

**The Patterns of Food Stamp and WIC Participation and
Their Effects on Health of Low-Income Children**

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Abstract

The primary purposes of the paper are to examine: 1) the patterns of program participation in the Food Stamp Program (FSP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) during the time of welfare reform in Illinois; and 2) the effects of WIC on young children's health outcomes. The study used a unique linked data set based on population-level administrative data on all births, Food Stamp and WIC participation, and Medicaid eligibility and claims in Illinois between 1990 and 1998. In the study, we find that as welfare reform was implemented in Illinois, most of the decrease in FSP participation was due to drops in entries to TANF. We find some evidence to suggest that families with young children are more often turning to WIC for essential food items for their young children during the same period. We also find that service receipt duration for both FSP and WIC has become shorter in recent years, although the change in reduction was more noticeable in FSP compared to WIC. When the effects of WIC on health outcomes are considered, we find that children receiving WIC are more likely to receive preventative health care services through EPSDT service than those not receiving WIC. Among those children enrolled in Medicaid, WIC children are significantly less likely to be diagnosed with health problems associated with inadequate nutrition than those not participating in WIC.

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Introduction

Although the Food Stamp Program (FSP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) are two prominent federally funded food assistance programs for families with young children, very little is known about how the two programs interact with each other and with cash assistance program (formerly AFDC and now Temporary Assistance for Need Families, or TANF) in aiding low-income families during their children's early years. The primary focus of this study is to explore how the FSP and WIC programs interact to contribute to the health of low-income children and the self-sufficiency of their families. Specifically, using a linked state agency administrative database, the paper analyzes the patterns of Food Stamp and WIC participation among young children, the patterns of interaction between the two food assistance programs and AFDC/TANF, and the effects of food assistance program participation on two health outcomes: the incidence of health problems associated with inadequate nutrition and receipt of regular preventive health care services.

The Personal Responsibility and Work Opportunity Reconciliation Act (PROWRA) of August 1996 significantly altered the basic safety net for low-income families with children. The conversion of the Aid to Families with Dependent Children (AFDC) entitlement program into state block grants, the introduction of federally mandated time limits and work requirements, and increased state flexibility in designing and implementing antipoverty programs is likely to affect the well-being of children and families in different ways. During this transition period of U.S. welfare policy, it is critical to understand the role that the two food assistance programs play in mitigating the effects of poverty on young children's health and their relationships to the income assistance program in helping low-income families attain self-sufficiency.

With the end of AFDC resulting from welfare reform, the Food Stamp program has become one of the most important components of the public assistance safety net for low-income families. Families eligible for food stamps must have incomes below 130 percent of the federal poverty line.¹ Benefit levels are determined by household size and income. In 1994, the Food Stamp program served 27.5 million individuals (Joint Center for Poverty Research, 1999). The importance of the Food Stamp program as a safety net for children is evident in the number of children who are served by the program. At any time, one can assume that one-half of the caseload is children (GAO, 1999). Unlike AFDC, the Food Stamp program was essentially preserved under welfare reform, with restrictions applied mainly to able-bodied adults with no dependents.²

Although food stamps are designed primarily to help low-income households maintain a nutritionally adequate diet, the program resembles a cash benefit program more than the other nutrition programs, such as WIC, because eligibility is based solely on financial need, and food stamps are often substituted for other cash income when purchasing food. It is estimated that nearly 70 percent of food stamp benefits are used to divert other household cash income to nonfood expenditures (Devaney, Ellwood, & Love, 1997). Because of this substitution effect, as well as little change in eligibility under welfare reform (compared with cash assistance), some

have anticipated more intensive use of food stamps among families with children. Some have even suggested the possibility that food stamp use would undermine welfare reform because TANF recipients wanting to avoid the work requirement would rely more intently on food stamps rather than use their time-limited TANF grant. (Besharov & Germanis, 1999).

The WIC program provides not only food assistance but also nutritional counseling and referral services to low-income pregnant and post-partum women with children up to age 5. Along with the income eligibility requirement (185% of the poverty line), all participants must be considered nutritionally “at risk.” WIC provides eligible families with monthly vouchers to purchase a specified nutrient-rich package of food, as well as offering counseling and access to health services. The food packages are designed to supply specific nutrients lacking in the diets of the targeted participants. Unlike the FSP, the WIC program is not an entitlement program in which participation is limited by appropriated federal funding. It saw no changes under welfare reform.

