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Program and Services to Improve the Nutrition of Pregnant Women, Infants and Young Children

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Introduction

Pregnancy, infancy and early childhood are periods of rapid physiological growth and development. Insufficient nutrition during these critical growth and developmental periods places infants and children at risk of impaired emotional and cognitive development and adverse health outcomes. As a result, many programs and services educate pregnant and postpartum women about the importance of good nutrition and encourage them to feed their children and families healthy and nutritious foods.

Probably the largest and most visible program providing services to improve the nutritional status of pregnant women and children is the U.S. Supplemental Nutrition Program for Women, Infants, and Children (WIC). WIC provides supplemental foods, nutrition education, and health care and social service referrals to low-income pregnant, breastfeeding, and postpartum women, to infants, and to children one to four years of age who are at nutritional risk. In the United

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States, almost half of all infants and one-quarter of all children one to four years of age participate in the WIC program.[1]

Subject

The purpose of the WIC program is "to provide supplemental nutritious food as an adjunct to good health care during such critical times of growth and development in order to prevent the occurrence of health problems and improve the health status of these persons" (U.S. Public Law 95-627). To accomplish this, the WIC program provides three main benefits to participants: (1) supplemental foods, (2) nutrition education, and (3) referrals to health care and social service providers.

Supplemental foods are provided in food packages designed to provide specific nutrients thought to be lacking in the diets of eligible WIC participants—protein, vitamin A, vitamin C, calcium, and iron. Supplemental food is provided in the form of a food instrument (either a voucher or check) that can be exchanged for specific foods in stores. This food instrument lists the quantities of food items, sometimes including brand names, which can be obtained. WIC food packages for pregnant and postpartum women, infants and children include iron-fortified formula, milk and cheese, eggs, iron-fortified ready-to-eat cereals, fruit and vegetable juices, dried peas or beans and peanut butter. The WIC food packages are designed for seven categories of participants: (1) pregnant and breastfeeding women (basic); (2) postpartum, non-breastfeeding women; (3) breastfeeding women (enhanced); (4) infants from birth through three months of age; (5) infants from four through 12 months of age; (6) children one through four years of age; and (7) women, infants, and children with special dietary needs. About 80 percent of WIC funds are used to provide these supplemental food packages.

WIC also provides nutrition education to program participants. WIC nutrition education focuses on the relationship between nutrition and good health and helps participants to achieve positive changes to dietary practices. At least two nutrition education sessions must be provided in each six-month certification period. Participants cannot be denied food instruments, however, if they fail to attend the nutrition education sessions.

The WIC program also promotes good health care by referring participants to health-care providers and advising them on how to receive health care and why it is important. Referrals to both health-care and social-service providers are expected to address the full range of health and

nutrition needs of low-income women and their children. WIC funds, however, cannot be used to provide health care to participants. Many WIC clinics are located at or near public health clinics.

WIC eligibility is based on categorical criteria, income and evidence of nutritional risk. To be categorically eligible, an individual must be either (1) a pregnant woman, (2) non-breastfeeding woman up to 6 months postpartum, (3) a breastfeeding woman up to one year postpartum, (4) an infant up to one year of age, or (5) a child under age five. All of the U.S. states use 185 percent of the poverty income level as the income eligibility criterion, though adjunctive eligibility is also used for applicants who participate in other selected public assistance programs. Finally, program applicants must be determined to be at nutritional risk based on a medical or nutritional assessment by a “competent professional”, such as a physician, nutritionist or nurse.

