benefits of early intervention efforts. The framework involves: (1) identifying program outcomes, (2) quantifying program outcomes, (3) estimating and apportioning cost savings, and (4) conducting sensitivity analyses (see pp. 14-16). GAO's framework could be used to determine whether other federally funded early intervention programs result in cost savings. To conduct such analyses, however, program officials must identify and collect specific information on outcomes, costs, and participant demographic characteristics (see pp. 17-19).

Investing in WIC Prevents Low Birthweight and Produces Cost Savings

By statistically combining results from 17 studies, GAO concluded that prenatal WIC benefits reduced the rate of low birthweight births by 25 percent. Results from 5 studies that examined WIC's effect on very low birthweight (under 1,500 grams, or 3.3 pounds) showed even more dramatic results—a 44-percent reduction in such births.

As a result, GAO estimates that the following savings could accrue over 18 years from providing prenatal WIC services to infants born in 1990: (1) the federal government could save over $337 million in reduced payments for Medicaid, Supplemental Security Income, and special education, (2) states could save over $277 million in reduced payments for Medicaid and special education, and (3) private payers, hospitals, and localities could save

[1]This is GAO's best estimate from a range of estimates, based on differing assumptions about program effectiveness, participant use of federal programs, outcome costs, and expected trends in cost increases (see apps. II-V).

$423 million, principally in reduced health care costs. Because of high initial medical costs, over three-fourths of the estimated savings due to WIC resulted from avoiding medical costs in the first year. Expected net savings over 18 years could be almost $740 million.

Stated another way, each federal dollar invested in WIC benefits returns an estimated $3.50[2] over 18 years in discounted present value, and $2.89 within the infants' first year to federal, state, and local governments and to private payers. Because GAO did not quantify all program benefits and estimate all potential cost savings at current eligibility and participation levels, savings may be greater than these estimates.

WIC Funding Formula Does Not Allow All States to Enroll All Eligible Pregnant Women

Under the current WIC formula and with existing federal funding, some states cannot enroll all potentially eligible pregnant applicants, while others can enroll lower priority applicants. The regulatory formula used to allocate federal funds to states distributes funds principally on the basis of previous funding levels. This gives some states a smaller share of the total federal funds than if the funds were allocated by states' estimated share of eligible women, infants, and children.

To serve applicants thought to be at greatest risk first, states enroll applicants based on a priority system. Applicants with medically based conditions are higher priority than applicants at dietary risk due to poor eating habits. Of 38 states, the District of Columbia, and Puerto Rico surveyed in 1990 by the Food and Nutrition Service and the National Association of WIC Directors, all were enrolling pregnant women at medical risk. But 12 states and Puerto Rico (together serving 40 percent of all prenatal WIC participants) were not enrolling eligible pregnant women at dietary risk. In contrast, 12 other states and the District of Columbia were able to serve lower priority applicants.

Cost Savings Could Still Be Achieved If All Income-Eligible Pregnant Women Enrolled

The WIC program served an estimated 75 percent of all income-eligible pregnant women who would have given birth in 1990. The Food and Nutrition Service estimates that almost all pregnant women who are income-eligible are also at nutritional risk. GAO estimated that serving all income-eligible women who gave birth in 1990 would have cost about $407 million, or about $111 million more than was spent on pregnant women,

[2]For infants born in 1990, using a 2-percent discount rate (in real terms). For results calculated using other rates, see appendix IV.

but could have returned more than $1.3 billion in avoided expenditures over the next 18 years.

Matter for Congressional Consideration

In view of the potential cost savings, the Congress should consider amending the Child Nutrition Act of 1966 to make all pregnant women with family incomes up to 185 percent of the federal poverty level eligible for WIC, irrespective of their level of nutritional risk, and to appropriate sufficient funds to ensure that such women receive WIC services.

Recommendation to the Congress

GAO recommends that the Congress, when legislating new early intervention programs, require the administering department to identify and collect standard outcome, participant, and cost data to enable the department, where appropriate, to estimate potential cost savings.

Recommendations to Departments

GAO recommends that the Secretaries of Health and Human Services (HHS), Education, and Agriculture assess ongoing early intervention programs for children and identify data needed to estimate cost savings; and, where appropriate, develop needed evaluation data and estimate the extent to which these programs provide cost savings, to help determine the most appropriate investments to make in services for children.

GAO is making other recommendations to the Secretaries of HHS and Agriculture (see pp. 39-40).

Agency Comments

GAO gave the Departments of Agriculture, Education, and Health and Human Services the opportunity to comment on this report. Education agreed with GAO's conclusion that early intervention could produce savings, agreed in general with the methodology, and concurred with the recommendation to the Secretary (see ch. 6 and app. VII). HHS agreed that early intervention programs could produce fiscal benefits, but was concerned that the technical difficulties in trying to conduct cost-saving analyses made the recommendations on data gathering infeasible (see ch. 6 and app. VIII). Agriculture agreed with GAO's overall conclusion that WIC was a cost-effective program, but did not concur with the recommendations and was concerned that the methodology led to overestimates of savings (see ch. 6 and app. VI). GAO disagrees with HHS and Agriculture and believes the methodology and recommendations were sound (see ch. 6).

Contents

Figures

Abbreviations

CBO	Congressional Budget Office
CDC	Centers for Disease Control
CPS	Current Population Survey
DRC	Decision Resources Corporation
ECIA-SOP	Education Consolidation and Improvement Act – State Operated Programs
EHA-B	Education of the Handicapped Act – Part B
FNS	Food and Nutrition Service
HHS	Department of Health and Human Services
LBW	low birthweight
MLBW	moderately low birthweight
NGA	National Governors' Association
SIPP	Survey of Income and Program Participation
SSA	Social Security Administration
SSI	Supplemental Security Income
VLBW	very low birthweight
USDA	United States Department of Agriculture
WIC	Special Supplemental Food Program for Women, Infants, and Children

Introduction

Federal investments in early intervention programs for children can prevent serious and costly problems and can improve children's health and development. Such investments have the potential to return more to society than their cost. Analysis of early intervention programs' potential cost savings is needed to determine which programs are effective in achieving legislative goals, which are most beneficial, and which produce the greatest return on the investment.

The Senate Appropriations Committee's Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, and Senator Dale Bumpers asked us to (1) develop a framework to estimate the cost-savings potential of early intervention programs, such as the Special Supplemental Food Program for Women, Infants, and Children (WIC) and the Childhood Immunization Program, and (2) estimate the extent to which these programs can reduce the costs of other federally funded programs, such as Medicaid.

Early Intervention Programs Are Social Investments

Early intervention programs seek to improve the lives of children and their families and prevent problems before they become irreversible or extremely costly. Such programs include WIC, which provides supplemental food, nutrition and health education, and social service referral to low-income pregnant, breastfeeding, and postpartum women, infants, and children; and the Childhood Immunization Program, which provides grants to states to purchase vaccines to prevent childhood illness. These programs are social investments when current expenditures generate future fiscal benefits that accrue to society, such as preventing disease and the need for medical treatment. Early intervention programs can save money if the resulting fiscal benefits produced or expenditures averted are greater than the initial financial investment.

Weighing the costs and quantifiable benefits of early intervention is only one consideration in assessing the overall worth of such programs. Improving children's health and development is also valuable, and a social goal worth pursuing, even when the monetary value is intangible or difficult to quantify for assessment purposes. The federal government funds programs for a variety of reasons—for example, to provide equity to disadvantaged individuals or to develop or safeguard national resources—without necessarily considering whether they provide an overall net savings to the government.

However, legislators face competing choices with limited dollars to spend. Should they fund prevention or treatment, or refuse to fund particular services for children? Evaluation can play a key role in determining which early interventions should be supported and expanded, and which are less effective. If early interventions improve children's health and development and return real fiscal benefits, the wisdom of funding them is clear. For that reason, estimating the cost savings of early intervention programs is crucial.

Scope and Methodology

We developed a framework to analyze federal and overall cost savings, after consulting with experts in evaluation and cost-benefit analysis. As we analyzed WIC and the Childhood Immunization Program, we continued to refine the framework, which detailed the data requirements and procedures needed to apply it to early intervention programs (see ch. 2).

To assess federal and overall cost savings in the WIC and Childhood Immunization programs, we interviewed federal program officials; reviewed agency documents, regulations, and relevant law; and reviewed current evaluation literature. From this review we determined that not enough information was available on Childhood Immunization recipients to estimate the federal share of any cost savings. We also determined that the most reliable body of evaluation evidence as to WIC's effect was on the reduction in low birthweight rates among women who had received benefits prenatally. We therefore confined our analysis to the cost savings resulting from providing WIC benefits to pregnant women.

To determine the potential federal and overall cost savings due to prenatal WIC, we

- analyzed evaluations comparing low birthweight rates of WIC recipients and similar nonrecipients to estimate WIC's effect on reducing low birthweight. These evaluations were conducted at the local, state, and national levels, between 1971 and 1988, and differed somewhat in methodology—(see ch. 3 and app. II).
- estimated the number of infants born in 1990 who would have been born at low birthweight but instead were born at normal birthweight (low birthweight births averted) because their mothers received WIC benefits (see ch. 3 and app. II).
- estimated the medical, educational, and supplementary income costs for very low, moderately low, and normal birthweight children over 18 years,

and the extent to which federal, state, and local governments or others would pay for the excess costs of low birthweight children (see app. IV).

- estimated the federal and overall cost savings associated with giving WIC benefits to pregnant women who gave birth in 1990 (see ch. 4 and apps. IV and V).
- estimated how many income-eligible pregnant women did not receive services and the costs and potential savings that could accrue if WIC served all such women (see ch. 5 and app. III).

We did our work between May 1990 and June 1991 in accordance with generally accepted government auditing standards.

Using a Framework to Estimate Cost Savings of Early Interventions

Early intervention programs may produce cost savings by reducing the need for other publicly financed services. Through avoiding poor health and developmental outcomes for children, such programs may decrease the need for later treatment. We developed a framework to analyze cost savings of early intervention programs (see app. I for details), and then applied the framework to analyze cost savings to the WIC and Childhood Immunization programs.

Estimating cost savings requires information from many sources to quantify program outcomes, costs, and estimated averted expenditures and to allocate averted expenditures to federal, state, and local governments or to private payers. Our review disclosed that when key information is lacking, reliable estimates of cost savings cannot be made. When we examined the Childhood Immunization Program and WIC, we found data gaps that limited potential analyses. However, we found sufficient convincing evidence to demonstrate that WIC reduced low birthweight rates of participating pregnant women (see ch. 3). We also found enough cost data on low birthweight to enable us to estimate cost savings from providing prenatal WIC services (see ch. 4).

Four Steps to Estimate Cost Savings

An early intervention program commonly generates positive economic benefits by preventing outcomes that will entail future costs. When the economic benefits from the program outweigh program costs, the program produces net savings. The ratio of benefits to costs gives the estimated return in dollars for each dollar invested in the program.

Estimated program returns or net savings are savings to society that may accrue to various entities. A federal program can return cost savings to the federal government, states, localities, private corporations, or individuals. Total cost savings can be apportioned based on participants' estimated use of public or private resources to pay for excess treatment costs. Apportioning cost savings this way may give legislators and policymakers some additional guidance for program decision-making by letting them know whether a specific level of government or the private sector is getting the fiscal return for the federal program investment.

The framework we developed to analyze potential cost savings consists of four steps:

1. Identifying program outcomes.

2. Quantifying program outcomes.

3. Estimating and apportioning cost savings.

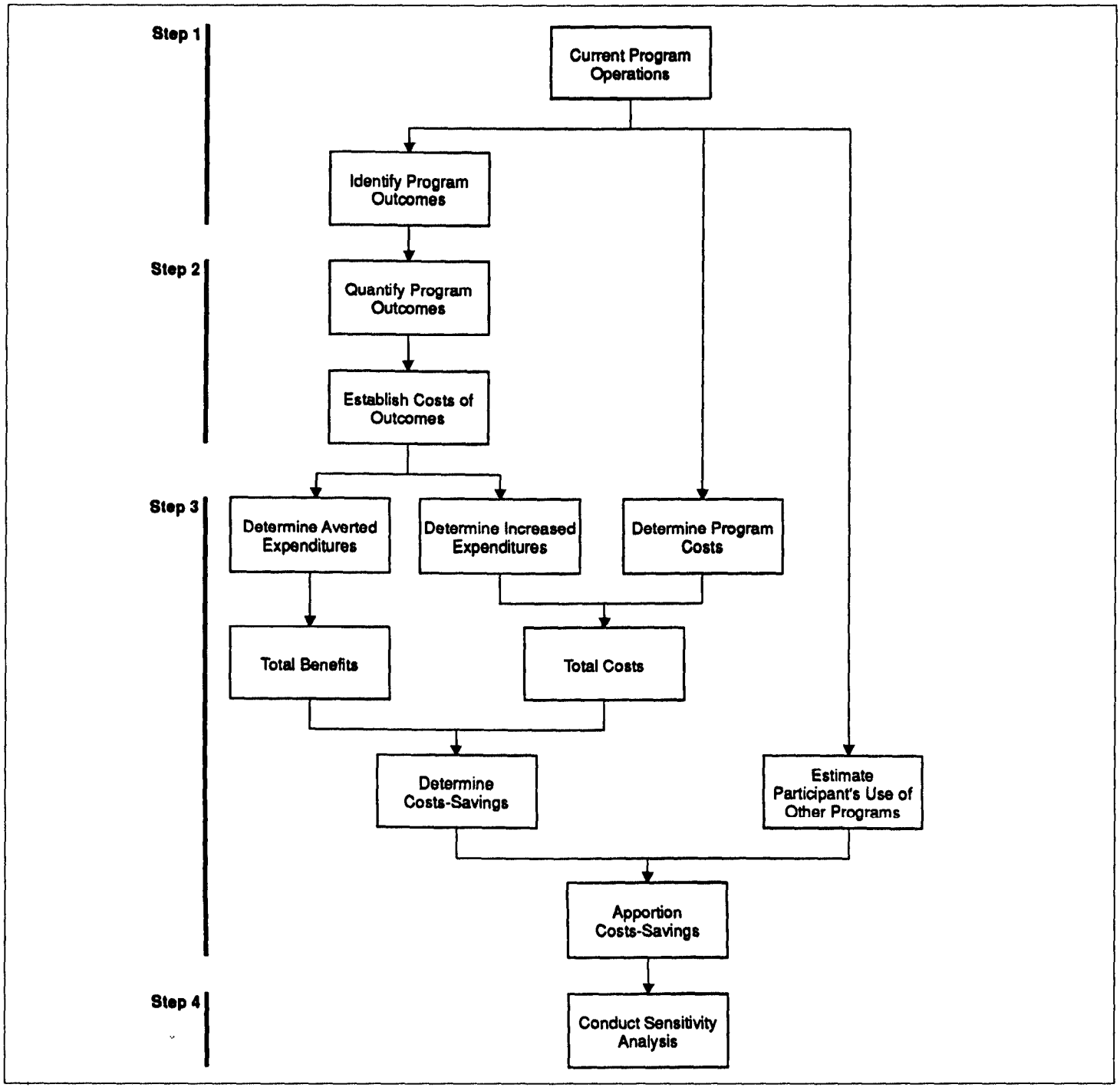
4. Checking key assumptions and conducting sensitivity analysis, including analyzing the likely impact of omitted outcomes.

Each of these has a distinct set of tasks, outlined in figure 2.1 and discussed in more detail in appendix I. Figure 2.2 shows the process for estimating cost savings.

Figure 2.1: Framework to Estimate Cost Savings

Step 1: Identify Program Outcomes	a. Identify potential outcomes b. Include direct and indirect effects, both intended and unintended c. Review program evaluation literature to identify quantified outcomes that are based on sound evaluation d. Identify where evaluation limitations may underestimate or overestimate benefits
Step 2: Quantify Program Outcomes	a. Quantify outcomes based on scientifically valid empirical studies b. Synthesize results from multiple studies where appropriate c. Estimate outcome cost
Step 3: Estimate and Apportion Cost Savings	a. Sort outcomes by costs or benefits b. Determine rate for discounting future benefits and costs c. Determine time horizon d. Calculate costs of achieving program outcomes, including the relative portion of program costs e. Estimate program participants' likely use of other publicly funded programs f. Apportion costs and benefits to entities that fund averted services to determine which entities receive benefits
Step 4: Check Key Assumptions Conduct Sensitivity Analysis	a. Be explicit about assumptions b. Conduct sensitivity checks throughout the process c. Check sensitivity to underlying assumptions

Figure 2.2: Process for Estimating Cost Savings



Data Limitations Preclude Cost-Savings Analysis of Some Early Interventions

Lack of information can prevent analysts from conducting cost-savings analysis. Conducting such analysis requires combining information from many sources. Analysts need program outcomes evaluation, economic valuations of expenditures avoided when negative outcomes are avoided, information on demographic characteristics of program recipients to estimate service needs and payment sources, and program costs. Because cost-savings analysis requires these kinds of specific information, program managers may have to conduct a set of evaluations first—of outcomes, costs of outcomes, participant demographics, or program costs—in order to determine cost savings later. Our work on the Childhood Immunization Program and the effect of providing WIC benefits to postpartum women, infants, and children shows that if evaluation information is lacking at any step in the analysis, the analysis cannot be completed.

Lack of Quantified Program Outcome Information Can Hamper Cost-Savings Analysis

The first step in a cost-savings analysis involves identifying program outcomes. If the analyst finds little or no evaluation of key outcomes, either (1) there will be no basis for the cost-savings analysis or (2) the analysis will not capture a reasonably complete set of program benefits.

For example, we located only one evaluation on the effect of giving postpartum WIC benefits to women. This evaluation showed statistically significant improvements in low birthweight in subsequent pregnancies for California women who had been given postpartum benefits after the previous pregnancy, compared to California women who did not receive such benefits and some other health benefits, such as improved blood hemoglobin. However, this captures only some of the potential benefits of giving postpartum WIC services.

The second step in analyzing cost savings involves quantifying program outcomes. But using results from a limited or nonrepresentative set of evaluations can drastically over- or understate program effect. Examining the previous example, both the women who had received postpartum WIC benefits and those who had not had lower rates of low birthweight than has been commonly measured in WIC populations. Therefore, this WIC sample population differed significantly from other WIC populations and, in our opinion, could not be used to estimate WIC's effect on other populations. Because we found only one limited evaluation, we did not analyze the potential cost savings of providing WIC benefits to postpartum women.

Data on Costs of Outcomes and Participant Characteristics Needed for Cost-Savings Analysis

The third step in a cost-savings analysis involves estimating cost savings that will be achieved by other programs as a result of the early intervention. First, evaluations must be available to determine the costs of outcomes averted. Second, sufficient information must be available to determine the cost of providing early intervention services to individual recipients. Third, analysts need demographic information to estimate the extent to which recipients of early intervention services would likely use other publicly or privately funded program services. Without this information, analysts cannot apportion cost savings to federal, state, or local governments, or to private payers.

Current research on the effect of giving WIC benefits to infants and children provides a clear example of problems in estimating costs of averted expenditures. This research has examined a variety of measures—growth, anemia, immunization rates, cognitive ability, and diet. Infants and children on WIC have had better outcomes for many of these measures (for example, lower rates of anemia) than infants and children with similar socioeconomic backgrounds who did not receive WIC services. However, without adequate research on the extent to which anemic children, relative to more healthy children, require other services and the costs of such services, we could not determine the economic value associated with lowering the rate of anemia among a set of children.

Whether cost savings accrue to federal, state, or local governments or to private payers depends upon who would have paid for the expenditures averted. For example, the Childhood Immunization Program gives grants to states on a competitive basis to help state and local health agencies plan, develop, and conduct childhood immunization programs—in effect, federally provided vaccine is being delivered through a state-run system. The Centers for Disease Control (CDC), which administers the program, does not have information on the demographic characteristics of children who receive such vaccine, which would allow us to estimate the federal share of any cost savings. For example, we had no information to estimate how many of the children were eligible for or received Medicaid, and thus would have their health care paid for by state and federal governments. CDC also lacked national preschool immunization rates more recent than 1985, which we would need to assess vaccine coverage. For these reasons, we did not analyze the Childhood Immunization Program for federal cost savings.

In contrast to breastfeeding and postpartum women, infants, and children enrolled in the WIC program and to children receiving vaccine from the

Childhood Immunization Program, the effect of providing prenatal WIC on reducing low birthweight rates, and the cost consequences associated with low birthweight, are well documented.

Providing Prenatal WIC Benefits Reduces Low Birthweight Rate

The WIC program was developed to improve the health of low-income pregnant, breastfeeding, and postpartum women, infants, and children. Public health experts believe that reducing the rate of low birthweight is a key to improving infant health in the United States. Low birthweight infants are more likely to die within their first year of life and have greater incidence of health and developmental problems than infants born at normal birthweight. Many evaluations have shown that pregnant women who receive WIC benefits prenatally have lower rates of low birthweight than women of similar socioeconomic backgrounds who did not receive benefits. We estimate that WIC reduces the low birthweight rate by 25 percent and reduces the very low birthweight rate by 44 percent.