Although numerous studies have considered welfare participation in terms of receiving cash aid (see, e.g., Blank & Ruggles, 1996, for one of the more recent examples), fewer studies have focused exclusively on the dynamics of Food Stamp caseloads, and none that we know has focused on the interaction of the Food Stamp program with the nonentitlement program, WIC. One of the principal purposes of this paper is to fill the gap in this research. Our first set of research questions, therefore, asks, What are the patterns of program participation in WIC and/or FSP and how do they relate to each other?

Our second research question considers the interaction between the food assistance programs and cash aid. Welfare reform may affect the participation patterns of FSP and WIC. Time limits and work requirement may lead to decreased take-up rates (or shorter spells) of TANF, and longer and more intensive use of food stamps and WIC while families try to earn enough money to support themselves. We anticipate that changes in the cash assistance program as a result of welfare reform will affect the patterns of interaction between the food assistance programs and AFDC/TANF. Thus, our research questions are: What are the patterns of interaction between cash aid (AFDC/TANF) and the food assistance programs? Over time, is there evidence of changes in the interaction patterns that might suggest effects of welfare reform?

We take a two-stage approach to address the program participation questions. First, we examine the patterns of program entry among Illinois birth cohorts over time. Specifically, we estimate the probability that a child will receive a combination of AFDC/TANF, food stamps, and WIC during the first five years of life. The cohort we use is all births in Illinois from 1990 through 1996. The second stage of the analysis addresses how long children receive food stamps and WIC once they enter each program. Specifically, we use proportional hazards models to examine the effect of program entry year and receipt of AFDC/TANF on the duration of the FSP and WIC participation. The study population is all children who began receiving food stamps and WIC between 1991 and 1998.

The third research question considers the effects of WIC receipt on young children’s health outcomes. The health outcomes are defined as: 1) the incidence of health problems associated with inadequate nutrition (more specifically, anemia and physical development of infants and children), and 2) receipt of regular preventive health care services. The literature

suggests that WIC has helped to alleviate the effects of poverty on low-income children. Building on these earlier findings, we hypothesize that participation in WIC has a positive affect on the health of low-income children. More specifically, we posit that participation in WIC is negatively related to the incidence of health problems associated with inadequate nutrition among low-income children and that participation in WIC is positively related to the receipt of regular preventive health care.

Previous Studies

There is, of late, a growing body of research that examines the caseload dynamics of the Food Stamp program. A recent study by Gleason, Schochet, and Moffitt (1998) considered Food Stamp program dynamics using a 1990-91 sample from the Survey of Income and Program Participation (SIPP) that covers participation from 1989-93, a span that saw sizable increases in caseloads. They found that most people left the program relatively quickly, but often returned. At any given point in time, average length of participation was quite long, earnings played a key role in both spell beginnings and endings, and single adult households with children had more persistent dependency. Finally, over time, increasing lengths of spells appeared to account for the significant rise in caseloads beginning in the early 1990s. Martini and Allin (1993) found that the percentage of long-term participants (2+ years) was greater among those who entered the program in the 1990s compared with those who entered in the late 1980s. Beyond caseload growth or decline, researchers have looked at the question of eligibility and participation. Blank and Ruggles (1996), for example, found that a significant portion of Food Stamp participants leave the program even while still eligible. They find that those who leave while eligible are those with higher earnings, higher unearned income, and those who were recently married. Long-term food stamps users were generally those with fewer skills and lower income. Few, they found, were leaving the program owing to lack of knowledge about their eligibility.

More recent research shows that, since welfare reform, Food Stamp participation has dropped off dramatically, falling nearly 30 percent nationwide since 1996, with every state registering declines. By 1999, the numbers served had dropped by 35 percent to 18 million at the national level, a decline greater than that predicted by the Congressional Budget Office given changes in eligibility rules and improved economic conditions (Joint Center for Poverty Research, 1999).