Problems

The WIC program has been the focus of numerous and varied evaluations. In general, these studies have shown the effectiveness of WIC participation, especially for pregnant women and infants. Almost all of these studies compare the outcomes for a group of WIC participants with outcomes for a similar group of income-eligible non-participants. Such study designs almost always have the potential of selection bias, which occurs when underlying and unobservable differences between program participants and a comparison group of non-participants create differences in outcomes that are incorrectly attributed to program participation. For example, if WIC participants are more motivated and concerned about health and nutrition than non-participants, birth outcomes of WIC participants may be better than those of non-participants even in the absence of the WIC program. Alternatively, if WIC is successful at targeting and enrolling highest-risk women and children, any differences in outcomes between WIC participants and non-participants are likely to be understated due to pre-existing differences in risk. Thus, a key challenge for evaluations of WIC effectiveness is to control for observed differences between WIC participants and non-participants, and findings from studies of WIC effectiveness need to be interpreted within the context of the potential for selection bias.[2]

Research Context

Through the provision of program benefits and services—supplemental nutritious foods, nutrition education and health and social-service referrals—the WIC program is expected to improve the nutritional status of low-income pregnant, postpartum and lactating women, infants and

children. For pregnant, postpartum and lactating women, WIC is expected to improve diets, improve pregnancy outcomes and lactation performance and lead to recommended use of health care. For infants and children, WIC is expected to improve diets, lead to recommended use of health care, reduce the prevalence of iron deficiency anemia and improve physical, emotional and cognitive development.

Key Research Questions

Key research questions include the following: (1) Does WIC participation lead to better diets for women, infants and children? (2) Is prenatal WIC participation associated with improved birth outcomes and use of prenatal care? (3) Is WIC participation associated with better iron status of infants and children and reduced iron deficiency anemia? (4) Do infant and child WIC participants comply with recommended use of preventive health care? and (5) Does WIC participation affect children's physical growth and emotional and cognitive development? Given available data sources and ongoing surveys, some of these research questions are easier to answer than others. Specifically, information on dietary outcomes and use of health care is available from surveys of low-income women and can be used to address research questions related to dietary status and use of health care. Data from the standard U.S. birth certificate files can be used to analyze the relationship between prenatal WIC participation and birth outcomes. Surveillance data collected by the U.S. Centers for Disease Control and Prevention are useful for assessing trends in iron deficiency anemia and WIC participation. However, because of the long-term nature and expense of collecting data on children's growth and development, only limited information is available on the relationship between WIC participation and physical growth and emotional and cognitive development of children.

Research Results

Numerous studies document positive effects of WIC participation on birth outcomes, although variation in the magnitude of these effects exists due to differences in methodological approaches. By far the most common birth outcome examined in the literature is newborn birthweight, and most studies find a significant effect of prenatal WIC participation on birthweight.[3-7] In a synthesis of 17 major studies, the U.S. General Accounting Office concluded that providing WIC benefits and services to low-income pregnant women significantly reduced the percentage of infants born at very low and at low birthweight.[8] In addition, other reviews of the WIC evaluations conclude that WIC has a positive effect on newborn birthweight.[9,10]

One of the most important, though dated, WIC evaluations is the National WIC Evaluation conducted by David Rush and his colleagues.[11] In this evaluation, longitudinal data on prenatal WIC participants were compared with data on non-WIC registrants at prenatal care clinics. The findings were: a significant increase in the number of women seeking prenatal care early in pregnancy and a significant drop in the proportion of women with too few prenatal care visits; increased intakes of protein, iron, calcium and vitamin C (four of the five targeted WIC nutrients); a decrease in the rate of pre-term delivery; increased head circumference of infants; reduced incidence of fetal death of appreciable but not significant magnitude; increased birthweight with better WIC program quality; and greatest dietary benefits among women at highest risk of poor perinatal outcomes.

In addition to birthweight, other perinatal outcomes examined in previous studies include the timing and quantity of prenatal care, health-care costs at and around birth, and infant and neonatal mortality. Several studies found that prenatal WIC participants were more likely than non-participants to initiate prenatal care earlier and to receive adequate levels of prenatal care and less likely to receive no care or care in the third trimester.[6,12] The WIC-Medicaid study, which estimated the effects of prenatal WIC participation on health-care costs (Medicaid costs) after birth, found that the estimated savings in Medicaid costs within 60 days after birth per dollar spent on the prenatal WIC benefits ranged from $1.77 to $3.13 across the five U.S. states included in the study.[6] Prenatal WIC participation was also associated with reductions in infant and neonatal mortality, increased gestational age, and a lower incidence of pre-term births among Medicaid newborns.