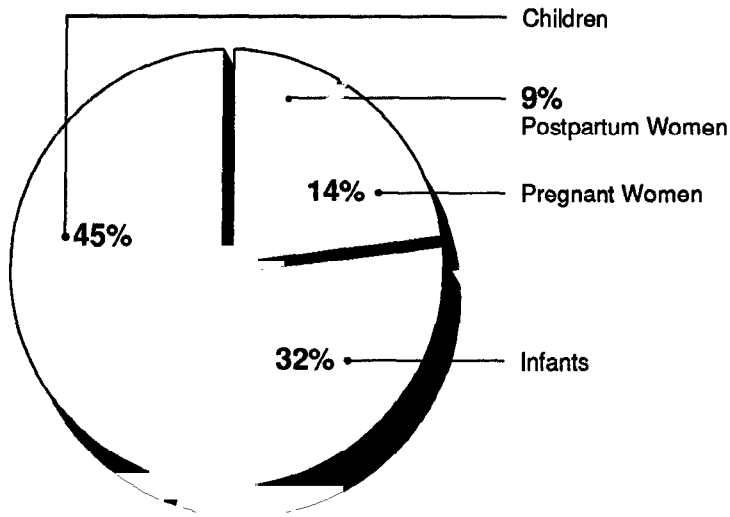
WIC's Goal Is to Improve Health of Pregnant, Breastfeeding, and Postpartum Women, Infants, and Children

WIC was established in 1972 through an amendment to the 1966 Child Nutrition Act to improve the health of low-income pregnant, breastfeeding, and postpartum women, infants, and children. Administered by the Food and Nutrition Service (FNS), Department of Agriculture, the program awards grants to state health departments or state health and welfare agencies. WIC provides supplemental foods, nutrition and health education, and health services referral to low-income pregnant, postpartum, and breastfeeding women, infants (children under age 1), and children up to age 5 at nutritional risk.[1] Pregnant women represent a small percentage of the 4.5 million fiscal year 1990 WIC participants (see fig. 3.1).

Both funding and number of participants have increased in recent years. The fiscal year 1990 WIC appropriation was $2.1 billion, and in fiscal year 1991, it increased to $2.4 billion. By fiscal year 1992, it had increased to 2.6 billion, and the President's fiscal year 1993 budget has proposed an increase to $2.8 billion.

[1]Nutritional risk means (a) detrimental or abnormal nutritional conditions, such as anemia, detectable by biochemical or body measurement; (b) other documented nutritionally related medical conditions, such as clinical signs of nutritional deficiencies; (c) dietary deficiencies that impair or endanger health, such as inadequate dietary patterns assessed by dietary history; or (d) conditions that predispose persons to inadequate nutritional patterns or nutritionally related medical conditions, such as alcohol or drug abuse.

Figure 3.1: Pregnant Women Represent a Small Proportion of All WIC Recipients



Note: In this figure, postpartum women include breastfeeding women.

Source: FNS fiscal year 1990 WIC report.

Applicants are eligible for WIC if their family income is below state and federal guidelines and if they are deemed by a competent professional to be at nutritional risk. States define specific nutritional risk criteria following federal guidelines. As of May 1990, most states set income eligibility levels for families at or below 185 percent of the federal poverty level.[2]

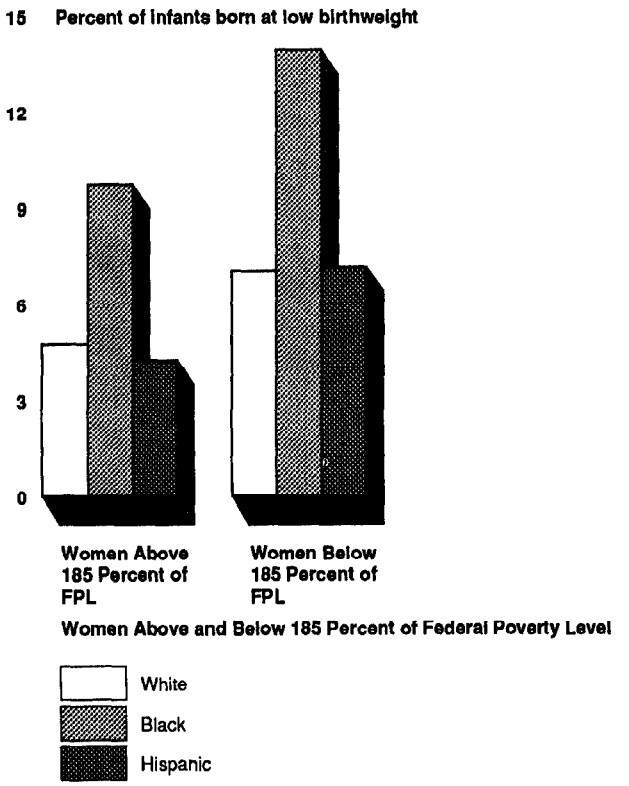
Low Birthweight Birth Decreases Infant Health

Public health experts believe that reducing the percentage of infants born at low birthweight is a key to improving infant health in the United States. Appropriate prenatal care, optimal nutrition during pregnancy, and avoiding high-risk behavior, such as smoking and drug or alcohol use, improves infant birthweight. In 1980 the Surgeon General established a goal to reduce low birthweight rates in the United States to no more than 5 percent nationally and no more than 9 percent for any county, racial, or ethnic subgroup. Currently the national low birthweight rate is 6.9 percent, but the rate for blacks is more than double that for whites (13.0 vs. 5.6 percent in 1988).

[2]Puerto Rico set eligibility at 100 percent and South Dakota at 175 percent of the federal poverty level; in Indiana, California, and Arizona, eligibility rates varied between 100 and 185 percent, depending on WIC agency location.

Women who are income-eligible for WIC (see figure 3.2) and women without medical insurance have higher rates of low birthweight. Many U.S. women are medically uninsured—27 percent of women in their childbearing years with family incomes at or below 250 percent of poverty.

Figure 3.2: Poorer Women Have Higher Rates of Low Birthweight

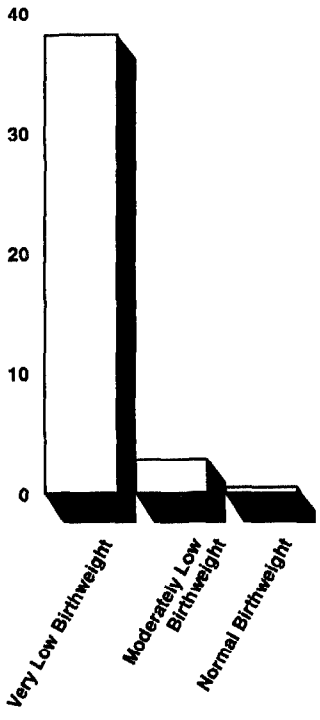


Source: Unpublished statistics from the National Maternal and Infant Health Survey, National Center for Health Statistics.

Low birthweight is a major contributor to the death of infants and the likelihood that a child will be ill or disabled. Infants are born at low birthweight (under 2,500 grams, or 5.5 pounds) either because they are premature, developed inadequately in utero, or both. Compared to normal birthweight children, low birthweight infants, especially the very smallest, are more likely to die within the first year (see fig. 3.3). Although low birthweight babies represent less than 7 percent of all births, they represent 61 percent of all U.S. infant deaths. Low birthweight children suffer from higher rates of cerebral palsy, mental retardation, serious

congenital anomalies, hydrocephalus, vision and hearing losses, subnormal intelligence, impaired school performance, and illness in their first year of life than normal birthweight children. For these illnesses and disabilities, the lower the birthweight, the more likely a child will be ill or disabled. Not surprisingly, low birthweight infants require more costly medical care than normal birthweight infants in their first year (see app. IV.)

Figure 3.3: Infant Mortality Increases With Decreasing Birthweight



Very Low Birthweight = <1500 gm.

Moderately Low Birthweight = 1500-2499 gm.

Normal Birthweight = >=2500 gm.

Source: National Center for Health Statistics.

WIC Receipt Reduces Low and Very Low Birthweight Rates

Many evaluations have shown that women who received WIC benefits have lower rates of low birthweight births than women of similar socioeconomic status who did not receive benefits. Through statistically combined evaluation results from 17 studies, we estimate that women who received

WIC benefits had 25 percent fewer infants born at low birthweight than did similar women who did not receive WIC.[3] WIC had an even more dramatic effect in reducing very low birthweight (under 1,500 grams, or 3.3 pounds) rates. Combining results from a set of five studies, we estimate that WIC reduced the very low birthweight rate among recipients by 44 percent. Reducing very low birthweight is particularly important because these infants are most likely to die or become disabled and to need costly care (see app. II for more detail on this synthesis and on low birthweight, and app. IV for costs of low birthweight).

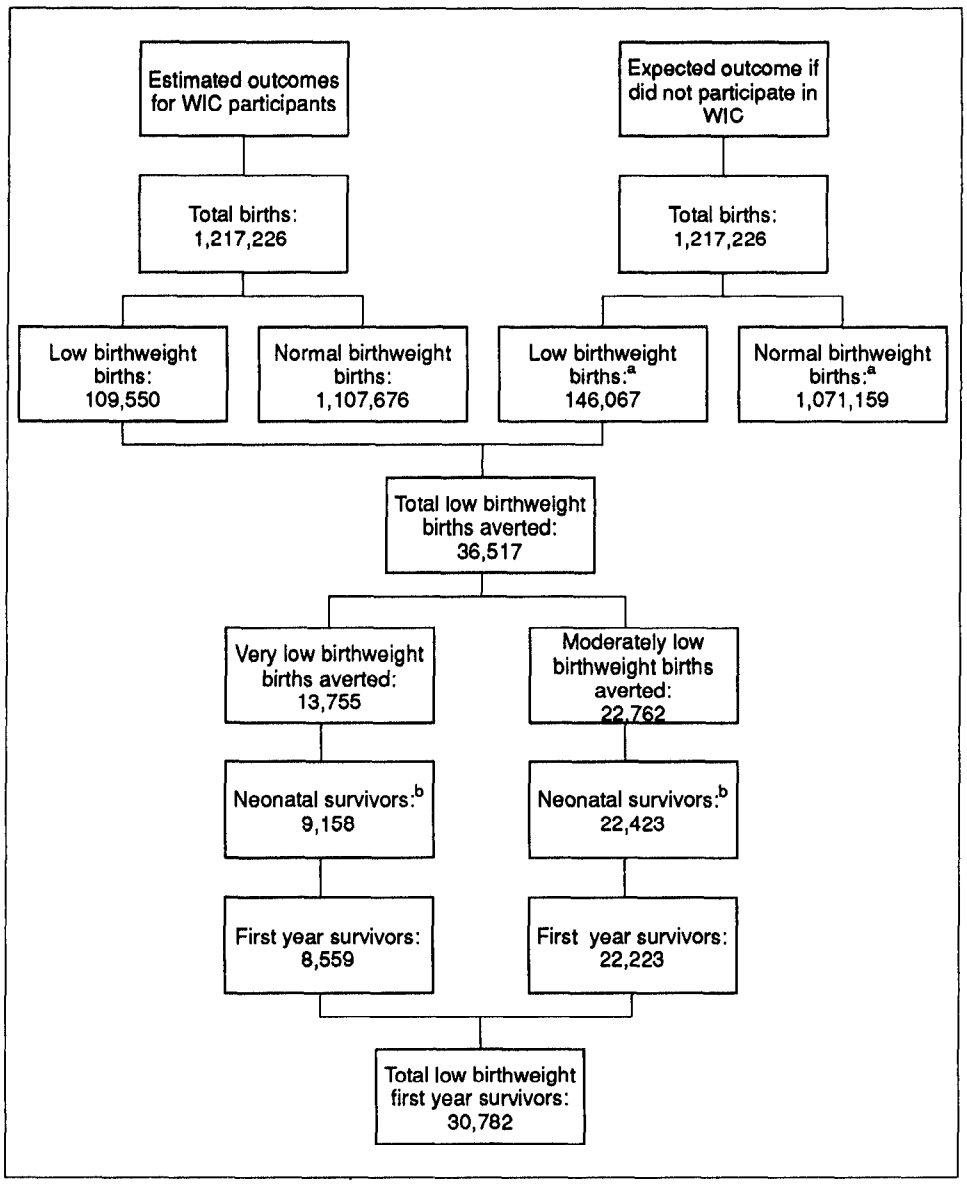
Estimating Infants Born at Normal Birthweight Due to WIC

We used the differences in the rates of very low and moderately low birthweight (being born between 1,500 and 2,499 grams, or 3.3 and 5.5 pounds) to approximate a national estimate of WIC's effect.[4] According to our estimate, 36,517 infants were born at normal birthweight in 1990 who might have been born at low birthweight if their mothers had not received prenatal WIC benefits. Since low birthweight infants are more likely to die within their first year than normal birthweight infants, we used 1985 neonatal and post-neonatal mortality rates (deaths in the first 28 days of life and between 28 and 365 days) by birthweight to estimate the number of infants who might have survived and required additional medical, educational, or support services (see fig. 3.4). According to our estimate, up to 5,735 of these infants might have died during their first year.

[3]This is greater than the reduction we estimated in our 1984 analysis of WIC evaluations, which was based on statistically combining results from six evaluations conducted between 1971 and 1982, WIC Evaluations Provide Some Favorable but No Conclusive Evidence on the Effects Expected for the Special Supplemental Program for Women, Infants, and Children (GAO/PEMD-84-4, Jan. 30, 1984). The results from five of the six low birthweight evaluations were later published in Kennedy 1982, Kotelchuk 1984, Bailey 1983, Metcoff 1985, and Stockbauer 1986. All six were included in the current analysis.

[4]The actual national effect of WIC may be greater or smaller than the effect we calculated from our synthesis of existing evaluations—see app. II.

Figure 3.4: GAO Estimates of the Infants Born at Normal Birthweight Due to WIC in 1990 (Number of Low Birthweight Births Averted)



[a]Estimates based on expected outcomes for similar women who did not participate in WIC.

[b]Survived at least 28 days.

Five WIC evaluations that we identified examined WIC's effect on either fetal, neonatal, or infant mortality.[5] All five reported lower rates of mortality for infants of mothers who received WIC benefits, and three reported significantly lower rates. One of the three, the National WIC Evaluation Historical Study, found a reduction of 2.3 fetal deaths[6] per 1,000—a 33-percent reduction. We think it is reasonable to assume from the low birthweight data that WIC could improve infant survival. We implicitly made the reverse assumption, that without WIC benefits more infants would die, as shown in figure 3.4. However, we believe more evaluation needs to be done of infant mortality among infants whose mothers did or did not receive WIC prenatal benefits, before estimating how many lives were saved because of WIC.

[5]Kennedy 84, Kotelchuck 84, Rush 88 (both the Historical and Longitudinal Studies), Buescher 91. Data on infant mortality were merged with Medicaid and WIC files as part of the USDA-funded WIC Medicaid study, but the results have not yet been analyzed and published.

[6]Death after 28 weeks of gestation.

Investment in WIC Reduces Federal, State, and Local Costs

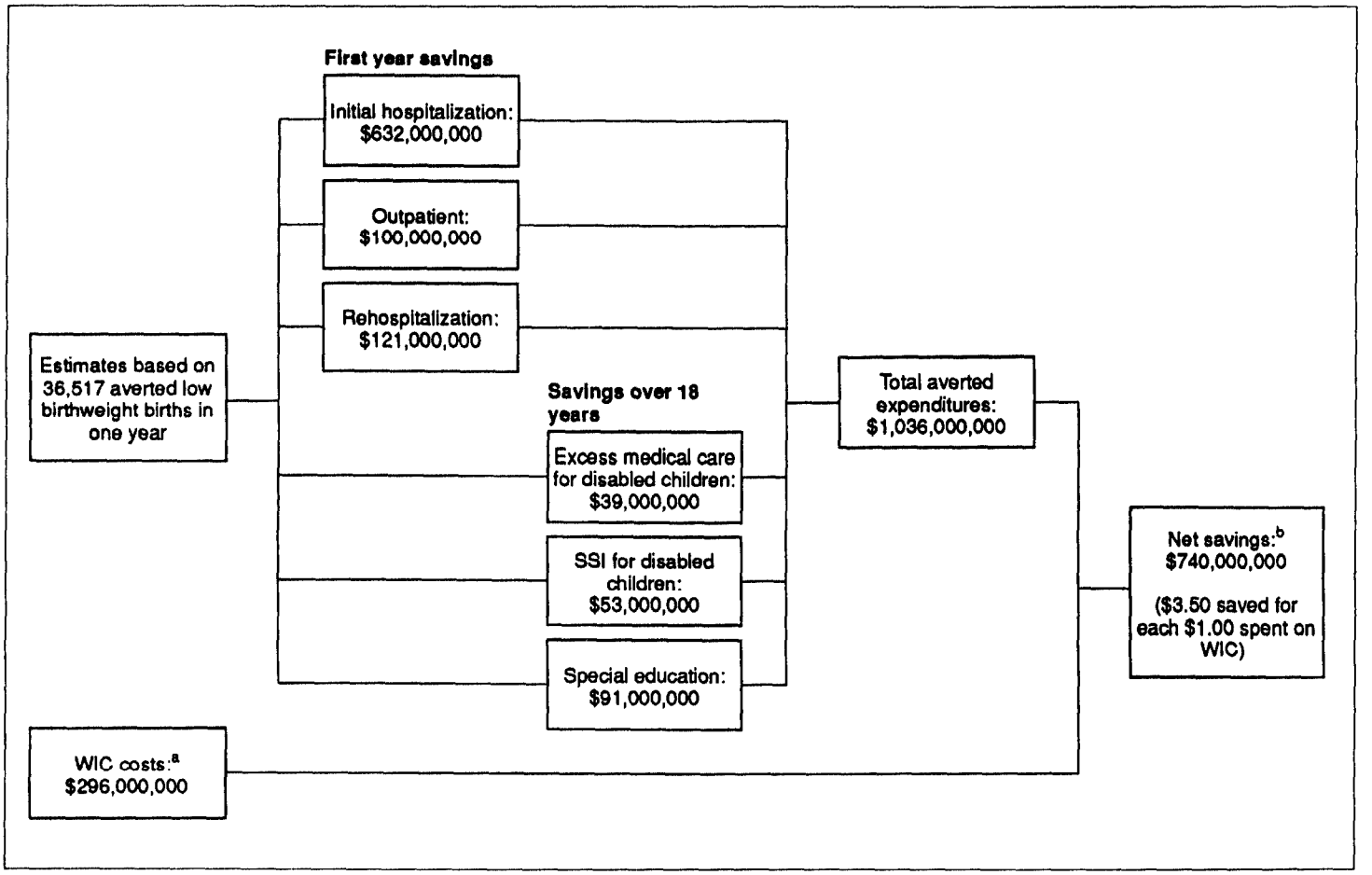
We estimate that providing WIC services to pregnant women who delivered their babies in 1990 cost the federal government $296 million, but could save $1.036 billion (present value) in federal, state, local, and private funds over the next 18 years.[1] Most of the savings—$853 million—are expected within 1 year of providing WIC services. Providing WIC benefits to pregnant women is expected to net savings of almost $740 million. The federal government alone would save an estimated $337 million from a 1-year investment in WIC for pregnant women—an expected net savings of $41 million.

These savings are possible because reducing low birthweight can reduce the costs of initial hospitalization, outpatient care, rehospitalization, special education, and supplemental income for disabled children (see fig. 4.1). Federal programs that provide these services include Medicaid, the Supplemental Security Income (SSI) program for the disabled, and special education programs.[2]

[1]Our analysis includes the estimated costs of serving all pregnant WIC participants who would have given birth in 1990, whether or not they had a live birth, compared to the benefits from 1990 WIC live births.

[2]Other federal funding sources include Title V and MCH Block Grants, but we did not estimate savings for all federal programs that might potentially fund services. We limited our estimates to the programs with the greatest financial impact and the most direct federal link to recipients.

Figure 4.1: GAO Estimates of the Cost Savings Attributable to WIC Prenatal Benefits



[a]Based on federal WIC program costs related to serving pregnant women in 1989-90.

[b]Net savings equal the total averted expenditures less WIC program costs.

WIC Reduces Anticipated Expenditures for Federal Government and Other Payers

For every dollar spent on WIC benefits for pregnant women who delivered in 1990, we estimate that the federal government could save $1.14 (in net present value) over the first 18 years of the infants' lives, in reduced costs to other federal programs. Most of the savings come in the first year after birth. For example, for every dollar spent on prenatal WIC, we estimate expected federal Medicaid program savings of $0.88 during the first year compared to expected federal Medicaid program savings of $0.94 over 18 years in net present value. We estimate a total of $472 million in expected federal and state Medicaid savings in the first year after birth.

Although estimated savings to the federal government alone are large enough to justify investment in WIC, overall expected cost savings are even greater. We estimate that during the first year after birth, the federal government, state and local governments, and other payers (such as hospitals, insurance companies, and private payers) could save $2.89 for every federal dollar spent on prenatal WIC (see tables 4.1 and 4.2). When measured over 18 years, the net present value increases to $3.50 for each federal dollar spent.