Reasons posited for this decline include welfare reform (owing to the historical link between AFDC and Food Stamps), tighter eligibility restrictions within the Food Stamp program, and a stronger economy (GAO, 1999). A strong economy is certainly responsible for much of the drop; however, it is not responsible for the entire decline. In fact, although child poverty has fallen in recent years (dropping 3% between 1996 and 1997), the drop in Food Stamp participation among children was significantly larger, declining roughly 10 percent between 1996 and 1997 at the national level (GAO, 1999).

This would suggest that other factors unrelated to the economy have been at play. As the GAO found, welfare reform and tighter Food Stamp eligibility criteria are likely to have played a role. In Illinois, changing eligibility rules under welfare reform affect 18- to 49-year-

old able-bodied adults with no dependents as well as legal immigrants who are not citizens. A two-month sanction is also imposed on those who do not comply with child support, work, or other rules. Historically, those who leave AFDC also tend to discontinue their Food Stamp benefits, despite still being eligible (Blank & Ruggles 1996), and with welfare reform, people are leaving TANF in record numbers. In addition, caseworker discretion in severing Food Stamp benefits when a TANF client is sanctioned is cited as a partial reason for the drop-off in Food Stamp participation, as is caseworker confusion surrounding eligibility. Clients are confused as well, often assuming that if they are ineligible for TANF they are ineligible for food stamps (GAO 1999). Finally, despite a 1997 revision stating otherwise, states have been disqualifying entire families from the Food Stamp program for a TANF rules violation. States have disqualified Food Stamp participants for not complying with TANF's work requirements even though the participant was exempt from work requirements under Food Stamps (GAO, 1999).

Although the reason for such a caseload decline is not entirely clear, there is some evidence that the need for food assistance is being met by other programs. The GAO (1999) reports that the number of children served in the National School Lunch Program increased by 6 percent between 1994 and 1997, while school-aged children receiving food stamps fell by 18 percent during those years. As our data show later, WIC may also be seeing the ramifications of declining Food Stamp participation.

Although there has been increased attention to the dynamics of the Food Stamp caseload, less is known about such patterns of participation in the WIC program. More general profiles show that, in fiscal year 1996, the program served a monthly average of 7.2 million persons, of whom 52 percent were children, 25 percent were infants, and 23 percent were women (Department of Health and Human Services, 1998). Among 1990 participants, average annual income was \$9,000; incomes of three-fourths of the women fell below 100 percent of the federal poverty line for that year. One-third had annual incomes less than 50 percent of the poverty line (Abt, 1990).

Some limited research has been carried out on the health outcomes for WIC families. The literature suggests that the WIC program has, for the most part, benefited families, especially in its contribution to the health of mothers and children (Basiotis, Kramer-LeBlanc, & Kennedy, 1998; Cook et al., 1995; Devaney, Haines, & Moffit, 1989; Devaney & Moffitt, 1991; Gordon & Nelson, 1995; Kramer-LeBlanc et al. 1999; Rush et al., 1988; Suarez, Simpson, & Smith, 1997). Its role in helping families facing substantial poverty to meet their nutritional needs by providing food supplements (as well as counseling and referral services) has led to improved health overall. Studies have found, for example, that participants had better pregnancy outcomes (Ekechuku, 1989). A 1989 evaluation of WIC found that those not participating in WIC were two to three times as likely to have received inadequate prenatal care. WIC participation was also linked to increased birth weight and lower incidence of preterm births (Mathematica, 1989). Given the suggestions in the literature of improved health status, we hypothesize that children receiving WIC are less likely to experience health problems associated with inadequate nutrition. Also, children receiving WIC benefits are more likely to receive regular preventive health care services than children not enrolled in WIC.

Data and Method

Data description

The primary data are drawn from the Illinois Integrated Database on Children's Services (IDB). The IDB is a state-level, longitudinal database constructed from administrative data gathered by public agencies serving children and families in Illinois (Goerge, Van Voorhis, and Lee, 1994). Specifically, we use individual-level longitudinal service records constructed from AFDC/TANF, Medicaid enrollment, and Food Stamp data from the Illinois Department of Human Services, Client Database; WIC data from the Illinois Department of Human Services, Cornerstone System; and Medicaid paid claims data from the Illinois Department of Public Aid. The Medicaid enrollment data contain the Medicaid enrollment status of clients, while Medicaid paid claims data contain payment records for medical services paid by Medicaid. Medical services for public assistance clients are reimbursed primarily through Medicaid. The individual-level AFDC/TANF, Medicaid, Food Stamp, WIC, and paid Medicaid claims records were linked by child in order to develop "spells" corresponding to the each research question.³ In addition to the individual-level service data, we also use birth certificate data that contain information on all births in Illinois to estimate the baseline population for the program entry pattern analysis.⁴