In contrast to the large body of literature examining the effects of prenatal WIC participation, fewer studies focus on the effects of WIC participation by infants and children. Nevertheless, several studies report generally positive effects of WIC participation. Of particular importance is the evidence suggesting that WIC participation is associated with increases in mean haemoglobin or hematocrit levels and reductions in childhood anemia.[13] Data from the Pediatric Nutrition Surveillance System indicate that the prevalence of anemia among low-income children decreased during the 1980s, a finding largely attributed to improvements in childhood iron nutrition status and to positive effects of public-health programs, especially supplemental foods offered through the WIC program.[14]

Most studies examining the effect of WIC on growth have used measures of children's weight and height. An early evaluation by Edozien and his colleagues[3] used data from a nationally

representative sample of over 6,000 infants and children ages zero to three years in 1973-76 and compared outcomes of clinical examinations for infants and children who had participated in WIC for six months with clinical data on newly enrolled infants and children. Their results indicated that WIC had a statistically significant impact on children's growth in weight and height. However, since low weight and height are used as criteria for WIC eligibility, the increase in weight and height after WIC participation may be due to regression to the mean.

Results from the National WIC Evaluation showed that WIC had no significant impact on weight but had a positive effect on weight for height for infants and children who had participated either prenatally or within three months after birth.[11] In addition, intakes of iron, vitamin C, thiamin, niacin, and vitamin B_6 were higher for WIC children than for non-participants.

A crucial feature of these evaluations of the effects of WIC participation by infants and children is that they are based on data that are very old, and significant changes have since occurred in the WIC program. In addition, evaluating the effects of WIC participation on the physical growth and development of children is problematic; impacts of WIC may not be evident until several years after a child has enrolled in WIC, and longitudinal studies of children participating in WIC are difficult to design and expensive to conduct.

Finally, some studies examine the impact of WIC participation on utilization of health care services. Data from the National WIC Evaluation showed that children receiving WIC benefits were significantly more likely to have a regular source of health care than non-WIC children, and that WIC participation was associated with immunizations for some subgroups of infants and children.[11] A recent study conducted using administrative data from the state of North Carolina found that low-income children participating in the WIC program are higher users of all types of health-care services than low-income non-participants.[15] Compared with income-eligible WIC non-participants, child WIC participants use more preventive-care services, more dental health services, and more emergency room and inpatient care. Moreover, children in WIC are more likely to be diagnosed and treated with common childhood illnesses — otitis media, gastroenteritis, upper and lower respiratory infections, asthma and other childhood illnesses. These results suggest that low-income children enrolled in WIC are linked to the health-care system and are much more likely to be receiving preventive and curative care.

Conclusions

Overall, research on the effectiveness of the WIC program suggests positive effects of the WIC program on intakes of most of the target nutrients for both women and children, improved pregnancy outcomes, savings in health-care costs associated with labour and delivery and increased use of health-care services. Less is known about the effects of WIC participation on the growth and development of infants and children, partly because well-designed studies are difficult and expensive to design and conduct. However, pediatric nutrition surveillance data indicate a strong positive effect of WIC on the incidence of anemia among low-income infants and children, a result that is likely to have a positive effect on long-term growth and cognitive development.

Implications

Although a large body of literature suggests beneficial effects of the WIC program, nearly all of this literature uses a study design that compares a group of WIC participants with a similar group of non-participants. However, because WIC participants are a self-selected group, it is not clear whether estimated program effects are due to the WIC program or to underlying and unobservable differences between participants and non-participants. In a context of designing and implementing a new program that would provide services to improve the nutrition of pregnant women and children, it would be very important and useful to implement the program in pilot sites where a random-assignment evaluation could be conducted. Random assignment designs provide the most rigorous and scientifically defensible estimate of program impacts, and are best used to evaluate new programs or program expansions that need to be evaluated before being undertaken on a larger scale.

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