Table 4.1: GAO Estimates of Averted Federal, State, Local, and Private Payer Expenditures

Dollars in millions

	Total	Federal	State	Local	Private
Averted medical expenditures	**$892**	$277	$226	$0	$390
SSI for disabled children	**53**	53	0	0	0
Special education	**90**	7	51	33	0
Total averted expenditures	**$1,036**	**$337**	**$277**	**$33**	**$390**

Note: Numbers may not add due to rounding.

Table 4.2: Estimated Return Per WIC Dollar in 1990

	First year	Over 18 years[a]	Total[a]
Federal savings:			**$1.14**
Medicaid	$0.88	$0.94	
SSI		.18	
Special education		.02	
State savings:			**0.93**
Medicaid	0.72	0.76	
Special education		.17	
Local government savings:			**0.11**
Special education		0.11	
Private sector savings:			**1.32**
Hospitals, insurance companies, private payers	1.29	1.32	
Total savings	**$2.89**	**$3.50**	**$3.50**

[a]Net present value.

States Benefit From WIC

State governments benefit from fewer babies being born at low birthweight through Medicaid and special education savings. States pay an average of 45 percent of overall Medicaid costs, as well as 56 percent of special education costs. Thus, lower costs in these programs benefit state budgets. We estimate total averted state expenditures from the 1990 WIC investment to be over $277 million.[3] States could save an estimated $51 million in special education expenditures over 18 years, $212 million in Medicaid expenditures in the first year, and an extra $14 million in Medicaid expenditures over 18 years. In addition, we estimate that local governments could save over $33 million in special education expenditures because of WIC's effectiveness in preventing low birthweight.

WIC Lowers Medical Costs for Other Payers

Other payers besides the federal and state Medicaid programs benefit from medical savings attributable to WIC. Hospitals, insurance companies, and private payers benefit substantially, especially in the first year, when low birthweight is reduced. For 1990 WIC births, we estimated averted expenditures of almost $390 million to other payers for expected short- and long-term medical costs. We estimate that the bulk of these averted expenditures ($380 million) occur during the first year, and another $9 million of expected long-term medical costs are avoided over the next 17 years.

Cost Savings Possible Because Low Birthweight Is an Expensive Outcome

The federal government and others get a large expected return on the investment in prenatal WIC services because low birthweight is an expensive outcome. Low birthweight infants, especially those with very low birthweights, have higher initial hospitalization costs than do normal birthweight infants. While a smaller portion of low birthweight infants survive their initial hospitalization to need more care due to disability or the need for special education, some of these extra services are very expensive.

Although our estimates are based on an assumed low birthweight effect and expected cost, nine evaluations that matched actual Medicaid paid claims files with WIC participation records in seven states have consistently shown lower average Medicaid payments for mothers and infants when

[3]This estimate does not consider the extra money that some states independently contribute to the WIC program. Including states' own money in the cost of the program would decrease the return to those states. Fourteen states and the District of Columbia contributed a total of $81,987,000 to the WIC program in fiscal year 1990. According to FNS, little or no state funding is used to serve pregnant women, because most of them are in the highest priority category and therefore enrolled with federal dollars (see ch. 5).

mothers received prenatal WIC services.[4] These evaluations measured Medicaid payments for medical services that began within the first 30 to 60 days. Recent benefit-to-cost ratios have ranged from $1.92 to $4.21 for every dollar spent on prenatal WIC services to Medicaid recipients.

The cost of providing WIC benefits to pregnant women is low compared to the costs of caring for low birthweight children. The Congressional Budget Office estimated the monthly cost per WIC participant to be $40.50. Using that cost figure, we estimate that the total cost of serving pregnant women who either delivered or would have delivered in 1990 but miscarried first was $296 million.[5] This works out to an average cost per child delivered of $243.

Additional Benefits From WIC

Providing prenatal WIC services had other benefits that we did not include in our calculations. Several evaluations reported that women who received WIC had better maternal health, including lower rates of anemia and improved nutritional status, than women who did not. WIC benefits provided postpartum also appeared to have a positive impact on improving the health of children born later. For various reasons, we could not always assign a direct dollar value to these positive outcomes, as required for a standard cost-benefit analysis. In addition, several studies reported that WIC had a positive impact on reducing the number of infant deaths. Placing a value on a life is a highly subjective, controversial process. As a consequence, we did not assign an economic value to any estimated infant deaths that were avoided due to WIC.

There are undoubtedly other costs associated with low birthweight that we could not include in our analysis. Their absence may underestimate our cost savings. It is possible that the medical costs of nondisabled low birthweight children over 1 year old are greater than the medical costs of children born at normal birthweight, but locating no research on this issue, we did not include these potential costs in our analysis.

[4]Schramm 1985; Schramm 1986; Mathematica 1990; New York State Department of Health 1990; Devaney, Bilheimer, and Schore 1991a; Buescher and others 1991.

[5]We assume that pregnant women average 6 months in the program. Our births-to-monthly-participants ratio counts births per all participants, including those who may have received WIC but had miscarriages before term (see app. I).

Expanding WIC Coverage Could Increase Health Benefits and Net Savings

Under the current WIC formula for allocating food funds to states, some states do not have enough federal funding to enroll pregnant women at dietary risk. Other states can enroll all applicants, including those considered less at risk. This mismatch between need and funding is occurring in part because the formula for allocating WIC food funds is based primarily on state WIC caseload levels before 1987, not on the estimated number of income-eligible women, infants, and children within states.

We estimate that larger net savings could be achieved if additional low-income pregnant women were enrolled in WIC. Although WIC is reaching many pregnant women, more women are eligible than enroll in the program. Even when taking a more conservative stance and assuming that it will cost more to serve currently unserved income-eligible pregnant women and that WIC may have slightly less impact on their low birthweight rates, we estimate that providing WIC benefits to all income-eligible pregnant women could provide net federal savings of $24 million and net overall savings of $918 million (net present value over 18 years).

Formula Funding and Current WIC Priorities Can Limit Enrollment of Eligible Pregnant Women

Because WIC has not been funded to the level that would allow all who are eligible to be served, WIC agencies set priorities for applicants in order to serve those considered most at risk. Pregnant women at medical risk are in the highest priority category—priority I. They are the first to be enrolled in all states as new participation slots open. Most pregnant women who receive WIC benefits—93 percent of those served in 1988—are in priority I, having documented nutritionally related medical conditions. Pregnant women at dietary risk, who have inadequate diets but do not have documented nutritionally related medical conditions, are considered lower priority—priority IV (see table 5.1).

Table 5.1: WIC Sets Priorities for Applicants Based on Assumed Risk

Priority I	Pregnant women, breastfeeding women, and infants at nutritional risk as demonstrated by documented nutritionally related medical conditions.
Priority II	Except for infants in priority I, infants up to 6 months of age born of women who were program participants during pregnancy, or who were at nutritional risk during pregnancy due to documented nutritionally related medical conditions.
Priority III	Children at nutritional risk as demonstrated by documented nutritionally related medical conditions.
Priority IV	Pregnant women, breastfeeding women, and infants at nutritional risk due to an inadequate diet.
Priority V	Children at nutritional risk due to an inadequate diet.
Priority VI	Postpartum women at nutritional risk. (State agencies have the option of defining "high-risk"postpartum women and placing them in priorities III, IV, and/or V.)
Priority VII	(State agency option) Previously certified participants who might regress in nutritional status without the continued provision of supplemental foods.

State and local WIC programs stop enrolling lower priority eligibles when caseloads are full. They may use waiting lists until slots open. Rising food prices or increased demand for services can affect what priority level applicants states will enroll at different times of the year.

The current WIC formula does not allocate money to states so that all states can serve the same priority levels. The formula is heavily weighted to maintain past state participation rates. First, states are allocated enough funding to maintain past participation levels, adjusted upward for inflation—called "stability" funds. After the stability funds have been allocated, half of the remaining funds are used to increase the funding share of specific states who are getting less under the current formula than they would if the formula was based entirely on the estimated number of eligibles in the states. The other half of the remaining funds are allocated to all states, based on the relative number of priority I applicants served, compared to the nationally estimated number of priority I applicants. As a result, while some states are able to serve all eligible applicants, others can serve only the highest priority eligibles and must maintain waiting lists (see table 5.2.)

Table 5.2: Some States Limited Enrollment in Priority Levels IV to VI (May 1990)

Priority being enrolled	State or locality	
Priority I-VI	District of Columbia	Nevada
	Delaware	New Hampshire[a,b]
	Maryland	New Jersey[c]
	Minnesota	
Priority I-V only	Connecticut	Montana
	Iowa	Ohio
	Kentucky	Virginia
Priority I-IV only	Colorado	North Carolina
	Florida	North Dakota
	Hawaii	Pennsylvania
	Indiana	Rhode Island
	Kansas	South Dakota
	Massachusetts	Vermont
	Missouri	Wisconsin
Priority I-III only	Arizona[c]	Oregon
	Arkansas	Puerto Rico[c]
	California[c,d]	Texas
	Georgia	Washington[c]
	New York[c]	West Virginia[c]
	Oklahoma[c]	Wyoming
Priority I-II only	Utah	

Note: Data were not reported for all states. States not reporting were Alabama, Alaska, Idaho, Illinois, Louisiana, Maine, Michigan, Mississippi, Nebraska, New Mexico, South Carolina, and Tennessee.

[a]State enrolls only some eligible applicants in Priority V.

[b]State enrolls only some eligible applicants in Priority IV.

[c]State enrolls only some eligible applicants in Priority III.

[d]State enrolls only some eligible applicants in Priority II.

Source: FNS and/or the National Association of WIC Directors, as reported in Women, Infants, and Children (WIC): The Current Crisis, Hearing Before the Task Force on Human Resources, House Committee on the Budget, June 27, 1990, Serial No 5-9, U.S. Government Printing Office, Washington D.C.

States Limited Enrollment of Pregnant Women in 1990

In 1990, costs for foods provided through WIC unexpectedly increased by 7 percent by mid-year, when the Department of Agriculture had forecast a rise of less than 4 percent. As a result, fewer recipients could be served than had been planned. State WIC directors responded in several ways. Some states limited the items that could go into the WIC food basket. California, for example, omitted cheese, an expensive item. However, some states restricted enrollment of lower priority recipients.

At least 41 percent of all pregnant participants lived in states that had stopped enrolling pregnant women at dietary risk in May 1990. FNS and the National Association of WIC Directors independently surveyed states in May

1990 to determine which priority levels were being served. Of 38 states, the District of Columbia, and Puerto Rico, 12 states and Puerto Rico restricted enrollment of priority IV eligibles, which includes pregnant women at dietary risk (see table 5.2).[1] Four states with higher than national rates of low birthweight—Arkansas, Georgia, New York, and Wyoming—were not enrolling priority IV eligibles. Three states appropriated their own funds in fiscal year 1990—New York, Texas, and Washington—but were still not able to enroll pregnant women at dietary risk who lacked documented nutritionally related medical conditions. In contrast, Minnesota, Delaware, and New Hampshire, with lower than national rates of low birthweight, were able to enroll all priorities.

Enrollment restrictions continued in 1991 to a lesser degree. According to a May 1991 survey by the National Association of WIC Directors, of 38 surveyed states, 6 restricted enrollment of pregnant women. These six states[2] included both those with higher than average low birthweight rates (Arkansas, North Carolina, and South Carolina) and those that appropriated state monies for WIC in fiscal year 1991 (New Hampshire, North Carolina, and West Virginia).

WIC Serving Many, but Not All, Income-Eligible Births

WIC is serving many, but not all eligible births.[3] According to our calculations, about 1.6 million births each year are to women who are income-eligible for WIC. FNS estimates that 91 percent of pregnant women who are income-eligible are at nutritional risk by current criteria. We estimate therefore that 1,479,528 births per year are to women who are both income and nutritionally eligible.[4] We estimate that 1.2 million who received WIC benefits prenatally gave birth in 1990. Therefore, WIC served 82 percent of fully eligible women and 75 percent of all income-eligible women giving birth in 1990.

[1]Some states did not respond to the survey, so the true percentage of pregnant women who could have been affected might be higher or lower. Regarding surveyed states, 50 percent of enrolled pregnant participants lived in states restricting enrollment of priority IV.

[2]Arkansas, New Hampshire, North Carolina, Oregon, South Carolina, and West Virginia.

[3]FNS has no information on whether income-eligible pregnant women not applying for WIC know about the program or might want WIC services if they knew they were eligible, or on the number of income-eligible pregnant women applicants not given WIC services.

[4]FNS, the Congressional Budget Office (CBO), and GAO have all independently estimated how many pregnant women are eligible for WIC. These estimates differ (see app. III).

Examining monthly participation, we estimate that WIC served only a little over half of fully eligible pregnant women each month in 1990. This figure is lower than the estimate for births served because current participants do not stay in WIC as long as they could. We estimate that pregnant women receive WIC for an average of 6 months. They could receive WIC longer—up to 9 months.[5] We estimate that, in 1990, 1,110,000 pregnant women were fully eligible in any month.[6] According to FNS data, 608,613 pregnant women were served on average between May 1989 and February 1990, excluding pregnant women served in Puerto Rico, Guam, and the U.S. Trust Territories. In other words, WIC served 55 percent of fully eligible pregnant monthly participants.

Net Savings Could Still Be Achieved If More Pregnant Women Were Enrolled in WIC

Providing more pregnant women with WIC benefits could generate cost savings. However, whether the savings per woman served could be as large as our estimates for serving current pregnant recipients would depend on whether WIC was as effective at reducing low birthweight for unserved women, and whether state agencies would incur higher costs trying to enroll more pregnant women.

We estimated the costs and potential cost savings of providing WIC to all income-eligible women. To examine the question using more conservative assumptions, we assumed higher costs and fewer benefits from serving currently unserved income-eligible women. Tables 5.3 and 5.4 present a range of estimates of the overall possible cost savings and the possible federal cost savings per federal dollar spent to serve currently unserved, income-eligible pregnant women. In both tables the rate of WIC's effectiveness in reducing low birthweight is assumed to decrease by 15, 40, and 50 percent. Obviously, if costs and benefits were the same as for currently served women, the benefit-to-cost ratio would remain the same as reported in chapter 4. Once again, we used discount rates of 2, 5, and 10 percent to calculate the net present value of the estimates. The estimates in table 5.3 represent the federal and overall benefit/cost when the monthly per person cost of WIC benefits remains at $40.50, while in table 5.4 we increased the monthly per person cost to $45.50. However, we had no evidence to say with certainty that providing WIC to currently unserved,

[5]Most women do not know they are pregnant for the first 6 weeks, but pregnant women can remain on WIC for 6 weeks after delivery before they come up for recertification. Therefore, pregnant women can receive benefits up to 9 months.

[6]We exclude Puerto Rico, Guam, and the Virgin Islands from our estimates, whereas CBO and FNS include these populations.

income-eligible pregnant women would result in higher or lower costs or benefits.

Table 5.3: Cost Savings per Federal Dollar to Serve Unserved Income-Eligible Pregnant Women at a Monthly Cost of $40.50

Annual discount rate	Estimated percentage point reduction in low birthweight rate					
	2.5		1.8		1.5	
	Federal	Overall	Federal	Overall	Federal	Overall
2%	.95	2.91	.68	2.10	.57	1.75
5%	.90	2.81	.65	2.02	.54	1.68
10%	.86	2.69	.61	1.94	.51	1.61

Note: Based on an estimate of 204,313 unserved monthly participants, which translates into 408,625 unserved births.

Table 5.4: Cost Savings Per Federal Dollar to Serve Unserved Income-Eligible Pregnant Women at a Monthly Cost of $45.50

Annual discount rate	Estimated percentage point reduction in low birthweight rate					
	2.5		1.8		1.5	
	Federal	Overall	Federal	Overall	Federal	Overall
2%	.84	2.59	.61	1.87	.51	1.56
5%	.80	2.50	.58	1.80	.48	1.50
10%	.76	2.40	.54	1.72	.46	1.44

Note: Based on an estimate of 204,313 unserved monthly participants, which translates into 408,625 unserved births.

Using the 2.5-percent effectiveness rate and $45.50 per person cost from table 5.4 as our "best guess," we estimate that the expected overall net savings for serving the estimated 408,629 income-eligible women who would have delivered their infants in 1990 and were not served by WIC could have been over $178 million, or $2.59 for every $1.00 invested. When we combine the benefit-cost estimates of both the served and the unserved portions of the WIC income-eligible population, we estimate that serving all income-eligible pregnant women who were to give birth in 1990 would have cost about $407 million, or about $111 million more than was spent by WIC, but could have returned more than $1.3 billion in avoided expenditures over the next 18 years. We estimate an expected overall net savings of $918 million. For every dollar invested in serving all income-eligible pregnant women, we estimate expected federal cost savings of $1.06 and overall cost savings of $3.25 in net present value over 18 years. Based on this scenario, the federal government could reap net savings of $24 million.

Conclusions, Recommendations, and Agency Comments

Conclusions

Investments in effective early intervention programs that improve children's health and development benefit society as a whole. Effective early interventions can decrease federal, state, and local government expenditures. Some early intervention programs, like WIC, pay back their investment rapidly, while others may not show results for many years. Both types of investment can be important.

We believe our review demonstrates that it is possible to assess the cost impact of early intervention programs. We also believe that more work should be done in this area, to give legislators and policymakers better information about the relative value of specific early intervention investments. To do so, analysts must

- determine if programs might produce cost savings,
- determine the type of evaluation that can be done to estimate such savings, and
- plan for and collect the data needed to analyze the savings.

While cost savings produced by an early intervention program are an important measure of its worth, we do not believe they should be the sole criterion considered. Policymakers also need to consider the human benefits of preventing or lessening such problems as mental retardation, cerebral palsy, blindness, or death. Programs that provide such benefits are worthwhile public investments.

Our work showed that women provided with prenatal WIC services had lower rates of low birthweight than did women of similar socioeconomic status. Lowering the rate of low birthweight reduces the need for other program expenditures to treat the consequences of infants born at low birthweight. As a result, we believe that all pregnant women with incomes at or below 185 percent of the federal poverty level should be made eligible for WIC. We also believe that the Congress should examine whether specific groups of women at higher risk of poor pregnancy outcomes, such as uninsured women with incomes above 185 percent of the federal poverty level, might also benefit from receiving WIC services.

More pregnant women could be served by reducing the number of infants and children served. But we do not believe this would be wise. The value of providing WIC benefits to pregnant women has become clearer through repeated evaluations. Current evaluation evidence suggests that providing WIC benefits to infants, children, and postpartum women is also beneficial, and potential health benefits and cost savings should be determined before

reducing the number of infants and children served. Therefore, we believe it would be desirable to expand the number of pregnant women served without reducing or restricting current participation levels of infants, children, and postpartum women.

One way to expand the number of pregnant women served by WIC would be to change the formula for allocating federal funds to the states. The current WIC formula is primarily based on past state participation rates and does not allocate much money based on the number of women, infants, and children eligible for services. We believe the formula should be based primarily on the estimated number of eligible pregnant, breastfeeding, and postpartum women, infants, and children in each state.

Under the current budget agreement, additional funding for domestic discretionary programs like WIC must come from decreases in other such programs. Given this constraint, adding funding to a program becomes more difficult. Nevertheless, in view of the health benefits and cost savings, we believe additional funding for WIC is warranted.

Matter for Congressional Consideration

In view of the cost savings that can be attributed to WIC, the Congress should consider amending the Child Nutrition Act of 1966 to make all pregnant women with family incomes up to 185 percent of the federal poverty level eligible for WIC, irrespective of their level of nutritional risk, and to appropriate sufficient funds to ensure that such women receive WIC services.

Recommendation to the Congress

We recommend that the Congress, when legislating new early intervention programs, require the administering department to identify and collect standard outcome, participant, and cost data to enable the department, where appropriate, to estimate potential program cost savings.

Recommendations to the Secretaries of Agriculture, Health and Human Services, and Education

We recommend that the Secretaries of Health and Human Services (HHS) and Education assess ongoing early intervention programs for children, such as Head Start, the Childhood Immunization Program, and special education programs, and identify data needed to estimate cost savings, using our framework or a similar one; and, where appropriate, develop needed evaluation data and estimate the extent to which these programs provide cost savings to the federal and state governments or other beneficiaries.

We recommend that the Secretary of Agriculture revise the Department's formula for allocating WIC funding to state agencies. The allocation should be based primarily on the estimated number of eligible pregnant, breastfeeding, and postpartum women, infants, and children in the state (using the best currently available data). We also recommend that the Secretary more fully examine WIC's effect on infants, children, and postpartum women, and any associated cost savings.

We recommend that the Secretary of HHS examine current birth outcomes by income level, insurance status, and other characteristics he deems significant and advise the Congress on whether WIC eligibility levels for pregnant women should be raised above the present income eligibility level for any specific type of low-income woman.