Because the original data used for this study come from different agency information systems that do not share a common ID, linking data records reliably and accurately across different data sources (public assistance databases and WIC) is an important issue. We used a process called probabilistic record-matching to link individual service records. Probabilistic record-matching is based on the assumption that no single match between variables common to the source databases will identify a client with complete reliability. Instead, probabilistic record-matching calculates the probability that two records belong to the same client using multiple pieces of identifying information. These "weights" will vary based on the distribution of values of the identifiers. We used full name, Social Security number, birth date, gender, race and ethnicity, and origin of residence in matching. The method was first developed by researchers in the fields of demography and epidemiology (Newcombe, 1988; Jaro, 1985, 1989). The method is considered the most reliable means of matching records across multiple data files under conditions of uncertainty.

Study design

Study population: To estimate the population program participation rates, one must first identify the population at "risk" of program entry. The base population in this study is defined as all children born in Illinois from 1990 through 1996. We use Illinois birth certificate data to calculate the base population size. To examine program entry patterns, we then follow the entire birth cohorts through children's fifth birthday until the end of 1998 (thus the 1994 to 1996 cohorts have censored observation periods). Because our administrative data contain information on all children who participated in AFDC/TANF, FSP, and WIC during the period, we can estimate population program participation rates of a particular birth cohort by using total

live births as the denominator data.⁵ We further classified the birth certificate data by region, county-level unemployment rate, poverty rate, and percent of female households in order to estimate the population program participation rates for each strata of a particular birth cohort.

To study the duration of program participation once children enter FSP and WIC, we selected those children under age 5 who entered FSP and WIC for the first time in 1991 through 1998.⁶ A total of 684,893 children and 919,861 children met our definition of first entry for FSP and WIC, respectively, during this period.⁷

For the health outcomes analysis, we focus on Medicaid-eligible children because our health measures are available only through Medicaid claims data. To examine the effects of WIC participation on the receipt of regular preventive health care services, we selected those children under age 5 who entered Medicaid for the first time between 1991 and 1997.⁸ To examine the incidence of health problems associated with inadequate nutrition and the effects of WIC participation on the incidence rates, we selected all Illinois children born in the span of 1990 to 1994 who enrolled in Medicaid within a week of birth and stayed in Medicaid until their fourth birthday. Because we use Medicaid claims data for our measures of the incidence of health problems, we would not be able to observe any diagnosed health problems while the child was not enrolled in Medicaid. Hence, we limit our analysis of incidence of health problems to only those who had received Medicaid continuously for 4 years from birth.

Statistical methods and variables: The outcome measures of interest in program participation pattern analyses are the rates of entry to and exit from FSP and WIC. We further break down FSP and WIC participation into those who receive food stamps and WIC with AFDC/TANF relative to those who receive only food assistance programs.

We employ multinomial logistic regression models to examine the effects of birth year on the program entry patterns to food assistance programs with AFDC/TANF, to food assistance programs only, and to receiving no services.⁹ The independent variables we consider are birth year, region, unemployment rate, poverty rate, and percent of female households for the county where a child was born. The region variable was classified as either Cook County (including Chicago) or rest of state. With the division between Cook County and “rest of state,” we try to capture urban and rural differences generally. Unemployment rate, poverty rate, and percent of female household were calculated at the county level using 1990 U.S. census data.¹⁰ The counties were then divided into quartiles for each measure.

We employ proportional hazards modeling to examine the effects of time of entry to FSP and WIC on the duration of each service receipt. Entry-cohort variables representing the year of first entrance to FSP and WIC are defined as a set of 7 dummy variables, using 1991 as the comparison year. Duration of each service receipt obviously depends on family demographic and socioeconomic characteristics, such as neighborhood residence and race. Controlling for such influences when determining the effect of policies is critical: therefore, in addition to using entry dates as proxies for policy effects, we also examine the effects of age, gender, race, neighborhood poverty, and living in a major city (Chicago) on the likelihood of making a successful transition.

We compare differences in the duration of service receipt for those who were receiving AFDC/TANF and for those who were only receiving food assistance programs. The variable

“being on AFDC/TANF,” is defined as a time-varying covariate, taking the value of 1 for the periods a child is receiving AFDC/TANF and the value of 0 for when a child is not receiving AFDC/TANF. This variable measures the differences in the likelihood of exiting FSP or WIC between the states of receiving and not receiving AFDC/TANF after a child’s first entry to each program.

Child’s age at the time of program entry was divided into four categories: age 6 months and under, 7-11 months, 12-23 months, and 24-60 months. Race and ethnicity were coded as non-Hispanic white, African American, Hispanic, and other. Child poverty rate was calculated at the zip-code level using 1990 census data. The results were divided into four levels of community poverty: fewer than 10 percent of the child population living below the poverty line, 10-20 percent, 20-30 percent, and 30 percent or more living below the poverty line. Once communities were characterized, we assigned a poverty status to all FSP and WIC entrants in a particular community.¹¹ Region and gender variables were classified as either Chicago or rest of state and male or female.

To study the effects of WIC participation on the nutrition-related health outcomes, we use the logistic regression method. Our dependent variable is defined as ever having or not having (a value of 1 or 0) health problems associated with inadequate nutrition (more specifically anemia, failure to thrive, and other nutritional deficiencies). The key independent variable is ever receiving or not receiving WIC. When the effect of receiving WIC on health outcome is considered, one must take into account the fact that children who possess health problems might be more likely to receive WIC because an eligibility requirement of the program is being nutritionally “at-risk.” This is known as the selection bias problem in the literature. To “correct” this possible bias, we only consider WIC participation before a particular health problem is diagnosed in terms of the timing of the event as the indicator of WIC service receipt. In other words, if we find that a child began receiving WIC service following a particular diagnosis in the matched Medicaid paid claims and WIC data, our WIC participation variable takes the value of zero. Only that WIC receipt we observe before the event of diagnosis is coded as 1.

The incidence of health problems associated with inadequate nutrition is measured by ICD-9-CM codes identified as the primary diagnosis in the Medicaid claims data.¹² Two of the health outcomes that we examined were drawn from categories defined by the Clinical Classification Software provided by the Agency for Health Care Policy Research (Agency for Health Care Policy and Research, 1999). The two outcomes included anemia and nutritional deficiency. Nutritional deficiencies include conditions such as malnutrition and vitamin deficiencies. Failure to thrive refers to a lack of normal physical development diagnosis.

Receipt of regular preventive health care services is also identified using primary diagnosis codes and service category in the Medicaid claims data. Through this process, we identify the timing of the receipt of well-child care service as a part of the Early Periodic Screening, Diagnosis and Treatment (EPSDT) services required of state Medicaid programs through Title XIX of the Social Security Act. In Illinois, the program covering well-child services is called Healthy Kids. To examine the effect of WIC receipt on the timing of the first EPSDT, we use proportional hazards models. The dependent variable is the time from entry to Medicaid until the first EPSDT service. The primary independent variable, the receipt of WIC,

is coded as a time-varying covariate, taking the value of 1 when the child is receiving WIC and the value of 0 when the child is not receiving WIC.

Findings

Program entry patterns

We are concerned with the patterns of FSP and WIC entries, as well as with how the entry patterns of the two food assistance programs interact with those of AFDC/TANF. First, we consider the entry patterns for the three programs separately. Table 1 presents summary statistics on program participation rates by age 5 (until their 5th birth date) for FSP, WIC, and AFDC/TANF for children born between 1990 and 1996 in Illinois. The “any of three programs” rows in Table 1 show that a significant number of all Illinois children born during the study period received either FSP, WIC, or AFDC/TANF during their first five years of life. For those children whose entry patterns can be examined for at least five years (those born between 1990 and 1993), allowing us to avoid the censored observation problem, we find that almost 65 percent of children born during the period received at least one of the three services by age 5. The data also show that the majority of children who enter any of the programs do so very early in life. Throughout the period, more than 55 percent of children began receiving services before age 2, equal to nearly 90 percent of all children under age 5 who ever enter these programs.