Agency Comments and Our Evaluation

We provided the Departments of Agriculture, Education, and Health and Human Services with the opportunity to comment on a draft of this report. We received written comments from all three departments. The comments appear in appendixes VI, VII, and VIII.

The Department of Education affirmed the value of assessing the costs and benefits of early intervention programs. It commented that our methodological approach was generally sound and concurred with our recommendation. The Department agreed to continue periodically supporting special studies to assess such programs and to cooperate in identifying program outcome measures that could be used to estimate savings.

The Department of Health and Human Services agreed that prevention and early intervention programs, such as the Childhood Immunization Program and WIC, had the potential to produce fiscal benefits through immediate and longer term reductions in the need for other publicly financed services. HHS agreed that we had accurately pointed out the shortage of data critical for decisionmaking regarding the cost-effectiveness of early interventions. However, it did not believe that cost-benefit analyses should be required for every future early intervention program. It also stated that it may be methodologically premature to undertake such analyses for programs such as Head Start. HHS agreed that the Secretary should examine birth outcomes of selected groups of women to advise the Congress on whether WIC eligibility levels for pregnant women should be raised above the present income eligibility level for any specific type of low-income women.

The Department of Agriculture agreed with our conclusion that prenatal WIC participation is cost-effective and was pleased that we recognized the importance of the program. However, USDA disagreed with the issues we raised for congressional consideration and our recommendations. In addition, USDA was concerned that the methodology we used to estimate cost savings might overestimate the savings. We continue to believe that the issues raised for congressional consideration, the recommendations, and our methodology are appropriate.

Department of Education Comments on Recommendation to Improve Data Collection Efforts

The Department of Education concurred with our recommendation to collect data to estimate cost savings of early intervention programs. The Department has sponsored a number of cost-benefit studies in the past. Based on the results of that work, the Department has concluded that early intervention programs are effective and result in cost savings. Equally important, there are other benefits of early intervention, such as improved quality of life, that cost-benefit studies may not address. The Department believes that data collection efforts must focus on these measures as well, so that future cost-benefit studies may yield a more accurate picture of program worth.

HHS Comments on Recommendations to Improve Data Collection Efforts

HHS agreed that more data are needed to assess the cost-effectiveness of early intervention programs, and cited new efforts by CDC to assess the most cost-effective ways to increase immunization rates among children who receive WIC benefits. However, due to the technical problems in measuring and assigning economic value to outcomes in some of HHS's programs, HHS said it was inadvisable to legislatively mandate cost-benefit analyses for every new early intervention program or to conduct analyses on every early intervention program currently administered by HHS. However, HHS agreed that, where appropriate, such analyses should be undertaken.

We agree with HHS that technical difficulties due to lack of data and difficulty assessing and valuing outcomes can prevent analysts from completing reasonable estimations of program cost savings (see pp. 17-19). However, we believe more attention needs to be paid to determining if specific early interventions have the potential for cost savings and the most cost-effective ways of achieving desired program goals. It is reasonable for HHS to go through a measured assessment of its programs, such as Head Start, focusing on their current program outcomes, client demographics, and costs, and determine from that

assessment where the data gaps lie and if cost-savings analysis would be possible. Such an analysis can help the Department plan its evaluation agenda for the future. As future programs are put in place, the Department will benefit from up-front planning of future evaluations, which can be used to assess cost-savings, where such analyses are possible. However, to clarify the intent of our recommendation, we have added the words "where appropriate" to the applicable report language.

USDA Comments on the Matter for Congressional Consideration

USDA agreed that WIC eligibility could be expanded to include all income-eligible pregnant women within the existing funding level. However, USDA interpreted our suggestion that nutritional risk be eliminated as an eligibility criterion for pregnant women to mean that such assessments should no longer be done. That was not our intent. We believe that the individual assessment, done as part of WIC services, is important to determine risk and what nutritional counseling and other services pregnant women need, but that the assessment should not be used as an eligibility criterion.

USDA Comments on Recommendation to Improve Data Collection Efforts

USDA agreed that there was a need to improve systems to better collect outcome and cost data, but was concerned that it would be time consuming, expensive, and difficult to collect the type of data we were recommending. We do not believe that data collection would be overly time consuming or expensive, relative to the potential benefits, and we believe it could be incorporated into USDA's ongoing research agenda. USDA has recently published data on WIC participant demographics and completed a WIC Medicaid study—both of which appear to have proved their worth in assessing WIC's impact on pregnant women and their infants. We believe that USDA should focus now on examining WIC's impacts on breastfeeding and postpartum women, infants, and children. We also note that USDA is planning a large-scale evaluation of WIC's impact on infants and children, which should give the Department an opportunity to collect data needed to examine the related cost savings from serving infants and children.

USDA Comments on Recommendation to Change the WIC Formula for Allocating Funds to the States

USDA did not agree that the formula for allocating WIC funding to state agencies should be revised now so that the allocation is based primarily on the estimated number of eligible persons in the state. USDA said that the data currently available to estimate the number of eligible people in each state are from the 1980 census. We do not believe this is a real obstacle. USDA now depends on the 1980 data for at least some portion of its funding

formula distribution. USDA will need to use 1980 data for probably no more than one more year, and then could change to 1990 census data. Moreover, it would make sense to phase in the change from the current formula to the new one over a period of several years in order to cushion states from abrupt program disruption. Such a phase-in, planned so that each year increasingly larger portions of the funds would be distributed based on the number of eligible persons in the state, would not depend heavily on the number of eligibles in the first phase-in year.

USDA also disagreed with our assertion that the number of pregnant women served could be expanded by changing the formula. USDA assumes that since all states served some Priority IV and V participants in 1990, few, if any, Priority IV pregnant women were being denied services. We disagree with that assumption. As stated in the report, states stop enrolling new eligible applicants in lower priority levels (such as Priority IV and V) when funding is as short as it was in 1990. Although they do not drop current recipients at those priority levels until they come up for eligibility re-determinations, they do stop enrolling new applicants at the lower levels. Therefore, it is not surprising that even states which were limiting enrollment of Priority IV eligible applicants in May 1990 still served some people in that category during the fiscal year.

USDA Concerns About Our Estimates of Cost Savings

USDA expressed concern that we overestimated cost savings attributable to WIC because certain of our model's assumptions might not hold. They were concerned that our model did not capture all of the program's positive and negative effects and depended upon evaluations that themselves may not have accurately separated program effects from all measured and unmeasured differences between WIC and non-WIC populations. They also said that the calculated reduction in low birthweight rates due to WIC based on the evaluations we used might not represent the true national effect of WIC, and that the evaluations used to develop the effect size were dated in that characteristics of the WIC population had changed. USDA was particularly concerned that we may have overestimated the number of WIC-eligible women.

As pointed out in our discussion of the general framework in chapter 2 and appendix I, all estimations of this kind are subject to error. They depend upon a set of assumptions that serve as a simplified version of program effect. They also normally depend on generalizing from other evaluations and intermediate estimates, so that problems inherent in these individual evaluations or intermediate estimates carry over to the final result. To

provide for the natural limitations of final estimates based on such analyses, the results are best presented as a range of values—which we did in appendix V and in tables 5.3 and 5.4. We discuss our assumptions and the data we used for our intermediate estimates in detail, so that readers have a basis to gauge for themselves how credible the final values might be.

Using WIC evaluations in our analysis presented expected problems. As stated in chapter 3, the average reduction in low birthweight rate we estimated might not be the true national effect of WIC. We discussed the problems with developing an estimate in appendix II (see pp. 54-59). We do not assume, as USDA states we assume, that WIC will have the same effect on all income-eligible pregnant women regardless of variations in income and risk status. But we do assume that an average effect size can be calculated for a population. It will always be true for any program that due to program changes, time, the state of the economy, the specific methodology of the evaluation, and many other factors, program effect size will differ. For example, looking only at the Medicaid WIC and non-WIC population in North Carolina in two different years, Mathematica's analysis for 1987 data and Buescher and others' analysis for 1988 data gave two different effect sizes—a difference of 5.1 versus 3.9 percentage points. This is why aggregating effect sizes to develop an average size is better than using a single one (unless the single one is from a recent, nationally representative sample.) We developed the best estimate we could given the information we had, and expect that better data will enable future evaluation efforts to develop better estimates.

USDA states that we assume that the only possible effect of early intervention programs is to increase savings—in fact, we assume in our framework that some programs may increase costs (see pp. 15-16 and 49). We agree that by improving the birthweight distribution, providing WIC benefits may increase the survival rate of some infants who would have otherwise died and thus lead to more children surviving. Even while the rate of low birthweight birth declined, the number of low birthweight children might rise, but it would be coupled with a larger number of surviving normal birthweight children. Many might argue that to have a larger number of infants surviving, with a higher rate of normal birthweight infants, can be valued as an economic benefit—or a human benefit. In our opinion, it was premature to estimate the economic implication of increased survival due to WIC (see pp. 25-26 and 31). Similarly, WIC might indeed be serving as an entry point into needed preventive health services. This is an explicit program goal. While such a role may increase short-term

costs, it could also increase long-term cost savings, such as by increasing rates of immunization.

Although the USDA comments focused primarily on areas where we may have overstated WIC's benefits, we believe that we have underestimated WIC's benefits in several ways. For example, we looked only at the relationship of WIC to low birthweight births, and not at any other health advantages to mother or child. Also, we may have underestimated the likelihood that low birthweight children would need special education and the medical costs of low birthweight. Low birthweight children might have additional costs for medical and long-term care that we did not estimate.

USDA Concerns About Our Estimates of WIC-Eligible Pregnant Women

USDA stated that we overestimated the number of pregnant women because we overcompensated for the impact of Medicaid adjunct eligibility (women are now income-eligible for WIC if they are eligible for Medicaid) and calculated births using too high a birthrate for women at or below 185 percent of the federal poverty level.

Medicaid adjunct eligibility is a recent policy change that has increased the number of income-eligible pregnant women in states where Medicaid eligibility is at or below 185 percent of the federal poverty level. This is because Medicaid eligibility rules are more liberal than WIC rules in determining income eligibility. Medicaid counts a pregnant woman as two persons in her household when determining her income eligibility. WIC counts a pregnant woman as one person. Therefore, in states where the Medicaid eligibility levels are the same as WIC levels (at or below 185 percent of the federal poverty level), women with income too high to income-qualify for WIC under the usual WIC eligibility rules could income-qualify for WIC under the Medicaid adjunct eligibility rule if such women qualified for Medicaid.

Because neither USDA nor our estimate factors in this policy change, both underestimate eligible pregnant women. We took the number of women aged 15-44 at or below 185 percent of the federal poverty level and multiplied it by an estimated birthrate of 93 per 1,000 (see app. III). We made no adjustment to include births to women with incomes above 185 percent of the federal poverty level now eligible for WIC under Medicaid adjunct eligibility rules.

USDA cites recent census data on fertility by income level in concluding that the birthrate we used would lead to an overestimate. Because

determination of the federal poverty level is by income and family size and the census data are only by income level, these comparative birthrates cannot be applied directly to estimate birthrates for women at or below 185 percent of the federal poverty level. For example, a family of six could have income up to $31,413 in the continental United States and territories and qualify for WIC benefits in June 1991, but a family of two could only have income up to $15,577 and qualify.

We also disagree with USDA that our estimated birthrate is too high because our analysis of 1989 CPS data indicates women at 185 percent of the federal poverty level appear to have birthrates in the range we used. Dividing the number of women aged 15 to 44 with children aged 1 at or below 185 percent of the federal poverty level by the number of women aged 15 to 44 at or below 185 percent of federal poverty gives a rate of 98 per 1,000. This does not account for infant mortality (9.1 per 1,000 in 1990), children not living with women, or miscarriage. Therefore, we do not believe using a birthrate of 93 per 1,000 to estimate births is too high.

USDA's estimation process has led to serious underestimation in the past. During fiscal year 1990 the number of infants served by WIC was 24 percent greater than the number estimated to be eligible by USDA—even though some states were not enrolling all eligible infants. However, our discussions with USDA officials indicated they were aware that their estimation processes could be improved.

We also received technical comments from Agriculture and Education that we incorporated where appropriate.

A Framework for Estimating Cost Savings Resulting From Early Intervention Programs

As requested, we developed a framework for analyzing cost savings from early intervention programs. The framework, which we used to analyze the effects of giving prenatal WIC benefits to pregnant women, consists of four steps:

1. Identifying program outcomes.

2. Quantifying program outcomes.

3. Estimating and apportioning cost savings.

4. Checking key assumptions and conducting sensitivity analysis, including analyzing the likely impact of omitted outcomes.

Each of these has a distinct set of tasks and is explained in further detail below.

Four Steps to Estimate Cost Savings

Step 1: Identify Program Outcomes

The first step in a cost-savings analysis is to identify potential program outcomes, both intended and unintended. This includes identifying both the direct effects, which are the immediate outcomes of programs, and the indirect effects, or secondary outcomes. For example, reducing a rate of low birthweight among a group of women through prenatal intervention would be a direct effect. Reducing the need for special education consequent to reducing low birthweight would be a secondary effect. A review of program evaluation literature can help identify outcomes that are based on sound evaluation.

A cost-savings analysis should use outcomes substantiated by empirical research. This research should use scientific methods to demonstrate a causal relationship between the provision of benefits and observed outcomes.[1] In practice, depending on strong previous program evaluation may mean analyzing cost savings for only that subset of a program for which the evaluation evidence is clear and convincing and the outcomes

[1]Some evaluators include only relevant studies of acceptable quality, while others believe that all relevant studies should be included when aggregating evaluation results, without a judgment as to their quality.

can be assigned an economic value. Consequently, when few outcomes have been evaluated and analyzed, analysts may undervalue the program.

Step 2: Quantify Program Outcomes

The second step involves quantifying program outcomes and linking them with other evaluations of these outcomes and assessments of costs. Aggregating evaluation results is sometimes the best way to quantify program outcomes, but results from multiple studies cannot always be aggregated easily, for several reasons. First, the studies may not have used comparable methodologies. Second, program or type of program participants may have changed. Moreover, evaluations may have been conducted at different times or over different populations. Analysts must try to account for factors that lead to variations in results.

Step 3: Estimate and Apportion Costs and Cost Savings

The positive value of an outcome often includes the savings from avoiding future expenditures.[2] Expenditures averted as a result of early interventions may be those for acute care or other remedies made unnecessary by preventing undesirable outcomes. The savings are measured from the averted excess cost that providing the remedial treatment requires.

The total cost of operating a program would be the relevant program cost to include when results from all program participants are being analyzed. When the results from a subgroup of program participants are being analyzed, only the appropriate fraction of program costs should be included. Overhead or administrative costs should be apportioned equally among the program recipients when these costs are not disaggregated by type of recipient.

Analysts should discount benefits that occur in the future to determine their value in present dollars. The choice of a discount rate can greatly affect the results of the analysis—particularly for costly programs that generate benefits far into the future. A low discount rate may show a positive net benefit for the program, while a high discount rate may show a negative net benefit.

In theory, the discount rate should reflect the social opportunity cost of the investment, which equates roughly to the nominal interest rate minus the rate of expected inflation. No consensus exists as to the appropriate

[2]Outcomes could have negative value if, for example, they increase future costs. If so, these extra costs must be subtracted from program benefits when calculating net savings and benefit-to-cost ratios.

discount rate; rates as high as 10 percent have been used in the cost-benefit literature, although lower rates are probably more appropriate. GAO's policy is to use the interest rate on marketable Treasury debt with maturity comparable to that of the program being evaluated when benefits and costs are presented in current (nominal) dollars.[3]

The time horizon to be chosen for the analysis represents a trade-off between precision and completeness. In general, the net benefit of a program will be understated when the time horizon is too short (assuming that the costs of the program occur over a short time, while benefits continue into the future). However, overextending the time horizon may lower the precision of the analysis. The confidence interval surrounding the benefit estimates increases and, because of discounting, the present value of future benefits decreases with time. Once benefits have been discounted, including benefits received in the distant future may not greatly increase total benefits measured in present dollars.

Apportioning Costs and Savings

An early intervention program can generate cost savings for the federal government, state and local governments, and other parties. To apportion costs, analysts should identify the parties that fund the program to determine initial program costs. To apportion averted expenditures, analysts should identify the parties that would provide acute care or treatment. Analysts should then calculate the percentage of recipients likely to have their care paid for by specific parties. Analysts can use demographic information on current program participants to estimate their use of publicly funded programs in the future.

The federal cost savings generally are only a part of the total cost savings to society. An early intervention program's ability to generate federal cost savings is limited by two factors. One is the existence and funding levels of other affected federal programs. The other is the likelihood that participants in the early intervention program being analyzed would receive support from other federal programs. In contrast, the net benefit to society of an early intervention program does not depend on the existence or funding level of other federal programs. Obviously, if the federal government provides few social services, then the potential for federal savings from the operation of many early intervention programs is limited. But society as a whole would still receive the benefits of early intervention—for example, healthier infants.

[3]Discount Rate Policy (GAO/OCE-17.1.1).

Step 4: Check Key Assumptions—Conduct Sensitivity Analysis

Sensitivity analysis is an important component of any cost-benefit study. Typically, many, if not most, of the factors that feed into the analysis—the cost of the inputs, the efficacy of the program, and the value of the resulting benefits—are estimates. The precision of these estimates may vary considerably. In cases where either the estimate is thought to be imprecise or a portion of the analysis is crucial to the final result, analysts should try a range of estimates to determine whether the analytical results are sensitive to changes in the various assumptions or estimates. In addition, the whole analysis should be checked as a final step.

If important results are robust (that is, reasonable changes in the underlying assumptions do not dramatically alter the conclusions of the analysis), a high degree of confidence can be placed in the results, in spite of uncertainty regarding the "correct" assumptions. However, some important results may be sensitive to changes in the underlying assumptions. In these cases, sensitivity analysis indicates which portions of the analysis must be interpreted with more caution. Additional work may be required to provide more confidence in the appropriate underlying assumption.

Sometimes determining the maximum cost or minimum benefit at which the program would break even is helpful. In certain circumstances it may not be possible to derive a "best" estimate for either a specific program cost or a benefit value. A useful technique in these instances is to work "backward," that is, calculate the maximum input costs or minimum benefit values (whichever are appropriate) that would result in zero net program benefits.

Analysts should also consider outcomes that were omitted from the benefit-cost analysis because they were difficult to quantify or value in dollar terms. For some cases it may be possible to determine if including an outcome would raise or lower the net benefit and the likelihood that the impact would be large or small. In those cases, it is important to note that the cost figures reported could be larger or smaller than the true cost savings.

Benefits From a Changed Program May Differ From Current Average Benefit

An analysis based on current total program costs and outcomes cannot, by itself, determine whether program expansion would produce higher, lower, or similar total net benefits. Average cost, program outcomes, or both can change with a change in program scope. For example, if a program serves the persons most likely to benefit, the average program impact may decrease as the program expands. Moreover, net benefits might fall if program costs rise to fund additional outreach efforts required to reach an enlarged population. Conversely, net benefits might rise if average program costs fell with program expansion as fixed overhead costs were spread over more recipients.

We suggest two possible approaches to valuing program expansion or contraction. First, it may be possible to compare the currently served population with the population served by the changed program to estimate the program's effectiveness with its new population. Second, in the case of program expansion, the current average net benefit may be so high for an existing program that even an expansion that caused the average net benefit to fall could be justified in cost-benefit terms. In this case the analyst should calculate how low benefits could fall or costs rise and still produce a positive net benefit.

Limitations in Using Cost-Benefit Analysis to Assess or Compare Programs

The findings generated from any cost-benefit analysis should be interpreted with caution. In particular, special care should be used when the results are intended to compare the social value of programs that differ greatly in their objectives or implementation. We list four limitations of cost-benefit analysis below to stress that such analysis should be but one criterion used to value the worth of early intervention programs.

Cost-Benefit Results Do Not Address Equity or Distribution of Benefits Issues

Programs may vary not only as to the overall benefit-cost ratio, but also as to the population group that receives the benefits. If policymakers care about who receives benefits and who does not, then cost-benefit analysis should not be the only criterion used to compare the relative value of early intervention programs.

Results Are Reported for a Specific Level of Program Operation

The relative ranking of a set of programs could be reversed if the levels of operation for some of the programs were changed.

Some Programs' Benefits Are More Difficult to Value

Programs may vary in the extent to which their outcomes can be quantified or valued. Programs whose outcomes cannot be easily incorporated into cost-benefit analysis would suffer in comparison to programs whose outcomes lend themselves to such analysis.

All Cost-Benefit Estimations Are Subject to Error

Because all estimates are subject to measurement error, all cost-benefit results should be presented as a range of values. If these range estimates for various programs overlap, it may be impossible to rank the value of alternative programs.

Estimating WIC's Effect in Reducing Low Birthweight

To estimate the number of low birthweight births averted in 1990 as a result of the provision of WIC benefits to pregnant women, we needed to do three separate analyses. First, we developed an estimate of WIC's effect at reducing low birthweight rates of eligible women. Second, we estimated the number of births to women who had received WIC prenatally in 1990. Third, we applied the estimated rate of reduction in low birthweight to the 1990 WIC births to calculate how many low birthweight births were averted—that is, how many babies born at normal birthweight might have been born at very low or moderately low birthweight had their mothers not received WIC.

Combining Results From Evaluations of WIC

We estimated WIC's effect on reducing low birthweight by statistically combining evidence of WIC's effect from several evaluations (see table II.1). This updated an estimate we had done several years before with a smaller set of evaluations.[1] To do this analysis, we identified a set of evaluations that compared rates of low birthweight among WIC recipients and women with similar socioeconomic backgrounds who did not receive WIC benefits. We then sent a bibliography of these evaluations to the Food and Nutrition Service, the National Association of State WIC Directors, and well-known WIC researchers to ensure that we had included all available and methodologically adequate evaluations that examined low birthweight rates among WIC recipients. Through these contacts we added one evaluation to the set we used to establish WIC's effect numerically. We then had an outside consultant rate the evaluations for their quality based on (1) appropriateness/adequacy of measurement and analysis, (2) integrity of relative comparison of effect sizes, and (3) potential generalizability. For consistency, we used as our outside consultant one of the same consultants we had previously used. We ended with a set of 17 evaluations considered methodologically strong enough to be included. All of these evaluations were similar in that they analyzed and reported rates of low birthweight among WIC recipients and similar nonrecipients. We used the difference between WIC and non-WIC rates of low birthweight as the effect size for each evaluation. We weighted evaluation effect sizes by evaluation sample size to develop an overall effect size.

[1]WIC Evaluations Provide Some Favorable but No Conclusive Evidence on the Effects Expected for the Special Supplemental Program for Women, Infants, and Children (GAO/PEMD-84-4, Jan. 30, 1984).

Table II.1: Evaluation Results Show Lower Rates of Low Birthweight Among WIC Recipients

Evaluation	Year	State	WIC LBW rate	Non-WIC LBW rate	WIC sample size	Non-WIC sample size	Percentage point difference in LBW rate	Percentage difference in LBW rate
Silverman 81[e]	71-77	PA	9.7	13.0	1,047	1,361	-3.3[a]	-25
Kennedy 82	73-78	MA	6.0	8.8	897	400	-2.8[a]	-32
Kennedy 84	73-78	MA	7.3	12.5	316	316	-5.2[a]	-42
Kotelchuck 84	78	MA	6.9	8.7	4,126	4,126	-1.8[a]	-21
Bailey 83	80	FL	5.4	9.5	37	42	-4.1	-43
Metcoff 85	80-82	OK[d]	8.7	6.9	242	174	1.8	26
Stockbauer 86	79-81	MO	8.5	9.4	6,657	6,657	-0.9[a]	-10
Stockbauer 87	82	MO	7.7	9.2	9,411	9,411	-1.5[a]	-16
Schramm 85[b]	80-81	MO	10.7	12.6	1,183	5,737	-1.9[a]	-15
Schramm 86[b]	82	MO	10.1	13.1	3,221	5,719	-3.0[a]	-23
NWE-Rush 88[c]	83-84	US	5.7	6.8	2,708	497	-1.1	-16
Mathematica 90[b]	87	FL	9.5	12.8	18,758	12,974	-3.3[a]	-26
Mathematica 90[b]	87	MN	7.8	10.0	7,905	3,642	-2.2[a]	-22
Mathematica 90[b]	87	NC	11.1	16.2	14,219	6,469	-5.1[a]	-32
Mathematica 90[b]	87	SC	11.7	16.8	8,641	3,132	-5.1[a]	-30
Mathematica 90[b]	88	TX	8.8	12.2	12,303	13,407	-3.4[a]	-28
Buescher 91[b]	88	NC	10.4	14.3	16,177	6,166	-3.9[a]	-27

[a]Statistically significant difference.

[b]These results for Medicaid population in the state.

[c]National study.

[d]Sample only from women attending Oklahoma Memorial Hospital, Oklahoma City.

[e]Results as reported in GAO/PEMD-84-4.

These evaluations were not all alike methodologically. Most were quasi-experimental, in that they compared low birthweight rates of WIC recipients to comparison women, rather than measuring low birthweight rates of women randomly assigned to treatment and control groups. Only one evaluation (Metcoff 1985) used a true experimental design. However, that design chose women through a protocol that identified them as likely to have a poorer birth outcome, then randomly assigned them to receive WIC or not. This two-tiered selection process would have generated a group of women not representative of all WIC-eligible pregnant women in the locality at that time, since they were all expected to have poor outcomes.

Most of the quasi-experimental evaluations developed regression equations or otherwise statistically controlled for other factors that influence birth

outcomes.[2] Some factors, like controlling for the amount or adequacy of prenatal care, can help adjust for selection bias—that women who are eligible and choose to enroll in care (WIC or prenatal care) are different from those who may be eligible but do not enroll. But none of these studies truly adjusted for selection bias. Other factors, such as smoking, adjust for actual health behavior known to be associated with increased low birthweight rates. The most common factors these studies controlled for were mother's age, race, number of previous pregnancies or births, education level, marital status, smoking status, and amount or adequacy of prenatal care. Nevertheless, these evaluations could not adjust for all potential differences between WIC participants and nonparticipants. No matter how carefully quasi-experimental designs adjust their data, evaluators consider them weaker than true experiments, properly conducted. Developing an appropriate comparison group and controlling for other factors that could affect birth outcomes can be problematic, and has been for WIC evaluators.[3]

In four cases several sets of results were published based on the same data set. We used the following criteria to select results: (1) use the same results if the evaluation was used in the earlier GAO estimation, (2) minimize differences between how the evaluations defined WIC participation, and (3) choose most appropriate comparison group.

Kennedy compared WIC outcomes with outcomes of women who were on a WIC waiting list and women from local health centers. We reported the comparison group as women from the local health centers, as we did in our earlier report. This resulted in a smaller reported WIC effect. Stockbauer 1986 reported results using three methods of analysis. We used results as we reported them previously.

Most of the evaluations coded women as WIC participants if they had received any WIC benefits. One evaluation, the National WIC Evaluation's Longitudinal Study of Pregnant Women, defined WIC participation differently. If a woman did not receive WIC at the initial interview, but was receiving WIC at the second interview in the same pregnancy, she was

[2]The low birthweight and very low birthweight percentages reported in Buescher 1990 were based on raw data. The statistically controlled results were reported in odds ratios. However, we calculated an odds ratio for the raw data (1.44) that was extremely close to that of the statistically controlled data (1.45). Therefore, the simple percentages are a close approximation to the logistically adjusted ones.

[3]For a longer discussion of the problems in WIC evaluation, see GAO/PEMD-84-4, Rush and others (1988), and Mayer, Emshoff, and Avruch (1992), and see the relevant evaluations to assess the adequacy of design.

classified as "non-WIC." This led to an underestimate of WIC's effect at reducing low birthweight in that study, according to its author. We therefore used results reported for women who had received WIC at both initial and subsequent interviews as the "WIC" low birthweight rate with results reported for women who had not received WIC by their second interview as the "non-WIC" low birthweight rate. Even this adjustment would still underestimate WIC's effect within the whole data set, since a group that began receiving WIC benefits after the first interview had the best birth outcomes.

For a statewide study of WIC outcomes in North Carolina, we used the outcomes for WIC and non-WIC Medicaid recipients. In our opinion, Medicaid births were more appropriately comparable for estimating effect size than comparing all WIC birth outcomes to all non-WIC births outcomes in the state, since many of the non-WIC birth mothers might have higher incomes than 185 percent of the federal poverty level.

We counted some publications or studies with more than one effect size as individual evaluations, and we weighted effect sizes by WIC and non-WIC sample size to calculate our results. Therefore, effect sizes in evaluations with larger samples have greater weight. Mathematica studied WIC's effect in five states and reported each state separately. We counted and weighted each of these as a separate evaluation, since each state had its own individual effect size. Kennedy reported results of her WIC evaluation using both a comparison group and, in another publication, a case study methodology, with different results. We included both, even though they were separate analyses of the same WIC data set.

After we rated the evaluations, we transformed the percentage proportions of WIC and non-WIC low birthweight rates into arcsine values[4] and calculated a weighted effect size. Experts in using this methodology consider the arcsine transformation the most appropriate way to derive a meaningful effect size for proportions. This calculation resulted in a non-WIC low birthweight rate of 12 percent and a WIC low birthweight rate of 9 percent,[5] a 3-percentage-point difference. This represents a 25-percent difference in low birthweight rate. This effect was statistically

[4]The arcsine of a number is the inverse function to the sine—if y is the sine of x, then x is the arcsine of y.

[5]This result is higher than average low birthweight rates of WIC mothers (7.4 percent) reported in Study of WIC Participant and Program Characteristics, 1988: Final Report: Volume 1: Summary of Findings. Raw data being analyzed by FNS and the National Center for Health Statistics from National Maternal and Infant Health Survey data also show lower low birthweight rates for WIC and non-WIC women than the rates calculated from the 17 evaluations and reported here.

significant. Using a weighted average without the arcsine transformation also yielded a 3-percentage-point and 25-percent difference in low birthweight rate.

This result is our best present estimate of WIC's effect at reducing low birthweight rates nationally. In any given evaluation, the estimated impact of WIC may be partly a function of the economic, demographic, or ethnic characteristics of the local WIC population analyzed. The set of studies we included did not draw random samples from a nationally representative WIC population. They range over time between 1971 and 1988. The overall WIC population served may have changed over that time. Not all states or populations within states are represented by the studies, and some states are represented twice. Eight of the 17 studies examine WIC's effect on reducing low birthweight among Medicaid recipients.[6] When these studies were done, women needed less income in those states to qualify for Medicaid than for WIC. Studies that examine WIC's effect on reducing low birthweight rates in the Medicaid-WIC population as opposed to the entire WIC population (1) are among the most recent, (2) include large defined populations, such as all state Medicaid recipients during a given year, and thus are less likely to be biased by excluding parts of a significant population, (3) are evaluating a poorer group of women than all women eligible for WIC in the state, and (4) generally find larger effect sizes. Our weighting scheme was by population size. Therefore, the large statewide studies (which were mostly, but not entirely, Medicaid studies) weigh most heavily. As a consequence, our estimate of the national impact of WIC derived from the set of 17 studies we used may deviate from the actual effects to the extent that the study populations are not representative of the national WIC population—some of these populations were more at risk, the non-WIC population may have changed in characteristics over time, and all states were not equally represented.

We also applied a different weighting scheme to the studies, in hopes of improving the analysis. We grouped states by similar characteristics, assigned evaluation results from similar states to grouped states, and weighted the evaluation group effect size by number of pregnant women enrolled in WIC in these grouped states. We matched states that were comparably above and below the national mean in low birthweight rates, in the percentage of young people in poverty, and in the percentage of black births in the state. We assigned grouped evaluations to similar states and weighted the results by the states' number of prenatal WIC participants

[6]For Buescher 91, we are reporting only the Medicaid results, although he also reports outcomes for women who did not receive health care from either Medicaid or the health department.

between March 1988 and February 1989. The result was an estimated WIC effect size of 3.25 percentage points—larger than the estimate that we used. However, we were not sure it was better, particularly since we had indications that the national WIC low birthweight rate was lower than the composite WIC low birthweight rate we had calculated originally. Therefore, we continued with the original estimate of effect size.

Estimating Very Low Birthweight Effect

Because the set of evaluations that examined WIC and non-WIC very low birthweight rates showed a greater WIC effect at reducing such rates, we wanted to develop separate estimates of very low birthweight and moderately low birthweight births averted. This would give us more accurate estimates for costs since the excess medical costs of very low and moderately low birthweight infants are quite different. We therefore analyzed the reduction in very low birthweight as a percentage of total low birthweight reduction in these studies. We then applied the same proportion of very low birthweight to moderately low birthweight births averted to the WIC low birthweight effect size for the larger group of studies. See table II.2 for the results from the five evaluations.[7]

[7]Also see New York State Department of Health (1990), which reported similar very low birthweight results.

Table II.2: Evaluation Results Show WIC Associated With Lower Rates of Very Low Birthweight Rates

Evaluation	Year	State	WIC VLBW rate	Non-WIC VLBW rate	WIC sample size	Non-WIC sample size	Percentage point difference in VLBW rate	Percentage difference in VLBW rate
Kotelchuck 84	78	MA	0.49	1.04	4,126	4,126	-0.55[a]	-53
NWE-Rush 88[c]	83-84	US	0.37	0.28	2,708	497	0.09	32
Stockbauer 87	82	MO	1.01	1.38	9,411	9,411	-0.37[a]	-27
Schramm 85[b]	80-81	MO	1.10	1.40	1,883	5,737	-0.30[a]	-21
Buescher 91[b]	88	NC	1.63	3.43	16,177	6,166	-1.80[a]	-52

[a]Statistically significant.

[b]These results for Medicaid population in the state.

[c]National sample.

We did an arcsine transformation analysis, similar to the one described above, on the very low birthweight and low birthweight rate effects for the five evaluations that reported both. The estimated WIC low birthweight effect in those five studies was 2 percentage points, or 20 percent. The estimated WIC very low birthweight effect in those five studies was 0.75 percentage points, or 44 percent. We therefore estimated that the reduction in very low birthweight represented 0.0075/.02, or 37.5 percent of the total WIC effect.

We applied this result to our larger set of studies. For these studies, a similar relationship between very low and moderately low birthweight would lead to a very low birthweight reduction of 1.13 percentage points and a moderately low birthweight reduction of 1.88 percentage points, equaling a total reduction in low birthweight rate of about 3 percentage points.

Estimating Number of 1990 Births to WIC Prenatal Recipients

We used two methods to estimate 1990 births to WIC prenatal recipients. First, we used 1984 data from FNS's 1986 Study of WIC Participant and Program Characteristics to estimate a ratio of births to monthly prenatal participants. Second, we collected data from 10 states and Puerto Rico on actual 1989 births to WIC participants. From this information we developed a weighted ratio of WIC births to prenatal participants. The ratio we finally used was an average of these two ratios.

In 1984 the average number of weeks of gestation upon prenatal entry into WIC was 17.6. The average length of a WIC gestation was 39.1 weeks.

Assuming that pregnant women would remain on WIC 6 weeks postpartum, we developed an equation for average weeks on WIC as a pregnant woman:

$$(39.1 - 17.6) + 6 = 27.5$$

In other words, in 1984 pregnant women were on WIC an average of 27.5 weeks. Dividing by 52 weeks gave us a ratio of 1.9—or almost 2 WIC births for each monthly participant on WIC.

To develop more recent data, we contacted 10 states and Puerto Rico to request the number of births in 1989 to women on WIC. FNS staff recommended these states as being most likely to be able to generate birth data. Eight states and Puerto Rico were able to give us data. For states that reported calendar year 1989 data, we divided births by the average number of monthly pregnant participants between March 1988 and February 1989. For Pennsylvania, which could provide only state or federal fiscal year births, we used state fiscal year births (July 1, 1989-June 30, 1990) and divided them by the average number of monthly pregnant participants between February and August 1989.

We took the individual state ratios of births to participants and weighted the results by the average number of prenatal participants in each state between March 1988 and February 1989. From this we developed a weighted ratio of 2.1. Combining the results of our two analyses, we used a ratio of 2.

We multiplied the ratio of 2 by the average monthly number of pregnant participants in the United States (excluding Puerto Rico, Guam, and the Virgin Islands) during months that would lead to a calendar year 1990 delivery (May 1989 to Feb. 1990)—608,613. This gave us an estimated number of births to prenatal WIC participants in the United States in 1990—1,217,226.

Calculating Low Birthweight Births Averted

We calculated low birthweight births averted by separately multiplying the percentage reduction in very low birthweight and moderately low birthweight births attributable to WIC. This gave us:

Very Low Birthweight Births Averted	1990 births	X	estimated percentage reduction in very low birthweight births	=	very low birthweight births averted
	1,217,226	X	.0113	=	13,755 births

Moderately Low Birthweight Births Averted	1990 births	X	estimated percentage reduction in moderately low birthweight births	=	moderately low birthweight births averted
	1,217,226	X	.0188	=	22,762 births

Total Low Birthweight Births Averted	Very low birthweight births averted + moderately low birthweight births averted	=	Total low birthweight births averted
	13,755 + 22,762	=	36,517

Estimating the Number of WIC and Medicaid-Eligible Pregnant Women

To estimate the net savings that could be achieved by serving all eligible pregnant women, we needed to estimate how many pregnant women were eligible for WIC. We estimated how many pregnant women were income-eligible and then estimated how many were fully (income and nutritional-risk) eligible. And, to estimate federal cost savings, we needed to estimate how many WIC-eligible births were also Medicaid-eligible births.

Estimating the Number of Eligible Pregnant Women

No one knows exactly how many women, infants, and children are eligible for WIC at any time. Currently, potential recipients need to be both income-eligible and nutritionally at risk to be fully eligible for WIC benefits. FNS and the Congressional Budget Office have both estimated the size of the WIC-eligible population. Because the FNS and CBO estimates differed, and we were not sure which estimate was more accurate, we independently estimated the WIC-eligible pregnant population.

Table III.1: Differences Used in Estimating Number of Eligible Pregnant Participants, Per Month

	FNS	CBO	GAO
Number	765,000	1,200,000	1,110,000
Includes Puerto Rico, Guam, and the Virgin Islands	Yes	Yes	No
Percent at nutritional risk	91	96	91
Data base	CPS[a]	SIPP[b]	CPS[a]
Income	Yearly	Monthly	Yearly
Year	1990	1987	1984-86
Income	Household	Family	Family
Estimated from	Women with a child aged 1	Children aged 1	Birthrate of women age 15-44
Percentage of children aged 1 or women with a child aged 1 or estimated births used to estimate monthly pregnant eligibles	50	75	75

[a]Current Population Survey.

[b]Survey of Income and Program Participation.

FNS estimates eligibility based on a 1987 study, which used health survey data to estimate nutritional risk and 1980 census data to estimate income eligibility. FNS has updated its income-eligibility estimates with more recent

Current Population Survey (CPS) data for 1990, which measures yearly income. The FNS-commissioned study that used health survey data estimated that 91 percent of income-eligible pregnant women were also at nutritional risk, according to a set of common state nutritional risk guidelines.[1] FNS estimated pregnant women based on a fraction of the number of women with a child aged 9 months or younger and with household income at or less than 185 percent of the federal poverty level.

CBO estimated income eligibility using Census's Survey of Income and Program Participation for 1987. CBO assumed that 96 percent of income-eligible pregnant women would be at nutritional risk. CBO based its estimates on family income, not household income, using a data base that measures monthly income. The CBO estimate for the number of pregnant women is based on a fraction of the number of children aged 1.

The main difference between the two estimates is that they used different percentages of infants to calculate monthly pregnant eligibles. CBO multiplied the number of children aged 1 with family income at or below 185 percent of poverty by 75 percent. CBO assumed a similar number of women had been pregnant in the previous year and each woman could be on WIC up to 9 months, or 75 percent of a year. FNS multiplied the number of income-eligible women with a child aged 1 by 50 percent. FNS assumed that some women with children aged 1 would have family income at or less than 185 percent of poverty after their child was born and the family size increased—but not before when their income would be greater than 185 percent of poverty for their family size. FNS's 1987 study found a relationship in 1980 census data between women with infants aged 1 at a given poverty level and pregnant women at that poverty level to be 0.50 and therefore used that multiplier.

FNS's assumption is no longer correct for all pregnant recipients. Pregnant women who are receiving Medicaid are now automatically considered income-eligible for WIC. By Medicaid rules a pregnant woman counts as two people in the household; in other words, the same household would be the same size before and after the birth. Therefore, in states where Medicaid eligibility is up to 185 percent of poverty, the number of women with a child aged 1 would more accurately reflect the number of women eligible for WIC. Forty-two percent of current WIC pregnant recipients are in

[1]Since each state defines nutritional risk differently, this was an estimated risk set developed by the evaluators from risk criteria commonly used by many states.

states with Medicaid eligibility for pregnant women at or below 185 percent of the federal poverty level.

GAO's Estimate of WIC Births

We used a slightly different methodology. We multiplied the number of women aged 15-44 with family income at or below 185 percent of the federal poverty level by an income-adjusted fertility rate to estimate number of births. For the number of women, we used a set of published estimates based on averaging the 1984-86 CPS data.[2] We used state fertility rates from the National Governors' Association (NGA) estimates for 1984. We adjusted these by 42 percent to better represent fertility rates of women at 185 percent of poverty, following the methodology used by researchers at the Alan Guttmacher Institute.[3] We multiplied the number of women in each state by the income-adjusted state fertility rate, then added the estimated number of births in each state to get the national estimate. (This led to an overall adjusted fertility rate of 93 per 1,000 for women at or below 185 percent of federal poverty level. If we had raised the overall national fertility rate for 1988 by 42 percent, we would have used a fertility rate of 95 per 1,000.) Overall, we estimate 1,625,855 births annually to WIC income-eligible women.