Although the overall program participation rates (as shown by the entry rates to any of the three programs) indicate relatively little change across birth cohorts, the data on each program show somewhat different patterns of participation. After a steady increase in participation rates by age 2 (before their second birthday) among birth cohorts between 1990-1993 in all three programs, both FSP and AFDC/TANF participation rates began to decline with the 1994 birth cohort, while WIC participation rates continued to increase. WIC participation increased about 10 percent between 1993 and 1996, while AFDC/TANF dropped nearly 26 percent and the FSP participation rate decreased about 22 percent during the same period.

The relatively constant rate of participation in any of the three programs during the study period suggests that there is a group of young children who need some kind of income assistance, whether that be cash assistance or in-kind benefits. The question then becomes, How does one explain the increases in WIC while FSP and AFDC/TANF participation declined for the recent birth cohorts? On the one hand, the decline in AFDC/TANF can likely be attributed to welfare reform, with its lifetime limits on cash assistance and stricter work requirements, which may discourage families from entering cash assistance programs. On the other hand, the decline in FSP is somewhat puzzling given that there have been no significant changes in eligibility rules for families with children during the period.

Because family income eligibility is different across the three programs, one possible, and obvious, answer could be a changing distribution in family income among the population. In other words, if the numbers of families earning below both 100 percent and 130 percent of the poverty line decreased (AFDC and food stamps eligibility thresholds, respectively), with a simultaneous increase in those earning between 130 and 180 percent of the poverty line (WIC

eligibility), these changes in the family income distribution could explain a good part of the participation rate changes across the three programs. However, when we examine family income distribution using the Current Population Survey data in Illinois, we find little evidence to suggest that changing family income distribution was the main reason. The magnitude of the changes in the proportion of Illinois children ages 0-4 across the three income thresholds (100%, 130%, and 185% of the poverty line) during the 1993-96 period were much less than program participation changes. Between 1993 and 1996, the percent of the population with family income below 100 percent of the poverty line decreased from 21.5 percent to 19.5 percent, while the proportion with incomes between 100-130 percent increased slightly from 21.6 to 22.4. That translates to only an approximately 3 percent decrease in the number of children with family income below 130 percent of the poverty line. During the same period, the proportion of the population with family incomes between 130 percent and 185 percent increased 7 percent, from 18.3 to 19.5.

Given that WIC is not an entitlement program in which participation is limited by appropriated funding, another plausible explanation for increases in WIC receipt during the study period is simply increases in the WIC funding. As more funds are available, the program would be able to serve more of those who needed (or applied for) WIC services but did not previously receive the services due to the limited funding. In other words, in order to explain the increased WIC receipt as a function of increased funding, one needs to establish that, first, the funding increased, and second, there have been WIC applicants on the waiting list and the funding increase allows WIC programs to serve more of those on the waiting list. The evidence for the funding explanation is inconclusive. Although the total WIC funding (which includes federal appropriation and infant formula rebates) in Illinois increased from about \$12.5 million in 1991 to \$20 million in 1999, the rate of increase decreased over time during the period. From 1991 to 1994, the funding increase was about 34 percent; from 1994 to 1996 the increase was about 16 percent; and from 1996 to 1999 the increase fell to about 4 percent. Thus, the increases in funding alone do not seem to be able to explain most of the increases in WIC use because the rate of increases in WIC use has been increasing over time during the period. Furthermore, Illinois Department of Human Services officials who are familiar with WIC service delivery systems report that there has not been any significant waiting list problem for WIC in Illinois during the study period.¹³

To better understand the participation rate changes during the study period, we look to patterns of program overlap. Table 2 presents the patterns of program participation rates to “combination” of services by age 2. The participation rates are broken down by five possible categories: AFDC/TANF, FSP, and WIC; AFDC/TANF and FSP; WIC and FSP; FSP only; and WIC only. For example, among those born in 1990, 22.8 percent received all three services (AFDC/TANF, FSP, and WIC), 8 percent received AFDC/TANF and FSP without receiving WIC, and about 22 percent received WIC only before reaching their second birthday. As we discussed above, one finds that the FSP participation rate decreased 8.4 percent points, from 37.4 percent for 1993 birth cohort to 29 percent for the 1996 birth cohort. When the participation rates are examined by entries to the “combination” of services, it is clear that most of the drop in FSP participation is due to decreases in AFDC/TANF participation. The receipt of food stamps in combination with AFDC/TANF dropped 8.1 percentage points between the

1993 birth cohort and the 1996 birth cohort, accounting for over 95 percent of overall decreases in FSP participation during the period.