Women age 15-44 in each state	X	adjusted fertility rate for the state	=	income-eligible state births
Sum of all income-eligible state births			=	income-eligible national births

The number of income-eligible women fluctuates depending on demographic and overall economic trends in the country. Unfortunately, estimates based on census data sets are never entirely current, since it takes time for the data set to be compiled and distributed. According to our analysis of 1989 CPS data, 17,254,999 women aged 15-44 had family income at or below 185 percent of poverty—or slightly fewer women than estimates based on 1984-86 data. However, multiplying by the national income-adjusted fertility rate of 95 per 1,000 gives an estimate of 1,639,225 births, approximately the same number (within 1 percent). We therefore choose to use the estimate based on 1984-86 data for consistency with our Medicaid estimate (see the next section).

[2]P. Newacheck, Estimating Medicaid-Eligible Pregnant Women and Children Living Below 185% of Poverty, National Governors' Association, Washington, D.C., 1988.

[3]A. Torres and A. Kenney, "Expanding Medicaid Coverage for Pregnant Women: Estimates of the Impact and Cost," Family Planning Perspectives, Vol. 21, No. 1, January/February 1989, p. 21.

To estimate the number of fully eligible births (income-eligible and nutritionally eligible), we multiplied income-eligible births by 0.91. We used the same percentage of income-eligible pregnant women FNS estimates to be nutritionally eligible.

Income-eligible births	X	ratio nutritionally eligible	=	fully eligible births
1,625,855	X	0.91	=	1,479,528

From births in a year we estimated total possible monthly participation levels. We multiplied the number of income-eligible births by 0.75. We assumed that women could be eligible for WIC as pregnant participants for up to 9 months, since they continue eligibility as prenatal participants for 6 weeks or longer postpartum. We estimated potential monthly participation of pregnant women for both income-eligible and fully eligible women.

Income-eligible births	X	0.75	=	Maximum income-eligible monthly participation
1,625,855	X	0.75	=	1,219,391

Fully eligible births	X	0.75	=	Maximum fully eligible monthly participation
1,429,528	X	0.75	=	1,109,646

Estimating the Number of Medicaid-Eligible WIC Births

We estimated the number of Medicaid-eligible births in 1990 in several steps. First, we determined state Medicaid income-eligibility levels as of January and April 1990, using information collected by NGA.[4] In January 1990 state income eligibility levels for pregnant women varied from 75 to 185 percent of the federal poverty level. As of April 1, 1990, all states were required to provide Medicaid coverage to pregnant women with family incomes up to 133 percent of poverty. Some states chose to continue to serve women with higher incomes, up to 185 percent of the poverty level.

Second, we used NGA data on the number of women at or below 100, 125, 150, and 185 percent of the federal poverty level to estimate the number of

[4]National Governors' Association, "State Coverage of Pregnant Women and Children—January 1990" and "State Coverage of Pregnant Women and Children—July 1990," Washington, D.C., 1990.

pregnant women eligible for Medicaid. We combined the number of medically uninsured births at appropriate state Medicaid eligibility levels and the number of births covered by Medicaid before recent Medicaid eligibility expansions in each state. (We estimated numbers at 133 percent of poverty by extrapolating the numbers between 125 and 150 percent of poverty.) For each state and each income level, we subtracted the number of women without Medicaid from the total number of women at each income level to determine the number of women on Medicaid in 1984-86 at those income levels. We estimated the number of women who were uninsured in 1984-86 by multiplying the percentage uninsured by poverty level and region by each state's number of women.

For each state we calculated previous Medicaid-covered and previously uninsured births, using the appropriate adjusted fertility rate.[5] We added the number of previously uninsured births at the current (1990) state poverty eligibility level and previously Medicaid-eligible births at 185 percent of poverty[6] to reach a total state-specific estimated number of Medicaid-eligible births. For states that changed income eligibility levels in 1990, we separately calculated eligible births from January to March 31, 1990, and from April 1 to December 31, 1990. This gave us an estimated number of Medicaid eligible births for 1990—1,158,828.

We assumed that essentially all pregnant women who were WIC- and Medicaid-eligible, and who were receiving WIC services prenatally, would also have their births covered by Medicaid. We did so for the following reasons. Women who receive WIC generally get prenatal care—and in many evaluations have higher rates of adequate prenatal care than non-WIC income-eligible women. Because their prenatal care providers have a strong incentive to be reimbursed, the likelihood is strong that such women will be steered to apply for Medicaid. Hospitals that are caring for low birthweight infants have an even greater incentive to help families of eligible infants get Medicaid coverage. Many states were also actively working to enroll eligible pregnant women in Medicaid in 1990. FNS officials told us that WIC personnel routinely inform women who apply to WIC about their potential eligibility for Medicaid and how to apply for

[5]For 100 percent of the federal poverty level and below, we adjusted the state fertility rate upward by 54 percent—the appropriate adjustment for this income level. For all other income levels, we adjusted upward by 42 percent—the reported adjustment for women at or below 185 percent of poverty. Using an adjusted fertility rate appropriate for women at or below 185 percent of the federal poverty level for women at or below 125, 133, and 150 percent of the federal poverty level leads to an underestimate of their births.

[6]The difference between previously Medicaid-financed births at or below 185 percent of the federal poverty level and Medicaid-financed births at state 1990 Medicaid eligibility level was negligible.

Medicaid benefits. Therefore, we believe it is reasonable to assume a high proportion of Medicaid coverage for low birthweight births among Medicaid-eligible women receiving WIC.

We compared our estimated number of Medicaid-eligible births in states in 1989 and 1990 to actual numbers of Medicaid births in 1989 and 1990 in six states for which we had data.[7] In some states our estimate of Medicaid-eligible births was smaller than the real number of births; in other states it was larger. For these six states our total estimated Medicaid births is only 78 percent of real Medicaid births.[8] Real births may have been larger in some states because (1) women at higher income levels in some states can "spend down" their income and qualify for Medicaid if they have large medical bills, (2) real state fertility rates at specific income levels might be higher, and (3) underinsured women who might qualify for Medicaid were not included in the estimate. Real births might have been smaller in some states because (1) not all eligible women enroll in Medicaid and (2) some states are more actively recruiting eligible women. If we have underestimated Medicaid births, we will have underestimated the federal and state share of cost savings. If we have overestimated Medicaid births, we will have overestimated the federal and state share of cost savings. In either case, we will have overestimated the federal and state share of cost savings if substantially smaller numbers of Medicaid-eligible WIC women are signing up for Medicaid than we assume. Whether we over- or underestimated Medicaid receipt and thus the federal and state share of cost savings would not affect the total cost savings at all, since medical costs not paid by Medicaid would merely shift to private payers.

The Health Care Financing Administration, which administers Medicaid, was not able to tell us the actual number of births financed by Medicaid. However the agency estimated that about 25 percent of all U.S. births (or between 900,000 and 978,000) are financed by Medicaid, which is slightly lower than our estimate.

To calculate the percentage of WIC births likely to be financed by Medicaid, we divided our estimated number of Medicaid-eligible births by total WIC income-eligible births. This gave us an estimate of 71 percent of Medicaid-eligible births among WIC births in 1990. We used this figure as

[7]Florida, North Carolina, Oregon, Utah, Vermont, and Washington.

[8]We also had numbers of Medicaid births in four other states—Minnesota and South Carolina for 1987 and New York and Texas for 1988. Even comparing those states' actual Medicaid births at earlier time periods with estimated 1989 Medicaid births, our estimate of Medicaid births is still an underestimate.

the percentage of WIC births financed by Medicaid in 1990. (We conducted essentially the same analysis for 1989, and estimated that 57 percent of WIC-eligible births were Medicaid-eligible in 1989. Actual receipt of Medicaid by WIC pregnant women in 1988, when fewer states had expanded eligibility for pregnant women, was 41 percent. Naturally the percentage of pregnant women on Medicaid in a sample is likely to be somewhat lower than the percentage of births financed by Medicaid, since some women may begin receiving Medicaid late in their pregnancy.)

We also calculated the total number of insured and uninsured women at state Medicaid eligibility levels in 1990—1,278,121. Dividing the total number of insured and uninsured women at 1990 state Medicaid eligibility levels by WIC-eligible births gave us an estimated 79 percent of WIC-eligible births being Medicaid-eligible births also. We used this rate for our high estimates (see app. V).

Estimating Costs of Low Birthweight Births

This appendix gives more detail about the methods used to arrive at our estimates of costs and cost savings associated with reducing the percentage of infants born at very low and moderately low birthweight.

Because normal birthweight babies also generate costs, we estimated the excess cost of low birthweight; that is, the difference in average cost between low birthweight and normal birthweight infants, based on their measured use or need for specific services. Unless otherwise noted, our cost figures are estimated separately for very low birthweight (less than 1,500 grams) and moderately low birthweight (between 1,500 and 2,499 grams) infants. Births of very low birthweight infants were 1.24 percent of all U.S. births in 1988—less than a fifth of low birthweight births. But very low birthweight infants are much more expensive than moderately low birthweight infants. Because they have higher rates of mortality, morbidity, and disability, their costs make up a much higher fraction of total excess low birthweight costs.

We estimate savings from three main categories of costs: short-term hospital costs, expected long-term disability costs, and expected special education costs. A large portion of our estimated costs for low birthweight infants comes from medical costs in the first year of life. These short-term costs include initial hospitalization, physician services, outpatient care, and first-year rehospitalization. Expected long-term disability costs include costs to the Social Security Administration for the Supplemental Security Income program and costs to Medicaid and other payers for long-term medical care, based on the probability that a low birthweight infant will be disabled. Expected special education costs, also based on the probability a low birthweight infant will need special education, include costs to federal, state, and local governments, all of which share responsibility for special education programs.

Total expected cost savings is thus the expected savings in excess cost per infant, multiplied by the number of infants we estimate were not born at low birthweight because of WIC in 1990. By comparing the cost savings identified here with the costs of implementing the WIC program for pregnant women, as described in chapter 4, we are able to estimate a benefit-cost ratio, as well as the net benefit of WIC's service to pregnant women.

Estimating Excess Medical Costs for Low Birthweight Babies in 1990

Our first step in estimating excess medical costs was to take Maryland hospital charge data and adjust them to try to represent a national estimate of hospital costs. We used Maryland's hospital charge data base because (1) Maryland collects detailed information on all hospital patients; (2) Maryland identifies charge data by birthweight, so we could calculate the excess charges for low birthweight infants, and (3) Maryland's Hospital Cost Review Commission sets hospital rates based on hospital costs and could therefore give us adjustment factors for each hospital that we used to reduce charges to costs. We analyzed the 1989 nonconfidential hospital discharge charges file to develop our cost estimates. This included all infants discharged from Maryland hospitals in 1989, including those who died in the hospital before discharge. Maryland's average hospital cost per admission, which was 7.6 percent below the national average in 1989, was adjusted upward by that amount, assuming a uniform distribution, to try to approximate the national average.

Initial Hospitalization Costs

For initial hospitalization costs we confined our analysis to hospitals that had neonatal intensive care units and to newborns who did not transfer to another institution within 1 day. Our goal was to derive the full hospitalization costs of infants in our chosen population. Inconsistent coding kept us from including all hospitals, since we would have had duplicate admissions from infants with problems who transferred into hospitals with neonatal intensive care units.

We were able to identify detailed charge data by admitting hospital, so that we could adjust hospital charges back to actual costs, using deflators given to us by the Maryland Hospital Cost Review Commission. We took the difference in average costs between normal and very low birthweight, and between normal and moderately low birthweight infants. We then adjusted these excess hospital costs twice more; first, to account for the 7.6-percent difference between hospital cost per admission in Maryland and the national average hospital cost per day, and second, to inflate the 1989 dollar figures to 1990 levels (an increase of 9 percent), using the medical services component of the Consumer Price Index for Urban Residents. Our estimate of the excess cost of the initial hospitalization includes the cost of infants who did not survive to be discharged. We applied this excess cost to the total estimated number of averted low birthweight births.[1]

[1]Implicitly, we assume that average costs by moderately low and very low birthweight are proportional at the national level to what we found looking at hospitals in Maryland. See appendix II for a discussion of the estimated number of such births averted.

Cost of Physicians' Services

We calculated the average cost of physicians' services during an infant's initial hospitalization as a fixed percentage of adjusted excess hospital cost. We used the midpoint (15 percent) of the Office of Technology Assessment's range of between 10 and 20 percent of the total cost of the infant's initial hospitalization as an estimate of the cost of physicians' services.[2]

For 1990 births, we estimated that national initial hospitalization costs averaged $32,612 more for each very low birthweight infant and $4,445 more for each moderately low birthweight infant than the cost of a normal birthweight infant (see table IV.1). Physicians' fees during initial hospitalization were $4,892 and $667 more for very low birthweight and moderately low birthweight infants, respectively, than for a normal birthweight child.

Table IV.1: Estimating Excess Initial Hospitalization Cost (Hospital Costs and Inpatient Physicians' Fees)

	VLBW	MLBW	Total
Births averted	13,755	22,762	
Average excess cost	$32,612	$4,445	
Average physicians' fees	$4,892	$667	
Total overall excess cost for initial hospitalization	**$516,000,000**	**$116,000,000**	**$632,000,000**

Note: We developed our estimate of the excess average costs by analyzing Maryland hospital discharge data for 1989 by birthweight, and estimated physicians' fees according to percentages used by the Office of Technology Assessment.

Cost of Outpatient Care

We derived outpatient care costs in the first year of life through two steps. First, we calculated the average inpatient-outpatient Medicaid payment ratio for 38 states and the Virgin Islands in 1989 for children under 1 year old, using Health Care Financing Administration data. We used this ratio as a proxy for the national average of a low-income infant's inpatient-outpatient cost ratio. We then multiplied the inverse of the average ratio of inpatient-outpatient Medicaid payment by the excess hospital (i.e., inpatient) cost estimate to arrive at an estimate of average outpatient costs.

[2]Healthy Children (1988). This midpoint estimate is close to that of Phibbs, Williams, and Phibbs (1981). They estimated the cost of physicians' services to be 16 percent of the initial hospitalization cost.

We applied our estimate of the excess cost of outpatient care to the fraction of the original group of low birthweight births averted who survived the neonatal period (the first 28 days of life).[3]

Rehospitalization Costs in the First Year

We used the Maryland hospital charges data to develop the average cost per day of inpatient services for infants 28 to 365 days old. Again, we deflated charges to costs, adjusted to 1990 dollars, and tried to approximate the national average. According to one study, the average total days of rehospitalization per infant rehospitalized is greater for low birthweight infants than for normal birthweight infants.[4] We multiplied the excess number of days that low birthweight infants were rehospitalized in that study by the adjusted average cost per day to arrive at an estimated excess cost for rehospitalization of low birthweight infants.

We applied our estimate of the cost of rehospitalization to the fraction of the original group of low birthweight births averted who survived the post-neonatal period (28 to 365 days).[5] These first year medical costs were $14,498 higher for very low birthweight neonatal survivors and $3,906 higher for moderately low birthweight neonatal survivors than for surviving normal birthweight infants (see table IV.2).

[3]We used National Center for Health Statistics calculations of excess neonatal mortality relative to normal birthweight infants for 1985 births—1.5 percent for moderately low birthweight infants and 33.4 percent for very low birthweight infants.

[4]McCormick, Shapiro, and Starfield (1980). The excess average days of rehospitalization were estimated to be 3.7 for moderately low birthweight infants and 8.4 for very low birthweight infants.

[5]Again using National Center for Health Statistics calculations from 1985 births, post-neonatal mortality was 1 percent for moderately low birthweight infants and 6.5 percent for very low birthweight infants.

Table IV.2: Estimating First Year Outpatient and Rehospitalization Costs

	VLBW	MLBW	Total
Neonatal survivors	9,158	22,423	
Average excess outpatient costs	$8,153	$1,111	
Average excess days hospitalized	8.4	3.7	
Cost per hospital day	$755	$755	
Costs per rehospitalization	$6,345	$2,795	
Per child total outpatient and rehospitalization costs	$14,498	$3,906	
Total outpatient & rehospitalization expenditures averted	**$133,000,000**	**$87,000,000**	**$220,000,000**

Note: Average excess outpatient costs were calculated by developing a Medicaid inpatient-to-outpatient cost ratio and applying it to the excess hospital cost. Estimates for excess average days rehospitalized were from McCormick, Shapiro, and Starfield 1980. Cost per hospital day was developed from Maryland hospital discharge data for all infants.

Total Excess Medical Cost Estimate

We defined total excess medical costs as the sum of (1) the average excess initial hospitalization costs, (2) the average physician costs, (3) the average outpatient care costs, and (4) the average excess rehospitalization costs. These were estimated separately for very low birthweight and moderately low birthweight infants. Each cost figure was multiplied by 1 minus the relevant birthweight specific mortality rate.

Total excess medical costs = VLBW hospital costs + MLBW hospital costs + [VLBW outpatient costs * (1 - VLBW neonatal mortality)] + [MLBW outpatient costs * (1-MLBW neonatal mortality)] + [VLBW rehospitalization costs * (1 - VLBW post-neonatal mortality)] + [MLBW rehospitalization cost * (1 - MLBW post-neonatal mortality)]

Medicaid Share of Total Excess Medical Costs

We assumed, based on the estimated percentage of WIC-eligible babies born to Medicaid-eligible mothers, that 71 percent of this population received Medicaid in 1990. Therefore, 71 percent of the total excess medical cost is charged to Medicaid.[6] A 1991 American Hospital Association study estimated that Medicaid pays only 78 percent of actual hospital costs. Therefore, we assumed that of the resulting total excess medical cost for which Medicaid was responsible, only 78 percent was

[6]See appendix III for a discussion of how we developed this estimate. Sensitivity analysis showed no significant difference in final outcome when the fraction of Medicaid-eligible babies was increased to 79 percent.

actually paid by Medicaid. The other 22 percent was paid by either other insurance companies, private payers, or the hospitals themselves.[7]

Federal, State, and Other Payers' Shares

Once we arrived at our estimate of total excess medical cost savings, we calculated the breakdown in savings by payer. Because Medicaid is a federal-state program, cost savings to the Medicaid program are divided between the federal government and the states. CBO estimates that nationally the federal government pays $0.55 of every Medicaid dollar and the states pay $0.45. In addition, in the category of "other payers," we grouped (1) the costs of the 29 percent of mothers who were not eligible for Medicaid in the first place and (2) the 22 percent of the Medicaid costs that were never paid by Medicaid. The cost savings in this category are spread across hospitals, insurance companies, and private payers.

Total Excess Medical Costs = Federal Medicaid Costs + State Medicaid Costs + Other Costs

Estimating Long-Term Disability Costs of Low Birthweight Children From 1990 to 2008

Our first step in estimating long-term disability costs was to compare rates for disability for low birthweight children to disability rates for normal birthweight children. We used this ratio to estimate the number of low birthweight births averted who would have been born disabled. Then we developed estimates of the average cost of a disabled child to the Supplemental Security Income program, the Medicaid program, and other payers. We multiplied these average costs by our estimate of disabled children and projected separately the resulting total costs to SSI, Medicaid, and other payers, discounted to present value, over 18 years.

Rates of Disability

We evaluated an extensive volume of literature on the rates of disability, by very low and moderately low birthweight (see bibliography, p. 103). The studies we reviewed showed a consistent pattern of higher rates of illness or disability among very low and moderately low birthweight children compared to normal birthweight children (see table IV.3). However, these studies varied by kind and number of illnesses or disabilities reported. We chose to use the differential rates reported in Hardy and others, 1979, because in our opinion the type and severity of disabilities they reported

[7](78% x 71% = 55%) We are assuming that Medicaid pays 55 percent of the medical costs of WIC-eligible pregnant women. Assuming that Medicaid pays 100 percent of the total excess medical cost of Medicaid-eligible women does not change the overall benefit-cost ratio, but does increase the federal and state shares of the total benefit-cost ratio.

best represent the disabilities of children on SSI. We then applied these differential rates of disability to our estimate of the post-neonatal survivors of the original group of averted low birthweight births.

Table IV.3: Low Birthweight Infants Have Higher Rates of Certain Disabilities

Research study[a]	Birth years	Location	Outcomes	Percent VLBW[b]	Percent MLBW[c]	Percent NBW[d]
Moderate to severe disabilities						
Hardy (1979)	1959-65	14 hospitals in 10 U.S. states	Cerebral palsy, mental retardation, seizures, visual and auditory impairments	12.1	4.0	1.3
Sabel (1976)	1969-70	Sweden	Cerebral palsy, mental retardation, hearing defects, hydrocephalus	5.9	3.7	0.3
Christianson (1981)	1959-67	San Francisco, CA	Moderate and severe congenital anomalies	36.5	23.7	12.8
Pharoah (1987)	1967-77	Mersey, U.K.	Cerebral palsy	2.7	0.6	0.1
Mild disabilities and early-onset medical conditions						
McCormick (1990)	1964-77	U.S. national sample	Special education &/or grade retention	33.8	19.6	13.5
McCormick (1980)	1976	Sites in 5 U.S. states	Rehospitalization	38.2	17.3	8.4
Phibbs (1981)	1976-78	San Francisco, CA	Hyaline membrane disease	52.8	25.4	3.6

Note: This table includes primary research studies that give morbidity/disability outcome prevalence rates for three or more birthweight categories, ordered by severity of outcome.

[a]In each case, to save space we have listed only the first-named author of the study.

[b]Very low birthweight.

[c]Moderately low birthweight.

[d]Normal birthweight.

SSI Cost Estimate

From the resulting total number of disabled low birthweight births averted, we assumed that 90 percent of those children would apply for SSI benefits.[8] However, based on the most recent acceptance figures from the Social Security Administration (SSA) that incorporate new eligibility rules, we assume that only 62.7 percent of those applications would result in children found eligible for SSI benefits.

[8]This percentage is relatively high because we assume that since many states are making efforts to identify potentially disabled children early, low birthweight children will be identified early as possible candidates for disability benefits and their parents will be encouraged to apply for them.

We used SSA's estimate of the average payment rate for a child in 1990 ($345 a month) as the basis for our estimate of the average SSI cost per child. We multiplied the SSA monthly estimate by 12 to get a cost per year and assumed that every child would start receiving SSI in his or her first year and continue to receive the benefit until age 18. We also assumed the cost of the benefit would remain constant over time in real terms.

Table IV.4: SSI Expenditures Averted

	LBW
Number disabled	1,494
Percent who apply for SSI	90
Number who apply for SSI	1,344
Percent given SSI benefits	62.7
Number given SSI benefits	843
Average monthly SSI benefit per child	$345
Averted SSI expenditures[a] per child	$63,297
Total expected SSI expenditures[a] averted	**$53,359,197**

Note: We assumed that 90 percent of disabled children at WIC income level might apply for SSI services. Of these, 62.7 percent would receive services—the current ratio of children receiving to children applying for SSI benefits. We assumed a child would continue to receive the benefit until age 18.

[a]Net present value after discounting at 2 percent and summed over 18 years.

Long-Term Medical Cost Estimate

Some disabled SSI children are also eligible for Medicaid. Thirty states and the District of Columbia grant Medicaid automatically with SSI receipt, and another seven require a separate application but grant Medicaid eligibility automatically. In other states, SSI applicants must apply separately for Medicaid. However, starting in 1990, children up to age 6 with family incomes at or below 133 percent of the federal poverty level are eligible for Medicaid. States have the option of covering children up to age 6 with family income up to 185 percent of the federal poverty level. Starting in 1991, children at or below 100 percent of the federal poverty level are eligible for Medicaid from age 6 until age 18. We totaled all estimated WIC income-eligible births in states that guaranteed Medicaid automatically and all estimated births at 100 percent of poverty in the other states. Dividing this total by all WIC income-eligible births equaled 77 percent. This could be an underestimate, because some additional children in states that do not automatically confer Medicaid eligibility with SSI receipt probably do receive benefits.

However, we also needed to estimate the number of Medicaid-eligible children among disabled children not on SSI. At least 50 percent of infants

born to WIC income-eligible mothers are born to families with income at or below 100 percent of the federal poverty level and are therefore Medicaid-eligible. Many states allow families to "spend down" their income to qualify for Medicaid when their medical expenses are high. Medicaid-eligible disabled children with higher medical expenses are more likely to be Medicaid-enrolled than all Medicaid-eligible children. Therefore, we believed 50 percent was an underestimate. We instead assumed 77 percent of all WIC-eligible disabled children, both those who received SSI benefits and those who did not, would receive Medicaid until age 18.

According to a 1988 study by Newacheck and McManus, disabled children have significantly higher average medical costs per year than nondisabled children. We used the Newacheck and McManus estimates of a disabled child's average excess cost of medical services in a year, which were based on data from the 1980 National Medical Care Utilization and Expenditures Survey. We inflated their excess cost estimates to 1990 dollars, using the medical services component of the Consumer Price Index for Urban Residents. By multiplying this average cost by the estimated number of children eligible for Medicaid, we arrived at the total estimated Medicaid cost of disabled children.[9]

Table IV.5: Medical Expenditures of Disabled Children Averted

	VLBW	MLBW	Total
First year survivors	8,559	22,223	
Excess disability rates	10.7%	2.6%	
Number disabled	916	578	**1,494**
Average excess medical costs per disabled child (1990)			**$1,079**
Averted medical expenditures per child[a]			**$26,264**
Total expected medical expenditures averted[a]			**$39,238,216**

Note: We used Hardy and others (1979) to estimate excess rates of disability and Newacheck and McManus (1988) for average excess costs of disabled children. We assume all children who survived to age 1 survive to age 18.

[a]Net present value assuming a 5.5-percent growth rate and a 2-percent discount rate and summed over 18 years.

[9]We assume that all disabled children eligible for Medicaid will actually apply for and receive Medicaid.

Federal, State, and Other Payers' Shares

Unlike the assumption made in the hospital cost estimate, we assumed that 100 percent of Medicaid disability costs were actually paid by Medicaid. We based this assumption on Yudkowsky and others (1990), whose research indicated that Medicaid payments for outpatient pediatrician care roughly equaled overhead cost.[10] Once again, responsibility for total Medicaid costs paid was divided between federal and state governments in a 55-45 split. The category of medical costs to other payers includes the percentage of disabled children's medical costs that was not covered by Medicaid.[11]

We projected all three components of medical costs—federal, state, and other payers—over 18 years. We assumed that the annual growth rate of medical costs, in real terms, was 5.5 percent, based on historical rates of growth. We calculated the present value of the stream of costs using a 2-percent discount rate.[12]

Estimating Special Education Costs of Low Birthweight Children From 1990 to 2008

Our first step in estimating special education costs was to determine the differential need for special education of low birthweight children compared to normal birthweight children. We used this differential rate to estimate how many children in the group of low birthweight births averted would have required special education. We then estimated the average excess cost per child of special education in 1990. We multiplied that average excess cost times the estimated number of low birthweight children requiring special education and projected total costs, discounted to present value and including a 2-percent annual growth rate, over 18 years.

[10]A more recent study by McManus and others (1991), found that Medicaid payments to physicians for pediatric care of established patients averaged less than two-thirds of market rates, although new patient care is reimbursed somewhat better. Medicaid payments compared to market rates varied widely by region.

[11]This percentage is assumed to be 23 percent, based on the calculations made on the previous page.

[12]We calculated the real annual growth rate of medical expenditures in the United States between 1969 and 1987, the last year for which data were available. We also estimated the net present value of medical costs over 18 years using an annual real growth rate of zero. The results did not change the positive return on the federal dollar, both for the federal government and for society as a whole, although net savings were lower. We based our discount rate on the real yield on a short-term Treasury bill in 1990. Rates of 5 percent and 10 percent were also calculated, with very little change in the final numbers.

Differential Need for Special Education

We used Chaikind and Corman's (1990) estimate of a 3.5-percentage-point differential in the need for special education between low birthweight and normal birthweight children.[13] Chaikind and Corman controlled for characteristics of the individual and the family in estimating the probability of a child attending special education classes, including poverty status and region of residence of the family; age, sex, and race of the child; and whether the child was low birthweight.

The Chaikind-Corman differential is the best estimate we found of the relationship between low birthweight and the need for special education. We applied the Chaikind-Corman differential to the post-neonatal survivors of the original group of low birthweight births averted to arrive at a total number of low birthweight children requiring special education services. Some problems with this estimate include the fact that Chaikind and Corman's sample is restricted to children aged 6-15, while we are interested in children from birth to 18 years old.[14] In addition, because of data problems, their number may actually be an underestimate of the true relationship between low birthweight and the need for special education, especially for black children.[15] As a result, our estimated number of special education recipients may also be low. Another indicator that this may be true is the higher estimate of seriously disabled children that results from using the rates of disability in Hardy. We would expect the number of seriously disabled children to be lower than the number of children needing some form of special education.

To get some idea of the magnitude of the possible underestimate of special education recipients, we looked at the ratio of the number of children on SSI in 1988 to the number of children receiving aid through the Education of the Handicapped Act—Part B (EHA-B) program and Chapter 1 of the Education Consolidation and Improvement Act—State Operated (ECIA-SOP) programs in 1987-88. Children on SSI were only 6 percent of the total number of children served through the EHA-B program and ECIA-SOP. Applying this same ratio to our estimates of SSI and special education recipients suggests that the number of low birthweight births averted who would have received special education could be as much as 12 times

[13]Chaikind and Corman used the Child Health Supplement to the 1988 National Health Interview Survey. McCormick, Gortmaker, and Sobol (1990) used the 1981 version of the same survey.

[14]We assume that the effect of low birthweight on the need for special education is the same across all age groups.

[15]According to some unpublished preliminary estimates made by W.S. Barnett, the data set used by Chaikind and Corman included an underreporting of the use of special education by black children. This leads to a bias downward in the effect of low birthweight on the need for special education, although Barnett estimates that the bias is not large.

higher. However, because the ratio of children on SSI to children receiving special education involves estimates in both the numerator and the denominator, it is not clear which estimated number is closer to its true value. A better number to use would be the ratio of children on SSI to WIC income-eligible children in special education, but that information was unavailable. As a result, we did not change our original estimates of the number of low birthweight births averted who would have received SSI and special education in our final "best guess" calculations.

Estimation of Excess Costs of Special Education

We estimated the average excess cost of special education in 1990 by two methods—using Department of Education expenditure and enrollment figures for the major special education programs and a special Department of Education-commissioned study on the excess costs of special education. In our initial analysis, assuming a zero real growth path for special education costs, the two methods produced estimates that were extremely close to one another.

Method One

In order to estimate the number of LBW children who did not need each specific federal special education program, we first estimated what proportion of all special education recipients were served by each program. Using the Department of Education's published figures on average per pupil allocations and total amount distributed in 1990, we estimated the number of children served by Chapter 1 Handicapped, Part B, Part H, and the Preschool Grant Program (619), the four major federal special education programs. The Chapter 1 Handicapped program serves children from birth to age 21. Anyone participating in this program is not eligible for funds from Part B. The Part B program serves children from age 3 to age 21. Three to five year olds receiving special education and related services may have services funded through both Part B and the Preschool Grant program. Before age 3, children in need of special education or early intervention services can be served by Chapter 1, Part H, both Chapter 1 and Part H, or Part B. (Such children would not be counted for purposes of Part B, but may be counted under the Chapter 1 Handicapped program). Therefore, we estimated the total number of special education children served to be the sum of the children served by Chapter 1 and Part B, since these programs do not overlap.

Based on the Department of Education's breakdown of numbers of children served in each program in 1990, we calculated that 6 percent of all children served participate in the Chapter 1 program, and the other 94 percent participate in the Part B program. The Part H and Preschool Grant

programs serve children 0-2 and 3-5 years old, respectively. The children 3-5 years old are assumed to be part of the Part B child count. We estimated that 4 percent of the children served by Part B were also served by Part H, and 8 percent of the children served by Part B were also served by the Preschool Grant program.[16]

We applied these percentages to the estimate of the total number of low birthweight children requiring special education services in order to estimate the numbers of children served by specific programs. Because each program serves children at different ages and for varying lengths of time, we summed the average per-pupil program expenditure over the appropriate number of years, discounting future expenditures to present value. It is not clear if the special education expenditures reported by the states are expenditures in excess of the average expenditure on regular education. This was another reason for our decision to estimate expenditures on special education by two methods. We then multiplied each total program cost by the estimated number served in each program.

Some of the limitations of this method of estimating excess special education costs arise from the limitations of the data provided by the Department of Education. Since expenditures vary across the states, and state reporting of expenditures is not always consistent, these figures are most likely underestimates of the numbers of children being served. In addition, while the four programs defined here represent most federal spending on special education, there are other programs, such as Services for Deaf and Blind Children, Research and Demonstration Projects, that have been excluded because we lacked information on either total expenditures or numbers of children served.

Method Two

To check the accuracy of our cost estimates, we estimated the excess average cost of special education by a second method. In 1988 the Department of Education funded a study by Decision Resources Corporation (DRC), Patterns in Special Education Service Delivery and Cost. The study included a survey of special education expenditures. From information acquired in the survey, the DRC researchers estimated the average excess cost of special education in the 1985-86 school year. We

[16]While we recognize that Part H recipients are not included in the Part B child count, and may actually receive funds from either Part B, Chapter 1, or Part H alone, we estimated participants of Part H as a percentage of Part B participants because the Part B program contains the majority of all special education recipients.

took that estimate as our baseline and inflated it to 1990 dollars, using the all items component of the Consumer Price Index for Urban Residents.

The National Center for Education Statistics' medium projection of an annual growth rate for regular education expenditures is 2 percent. While there is some evidence to suggest that the growth rate for special education may be higher, we have no good estimate of it. Therefore, we assumed that the annual growth rate of special education costs is also 2 percent.[17] We then projected average excess costs over 18 years, discounted to present value, for the number of children estimated not to need special education due to not being born at low birthweight.

Federal, State, and Local Shares

For both methods, we estimated the portion of the total expenditure on special education funded by federal, state, and local governments separately. We used information from the Department of Education on the breakdown in expenditures in the 1986-87 school year in these three categories, and assumed that each entity's proportion of total expenditure did not change between 1986-87 and 1990. Thus, for the first method, which gives us total federal expenditures only, we first estimated total expenditures by applying the inverse of the ratio of federal funding to total funding, and then went on to estimate state and local funding as well. In the second method, where we estimated total expenditures on special education, we simply applied the appropriate ratios to get separate estimates of the federal, state, and local totals.

The difference between the two methods, assuming a zero growth path of special education costs, was not large. The totals derived from the DRC study were slightly higher in all three categories. This is to be expected, since the expenditure survey they are based on included spending for special education at residential institutions, as well as spending for services related to special education that may have been left out of the figures collected by the Department of Education from the states. We therefore opted to use the estimates derived using the DRC study, including a 2-percent real growth rate, in all of our later calculations in order to have a more accurate accounting of the average excess cost of special education.

For the extra fraction of the 1990 WIC infants that would have required special education services if born at low birthweight, the net present value

[17]We also used a high estimate of 3.3 percent from the National Center for Education Statistics, and a low estimate of 1.25 percent from the Chaikind and Corman study. We found the results did not significantly change either the federal benefit-cost ratio or the overall benefit-cost ratio by more than a few cents.

of the excess cost of special education over 18 years would average almost $84,000 per child. We estimate the expected cost savings from special education for children whose mothers received WIC in 1990 to be $90 million (see table IV.6).

Table IV.6: Averted Expenditures for Special Education

	LBW
First year survivors	30,782
Excess percentage rate of special education[a]	3.5
LBW birth averted survivors needing special education	1,077
Excess cost of special education per child (1990)	$4,664
Percentage growth rate of special education expenditures[a]	2
Special education expenditures averted per child[b]	$83,982
Total expected special education expenditures averted[b]	**$90,448,340**

Note: We used Chaikind and Corman (1990) to estimate the percentage point differential in need for special education, and Decision Resources Corporation 1988 for the costs of special education, inflated to 1990 dollars with an annual growth rate of 2 percent (National Center for Education Statistics medium projection for all education).

[a]The rate used to calculate this number may be low—see discussion.

[b]Net present value assuming a 2-percent growth rate and a 2-percent discount rate summed over 18 years.

Range of Estimates of Federal and Total Benefit-Cost Ratios for WIC

Benefit-cost estimates	2% discount rate		5% discount rate		10% discount rate	
	Federal	Total	Federal	Total	Federal	Total
High	1.51	3.50	1.46	3.37	1.40	3.23
Medium	1.14	3.50	1.09	3.37	1.03	3.23
Low	1.12	3.46	1.07	3.34	1.02	3.21

Assumptions:

- High: special education cost growth rate = 2%;
  Medicaid eligibility for disabled = 77%;
  Medicaid eligibility for mothers = 79%;
  Medicaid paid for disabled and mothers = 100%.
- Medium: special education cost growth rate = 2%;
  Medicaid eligibility for disabled = 77%;
  Medicaid eligibility for mothers = 71%;
  Medicaid paid for disabled = 100%;
  Medicaid paid for mothers = 78%.
- Low: special education cost growth rate = 0%;
  Medicaid eligibility for disabled = 50%;
  Medicaid eligibility for mothers = 71%;
  Medicaid paid for disabled = 100%;
  Medicaid paid for mothers = 78%.

Comments From the Department of Agriculture

United States Department of Agriculture
Food and Nutrition Service
3101 Park Center Drive
Alexandria, VA 22302

JAN 2 1 1992

Ms. Linda G. Morra, Director
Human Services Policy and Management Issues
Human Resources Division
U.S. General Accounting Office
Washington D.C. 20548

Dear Ms. Morra:

This letter is in response to the General Accounting Office (GAO) report entitled, "Early Intervention: Federal Investments Like WIC Can Produce Savings." The United States Department of Agriculture (USDA) finds that the overall conclusion of the report concerning the cost-effectiveness of prenatal WIC participation is a valid one, and is pleased that GAO recognizes the importance of the WIC Program. As addressed below, USDA would like to respond to some of the recommendations and conclusions of the report:

Now on p. 39.

I. CONCLUSIONS (p. 62)

GAO makes the assertion that the number of pregnant women served by WIC could be expanded by changing the formula for allocating federal funds to States.

AGENCY RESPONSE

Eligibility and coverage estimates by FNS for Fiscal Year 1990 showed that 85 percent of fully eligible pregnant women were receiving WIC services.** State and local agencies typically focus most heavily on reaching pregnant women in their outreach efforts. Many of the remaining 15 percent of unserved eligible pregnant women may be largely unreachable due to a variety of barriers not attributable to a lack of funds.

Now on p. 34.

The chart on page 52 of the GAO report showing the priority levels served by States is incomplete. FNS examined final priority data for May 1990, the same month used in the report, and ascertained that every State served participants in Priority IV (women and infants with dietary risk) and Priority V (children with dietary risk). Since all States are serving Priority V participants, FNS assumes that few, if any, Priority IV pregnant women are being denied benefits. FNS believes, then, that pregnant women are essentially a fully served category.

Now on pp. 35-36.

** On pp. 55-56 of the report, GAO overestimates the number of eligible pregnant women. This issue is further discussed in Attachment A of this letter.

Now on p. 39.

II. MATTER FOR CONGRESSIONAL CONSIDERATION (p. 62)
GAO recommends that Congress should consider making all pregnant women with family incomes up to 185 percent of the federal poverty level eligible for WIC, irrespective of their level of nutritional risk.

USDA Response
Eligibility could be expanded to include all income-eligible pregnant women, regardless of nutritional status. As estimated by FNS, 91 percent of income-eligible pregnant women are determined to be at nutritional or medical risk. Since pregnant women constituted only 14 percent of the participants served in 1990 with 85 percent of those fully eligible being served, expanding participation to include the remaining 9 percent of income-eligibles not covered by the nutritional risk definition would be possible within existing funding levels. Of course, without increased funding, fewer lower-risk children and postpartum women would receive services.

FNS does not, however, support the elimination of nutritional risk as an eligibility criterion, since participation in many other services is tied to a participant's nutritional risk assessment as evaluated by WIC staff. The WIC Program is unique in that, as a major characteristic of the program, each participant is assessed and evaluated on an individual basis to determine their nutritional risk. Also, WIC benefits are substantially enhanced by the individualized food prescriptions and nutrition education provided based on participants' particular nutritional risks as determined by qualified health care personnel. The elimination of this criterion may reduce the Program's role in identifying and alleviating nutritional problems in participants. This view is also shared by the National Advisory Council on Maternal, Infant and Fetal Nutrition, which clearly recommends the continuation and use of nutritional risk criteria in the WIC Program.

Now on p. 39.

III. RECOMMENDATIONS TO THE CONGRESS AND TO THE SECRETARIES OF AGRICULTURE, HEALTH AND HUMAN SERVICES, AND EDUCATION (p. 63)

GAO recommends that the Departments of Health and Human Services, Education and Agriculture identify and collect more outcome and cost data on their programs with which to estimate the effectiveness of those programs, and the savings that accrue to the government.

AGENCY RESPONSE

USDA agrees with GAO that there is a need to improve data systems. In fact, USDA is working cooperatively with the Department of Health and Human Services to improve data systems as part of the Healthy People 2000: National Health Promotion and Disease Prevention Objectives. However, collecting the kind of data that GAO recommends is expensive,

time-consuming, and requires a high level of interagency cooperation both to secure access to States' administrative data, and to link and maintain large longitudinal databases. The WIC Medicaid study is a good case in point. The project cost about $1.2 million. More than 200 computer programs were required to link each of the five States' WIC, Medicaid and Vital Records files. Even then, there were not enough explanatory variables available for an adequate comparison between WIC participants and eligible nonparticipants. This issue is further discussed in Attachment B of this letter.

Other difficulties include the fact that States differ in their ability to collect and manage complicated data bases, although improvements continue; and USDA had to work individually with each of the individual agencies within each State to obtain the release of the data. Some States were not able or not willing to participate in part due to confidentiality concerns.

Now on p. 40.

IV. RECOMMENDATIONS TO THE SECRETARY OF AGRICULTURE (p. 64)

GAO recommends that the Department's formula for allocating WIC funding to State agencies be revised so that allocation is based primarily on the estimated number of eligible pregnant and postpartum women, infants and children within the State. GAO also recommends that the Department more fully examine WIC's effect on infants, children, and postpartum women, and any associated cost savings.

AGENCY RESPONSE

To preserve Program stability and continuity, the current funding formula was constructed to ensure that States would not suffer drastic decreases in participation from one year to the next. The majority of food funds are allocated through this stability component, although the number of each State's potentially eligible participants is an important factor in the determination of funds. Towards the latter part of a decade, eligibility data becomes outdated and can be grossly inaccurate if used as the sole or major determinant of State funds. For example, because the 1990 Census was not yet available, it was necessary to rely on the 1980 Census in allocating Fiscal Year 1992 funds. Preliminary census data are projecting major shifts in poverty in this country from the 1980 Census, but these data will not be reflected in the allocation of WIC funds until at least Fiscal Year 1993. Once the 1990 Census is officially released, however, FNS intends to revisit this issue to determine whether the funding formula could be modified to allocate a larger percentage of funds based on each State's eligible population.

The Department is actively involved in research on WIC's impacts on each participant group, as our record of recent publications attests. In 1990, we released the WIC Medicaid study, which examined the effect of WIC on birth outcomes and Medicaid costs during the first 60 days postpartum. In 1991, we released a follow-up analysis examining the effect of WIC on Medicaid costs for services beginning in the first 60

Ms. Linda G. Morra 4

days postpartum. The Department is about to release a report which discusses WIC's effect on the very low birthweight rate among Medicaid newborns, also based on the 1987-88 WIC Medicaid data. A study of WIC's effect on infant mortality among Medicaid newborns is currently in progress. The Department agrees that it is important to study WIC's impact on participants, and will continue to include such studies in its research plans over the next few years, within the constraints of the research budget. The Department is continuing to study the best way to evaluate WIC's impact on children from one to five years of age, and expects to issue an announcement on that subject in the next few months.

We hope the issues addressed herein will be considered or noted in the final report. USDA would also like to acknowledge some concerns about the methodology used to estimate and project cost savings in the report. After a thorough technical review, USDA has concluded that the true cost savings attributable to prenatal participation in the WIC Program are likely to be somewhat lower than the estimates presented by GAO. These concerns are discussed in detail in Attachment B. Additional minor concerns on specific report pages are discussed in Attachment C. Thank you for this opportunity to respond.

Sincerely,

Betty Jo Nelsen
Administrator

Enclosures

ATTACHMENT A

Estimate of WIC-Eligible Pregnant Women:

The GAO report referred to an outdated interim estimate of WIC-eligible pregnant women that was never publicly released. FNS estimates that approximately 765,000 pregnant women were eligible for WIC in 1990 based on both income and nutritional risk. This estimate is based on the March 1991 Current Population Survey. At the 1990 average monthly participation level of 659,000, coverage of pregnant women was about 85 percent.

FNS estimated the number of pregnant women eligible for WIC in 1990 based on the number of infants in families with incomes at or below 185 percent of poverty in the March 1991 CPS. FNS used a factor developed from analysis of the 1980 Decennial Census to derive the estimate of eligible pregnant women. Decennial Census data allowed counting women below 185 percent of poverty (income eligible for WIC) with infants up to 9 months of age. This is a good proxy for pregnant women when adjusted to account for infant and fetal deaths. The number of income eligible pregnant women identified by this method represented 48.3 percent of the number of income eligible infants. This is different from GAO's use of a 75 percent factor to estimate income eligible pregnant women from income eligible births. FNS believes that the 48.3 percent factor reflects the impact of changing household size on income eligibility when a pregnant women delivers her child and an infant enters the household.

The methodology used by FNS to produce national eligibles estimates is strong for several reasons: it is replicable, allowing timely annual updates; it uses the CPS which has the most current income data available and a larger sample size than other alternatives to Decennial Census data; and, it uses factors for pregnant woman by poverty level developed from the detail and large sample size of the Decennial Census.

GAO used a different methodology and different years of data to estimate the number of WIC-eligible pregnant women and attempted to account for new program rules allowing pregnant Medicaid participants automatic WIC income eligibility. FNS believes that GAO overestimates the number of eligible pregnant women, and therefore underestimates program coverage, for two reasons: 1) GAO overestimates the impact of Medicaid adjunct eligibility; and, 2) GAO overstates the fertility rate of low-income women.

Without further research, FNS cannot comment on whether the higher factor used by GAO is the appropriate factor to account for Medicaid adjunct eligibility. However, if the appropriate factor is different from the one applicable for pregnant women not participating in Medicaid, it should only apply for the States where Medicaid coverage for pregnant women is at 185 percent of poverty. According to the GAO report, less than half of WIC pregnant participants are in States where the Medicaid eligibility limit is 185 percent of poverty. In that case, the factor to adjust for Medicaid participants would apply to less than half of the eligible population.

A recent Census Bureau report on the fertility of American women indicated that though low-income woman have higher fertility rates than women on average, the difference is below the 42 percent used in the GAO report. Women in the poorest households (those with income less than $10,000) had a fertility rate of 87.5 per thousand, that is 31 percent higher than the U.S. average rate of 67 per thousand in 1990. As income grew, fertility rates decreased to: 76.1 with incomes $10,000 - $14,999; 75.9 percent with incomes $15,000 - $19,999; and, 64.2 for incomes $20,000 - $29,999. A rough estimate indicates an average for low income women about 20 percent higher than the U.S. average.

ATTACHMENT B

Estimation of Cost Savings

GAO uses a simple conceptual framework in which the outcome of prenatal WIC participation is a lower incidence of low birthweight. Lower incidence of low birthweight in turn is assumed to be associated with lower health care costs, lower educational costs, and lower supplemental income costs. As a result of the reduced incidence of low birthweight, federal, State and local governments avert expenditures during the first 18 years of life amounting to $3.50 for each dollar spent on prenatal WIC.

In order to arrive at these conclusions, GAO aggregated the findings of 17 studies that have examined the impact of WIC on low birthweight, and used their results to approximate a national estimate of WIC's impact on birthweight. The aggregate impact estimate is used to project the number of infants who would have been born at low birthweight in 1990 in the absence of WIC. The difference between the actual number of low birthweight babies and the number that would hypothetically have been born in the absence of WIC is assumed to be a direct result of the WIC intervention. The average educational, health care, and supplemental income costs associated with low birthweight are then used to estimate the amount of public expenditures currently being averted over the course of the first 18 years of life due to WIC. GAO then generalizes from these data and concludes that additional savings would be possible if the WIC Program served all pregnant women who are income eligible for WIC regardless of nutritional risk.

The projected savings are based on GAO's estimate of the size of the WIC eligible population (discussed above), the assumption that past impact data can be used to project future impacts, the assumption that WIC will have largely the same effect on all income eligible pregnant women regardless of variations in income and risk status, and other measured and unmeasured differences between WIC participants and eligible nonparticipants. The savings are also based on the assumption that the conceptual framework adequately accounts for the direct and indirect outcomes of WIC from birth to 18 years of age, the benefits and costs associated with them, and the costs of other federal programs serving the WIC income eligible population. In fact, USDA believes that these assumptions do not necessarily hold.

As previously discussed, the estimates of eligible pregnant women GAO uses to project additional savings use a different estimation methodology, and are considerably higher than those USDA believes accurately reflect the size of the WIC income eligible population.

With only one exception, the studies that GAO uses to estimate WIC's impact on the 1990 birth cohort were collected between 1982 and 1988. None of the studies used in the synthesis were nationally representative. GAO nonetheless aggregates them weighted on the basis of sample size to come up with a national estimate of WIC's impact. In addition, numerous changes in the WIC and Medicaid Programs occurred both during and after the period in which these studies were undertaken. In 1988, for example, Congress relaxed the income criteria needed to qualify for Medicaid benefits. In addition, they passed legislation

intended to increase coordination and cross-referral between the WIC and Medicaid Programs. As a result of these initiatives and increases in WIC participation and coverage, the composition of the WIC and WIC-eligible nonparticipating populations is likely to have changed dramatically since 1988. Extrapolating from the pre-1988 WIC eligible population to the 1990 birth cohort assumes that the effect of WIC remains the same regardless of changes in the composition of the target population.

In its synthesis, the GAO study relies most heavily on data from USDA's 1990 study of The Savings in Medicaid Costs for Newborns and Mothers from Prenatal Participation in the WIC Program (the WIC Medicaid Study). As a result of the weighting system used in the aggregation of studies, the GAO estimates most closely reflect the effect of WIC on the extremely low income women who qualified for Medicaid in 1987-88, and who made up most of the sample. The WIC Medicaid data suggest that very low income women are more likely than the general population to experience poor birth outcomes. Generalizing from these data to the entire WIC income eligible population is likely to result in an overestimate of savings. In addition, the WIC Medicaid study suggests that there is considerable variation in WIC's impact from State to State, and that the impact of prenatal WIC is greatest for the lowest income women. The largest effects were found in States with lower Medicaid eligibility ceilings. The smallest effects were found in Minnesota, the State with the highest income eligibility ceiling.

GAO further assumes that the impact of WIC on participating women can be generalized to income eligible nonparticipating women as if they were directly comparable. In practice, USDA has found that defining an adequate comparison group for WIC participants is a major methodological issue in WIC research because there are both measured and unmeasured differences between WIC participants and eligible nonparticipants which may affect birthweight as well as other potential outcomes of WIC. Where there are initial, unmeasured differences between groups that affect the outcome of interest, selection bias is said to be operating. None of the studies reviewed by GAO, including USDA's WIC Medicaid study, adjusted their results for selection bias. In the case of the WIC Medicaid study, it was not done because the additional variables needed to model selection bias were not available in the WIC, Medicaid, or Vital Records administrative databases. The GAO report does not adequately discuss selection bias or other methodological limitations of extant literature on the effects of prenatal WIC, the scope of the studies, and limitations to the generalizability of their results. Based on the differences in effect sizes found in the WIC Medicaid research, USDA believes that generalizing from the extremely low income WIC Medicaid sample of 1987-88 to the 1990 WIC eligible nonparticipants is likely to result in an overestimate of the potential impact of WIC on the eligible population overall.

GAO assumes that the only possible effect of early intervention programs is to increase savings in other government programs, and that the conceptual framework used in this report encompasses all of the most important direct and indirect effects of WIC from birth to 18 years. In practice, the report looks at only one outcome (birthweight), and assumes the effects to other programs are always positive. This is an oversimplification. In fact, it is possible that by improving the birthweight distribution, WIC actually increased the costs of other programs. This would occur, for example, if WIC increases the survival rate of ill

infants who might otherwise have died. Other effects are also possible. In addition to supplementary foods, the WIC Program provides participants with nutrition education, and referrals to other health care services. Prenatal WIC participation serves as the entry point into the health care system for many women. By providing referrals to other services, it may actually increase the use of preventive health care and other services, especially in the short run.

Comments From the Department of Education

UNITED STATES DEPARTMENT OF EDUCATION

OFFICE OF SPECIAL EDUCATION AND REHABILITATIVE SERVICES

THE ASSISTANT SECRETARY

JAN 24 1992

Ms. Linda G. Morra
Director, Human Services Policy
and Management Issues
United States General Accounting Office
Washington, D.C. 20548

Dear Ms. Morra:

I am pleased to provide you with the Department's response to the recent General Accounting Office (GAO) draft report "Early Intervention: Federal Investments like WIC Can Produce Savings," which was transmitted to the Department of Education by letter dated December 16, 1991. The Department believes that the report is well written and well organized, and that the methodological approach that was used was generally sound.

The U.S. Department of Education administers seven early intervention programs. Three programs are administered under the Individuals with Disabilities Education Act, including the Part H program for Infants and Toddlers with Disabilities, the Part B Preschool Grants Program, and the Early Education Program for Children with Disabilities. In addition, four programs are administered under the Elementary and Secondary Education Act, the Chapter 1 program for Disadvantaged Children, the Chapter 1 State-operated and State-supported Programs for Children with Disabilities, and the Even Start Program.

Following is the recommendation made to the Secretary in the draft report, and the Department's response to the recommendation:

Recommendation

- **Assess ongoing early intervention programs for children and (1) identify and collect data needed to estimate cost savings and (2) estimate the extent to which these programs provide cost savings to the federal and state governments or other beneficiaries, to help determine the most appropriate investments to make in services for children.**

Department of Education Response

The Department concurs with the recommendation to collect information regarding the costs and benefits of early intervention programs. Thus, the Department of Education will, from time to time, continue to support special studies to assess the costs and benefits of early intervention programs.

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Page 2 - Ms. Linda G. Morra

In addition, the Department will continue to work closely with groups such as the Technical Planning Subgroup on Readiness for School of the National Education Goals Panel to identify multiple outcome measures that go beyond simple cost savings in estimating the benefits of the programs.

Historically, the Department has sponsored numerous efforts to collect cost and outcome information related to early intervention programs. In fact, such information constituted much of the rationale that the Congress used when it established and subsequently expanded the early intervention programs we administer. For example, the Department of Education was a principal sponsor of the cost-benefit studies conducted by the High Scope Foundation; the Department supported a follow-up study of children who participated in the Department of Health and Services' Perinatal Project; the Department has supported an early childhood research institute to conduct meta-analyses and prospective studies of the effects of early intervention for children at risk and children with disabilities; and the Department continues to support smaller-scale research and evaluation projects to determine the relative costs and benefits of different early intervention approaches and strategies, such as Program Features Projects and Experimental Projects under the Early Education Program for Children with Disabilities.

For the most part, the results of these investigations have demonstrated that early intervention programs are effective and do result in cost savings. Such cost savings are often reflected in children requiring less intensive and less costly services as they enter and proceed through the school system and into their adult lives. Importantly, there are other benefits of early intervention (such as improved quality of life, participation in community functions and activities, improved self-esteem and social-emotional development, greater levels of achievement, and support for the family) that studies of cost savings do not often capture as they are not readily quantifiable. The report acknowledges this by briefly mentioning that early intervention programs may yield benefits above and beyond cost savings. The Department fully agrees and believes that finding reliable measures of these benefits is important to achieving an accurate picture of the true relationship between the costs and benefits of such programs. One example of viewing the potential benefits of early intervention programs in a broader way is the approach being taken by the Technical Planning Subgroup on Readiness for School of the National Education Goals Panel. This Subgroup, in considering approaches to determine children's readiness for school, is advocating the use of multiple measures (including measures of the child's health and information about previous services and experiences). The Department believes that future cost-benefit studies of early intervention programs may yield more accurate information by applying such a multidimensional approach to outcomes.

Page 3 - Ms. Linda G. Morra

I appreciate the opportunity to comment on this report. I and members of my staff are prepared to respond if you or your staff have any questions. I have provided technical comments related to the draft report that are included as Enclosure A.

Sincerely,

Robert R. Davila

Enclosure

Comments From the Department of Health and Human Services

DEPARTMENT OF HEALTH & HUMAN SERVICES

Office of Inspector General

Washington, D.C. 20201

FEB 10 1992

Ms. Linda G. Morra
Director, Human Services Policy
and Management Issues
United States General
Accounting Office
Washington, D.C. 20548

Dear Ms. Morra:

Enclosed are the Department's comments on your draft report, "Early Intervention: Federal Investments Like WIC Can Produce Savings." The comments represent the tentative position of the Department and are subject to reevaluation when the final version of this report is received.

The Department appreciates the opportunity to comment on this draft report before its publication.

Sincerely yours,

Bryan Mitchell
For Richard P. Kusserow
Inspector General

Enclosure

COMMENTS OF THE DEPARTMENT OF HEALTH AND HUMAN SERVICES ON THE U.S. GENERAL ACCOUNTING OFFICE'S DRAFT REPORT, "Early Intervention: Federal Investments Like WIC Can Produce Savings"

General Comments

We agree that prevention and early intervention programs [such as the Childhood Immunization Program, and the Special Supplemental Food Program for Women, Infants, and Children (WIC)] have the potential to produce fiscal benefits through immediate and longer term reductions in the need for other publicly financed services.

The GAO accurately points out the shortage of data critical to decision-making regarding the cost-effectiveness of early and other prevention interventions. This shortage played a key role in the Centers for Disease Control's (CDC) decision to add immunization status information in 1991 to the Health Interview Survey conducted by the National Center for Health Statistics. The CDC also implemented a retrospective survey to collect and analyze the immunization status of kindergarten and first grade school health records beginning with the 1991/92 school year. This survey is included in the immunization program announcement for funding. The survey results will provide an immunization profile of children entering school in the fall of 1991 relative to their immunization status during their preschool years.

The CDC also began conducting demonstration projects in conjunction with the U.S. Department of Agriculture's WIC program in September 1990. The purpose of these demonstration studies is to evaluate the effectiveness of several methods of increasing the immunization levels of children enrolled in WIC programs. Methods to be evaluated include: (1) WIC-based assessment of client immunization status and referral of delinquent clients for immunization to an on-site or off-site immunization clinic; and issuance of a one month's supply of food vouchers instead of the usual three month's supply; (2) WIC-based assessment of immunization status and immunization of delinquent clients in the WIC clinic; and (3) assessing the impact of videotaped messages about the benefits of immunization in the WIC clinic waiting room. The method which proves to be the most cost-effective in raising immunization levels of WIC clients may be used on a nationwide basis.

GAO Recommendation

GAO recommends that the Congress, when legislating new early intervention programs, require the administering department to identify and collect standard outcome, participant, and cost data to enable the department to estimate potential program cost savings.

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Department Comment

We do not concur with this recommendation. Although we found the cost-benefit analysis for the WIC program to be interesting, we have serious concerns about the report's recommendation that such analyses should become a legislatively required component of all future early intervention programs within various governmental agencies. There are a number of significant problems with attempting to generalize the methodology and findings of the WIC study to other early intervention programs.

First, the specific benefits of the WIC program chosen for analysis and the resulting outcomes are easily identified, quantified, and given a monetary value. This ease in specification is partially due to the relatively uncomplicated and linear causal relationship between the provision of these specified benefits and the resulting decrease in the rate of low birthweight babies. In contrast, many early intervention programs, including those within the Department's Administration for Children and Families (ACF), are much more complicated, involving sets of variables which may not be as easily evaluated by this type of cost-benefit analysis. For example, some types of expected outcomes although easily identified and quantified, (e.g., grade retention rates, achievement scores, etc.), are more difficult to readily translate into monetary value.

Second, given the current technical difficulties in measuring expected (or unexpected) program outcomes, we think it inadvisable to recommend that Congress legislate mandated cost-benefit analyses for every new early intervention program that is funded.

GAO Recommendation

We recommend that the Secretaries of HHS and Education assess ongoing early intervention programs for children, such as Head Start, the Childhood Immunization Program, and special education programs, and (1) identify data needed to estimate cost savings, using our or a similar framework; (2) develop needed evaluation data; and (3) estimate the extent to which these programs provide cost savings to the federal and state governments or other beneficiaries.

Department Comment

Considering the current state-of-the-art in program evaluation methodology and the limitations of the WIC analysis, we believe that GAO's recommendation that HHS undertake cost-benefit analyses on its early intervention programs for children, such as the Head Start Program in ACF, is premature.

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However, we concur that where appropriate such analyses should be undertaken. For example, opportunities exist through the Childhood Immunization Program in the Public Health Service to screen for immunization and, where practical, to vaccinate children on-site. Although inner city preschool children are often described as "hard to reach," many of these children are in regular contact with public assistance programs that typically service enrolled families monthly. Currently few children are vaccinated at sites offering other public assistance programs, because different agencies are involved.

Investigations of inner city measles outbreaks during 1989 and 1990 in Chicago, Dallas, Los Angeles, Milwaukee and New York indicate that 40 to 91 percent of unvaccinated preschool children who developed measles were enrolled in one or more public assistance programs, most commonly Aid to Families with Dependent Children (and consequently Medicaid) as well as the Supplemental Food Program for WIC.

Failure to adequately vaccinate many children currently enrolled in public assistance programs suggests that many of the potential benefits gained by recent expansions in Medicaid eligibility may not be realized unless steps are taken to assure immunization is an integral part of program activities. Nearly one out of every three children younger than six--more than 6 million children in all--may now receive Medicaid benefits.

GAO Recommendation

We recommend that the Secretary of Health and Human Services (HHS) examine current birth outcomes by income level, insurance status and other characteristics as deemed significant by the Secretary and advise the Congress on whether WIC eligibility levels for pregnant women should be raised above the present income eligibility level for any specific type of low-income women.

Department Comment

We agree that the Secretary, in the context of other program priorities, should examine birth outcomes by income level, insurance status and other characteristics deemed significant by the Secretary and advise the Congress on whether WIC eligibility levels for pregnant women should be raised above the present income eligibility level for any specific type of low-income women.

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