Another interesting finding in Table 2 is the increases in WIC use only. The participation rate in the WIC-only group increased 31 percent, from 21.1 percent in the 1993 birth cohort to 27.2 percent in the 1996 birth cohort. Taken together, the data on participation rate changes suggest that both AFDC/TANF and FSP entries declined considerably during the time of welfare reform while WIC participation has increased. The increase in WIC participation can mainly be attributed to those using WIC only—or those not entering the “welfare” programs. Also from the data, we observe that most of the decline in FSP use is driven by drops in entries to cash assistance. The findings suggest that, while families with young children are forgoing food stamps, a benefit closely linked to (or perceived to be linked to) cash “welfare” programs, they may be turning to WIC for essential food items for their young children.

Participation in any of the three programs considered above obviously depends on characteristics of children other than birth years. Next, we present the results of multivariate analyses of program participation rates. Table 3 shows the estimated odds ratios from multinomial logistic regressions predicting the likelihood of receiving FSP or WIC with AFDC/TANF (“welfare” group) and receiving FSP or WIC without AFDC/TANF (“food assistance only” group). One should recall from the data presented in Table 2 that most FSP users would be considered among the “welfare” group and the majority of WIC users belong to the “food assistance only” group.

When the effects of birth year and region are examined in Model 1, we find that the effects of birth cohort found in the descriptive analysis remain. The first column in Table 3 shows that later birth cohorts are less likely to participate in food assistance programs in combination with cash assistance. For example, the odds that children born in 1996 participated in food assistance programs and cash aid compared with receiving no services are about 0.79 times the odds of those born in 1990. The second column shows that children born in 1996 are 1.4 times more likely than those born in 1990 to participate in food assistance programs only compared with no services. Comparing the use of both food assistance and cash aid with that of food assistance alone (column 3, Table 3), we find that, in fact, later birth cohorts are significantly more likely to participate in food assistance only compared with the combination package of food assistance and AFDC/TANF. Children born in 1996 were 1.8 times as likely as children in 1990 to participate in food assistance programs only over food assistance with cash aid. In Model 1, we also find that children born in Cook County are more likely to participate in food assistance programs overall. Comparing food assistance with cash aid versus no cash aid, we find that Cook County children are more likely to participate in food assistance with cash aid.

In Model 2, we add county poverty rate, unemployment rate, and percent of female households to the models. Controlling for these socioeconomic variables changes the birth cohort effects very little. However, once the county-level socioeconomic variables are controlled, the effect of Cook County reverses its direction. Children in Cook County are less likely to participate in food assistance programs in general, and they are slightly more likely to participate in food assistance only rather than combining it with cash aid. The finding might suggest the possibility that children in urban areas are underserved by food assistance programs.

The findings on the effects of area socioeconomic variables confirm results reported in previous studies. Children in areas of higher poverty, greater unemployment, and more female households are more likely to participate in food assistance programs overall. Also, as one might expect, we find that the county female household variable has the strongest effect on combining food assistance and AFDC/TANF. Comparing the likelihood of participating in food assistance programs only versus with cash aid, we find that those children in areas of higher poverty, greater unemployment, and more female households are significantly more likely to participate in food assistance with cash aid.

Program duration patterns

In this section, we focus on the duration of FSP and WIC program participation. Our primary interest is to examine the effect of program entry year and receipt of AFDC/TANF on the durations among FSP and WIC participants. Overall, the median duration of the first FSP spell for the study population was 10 months.¹⁴ Duration for WIC was somewhat longer, at 15 months. Table 4 presents the proportional hazards model estimates on the effects of independent variables considered in the study. The findings are presented in terms of estimated coefficients on the likelihood of leaving each program relative to a reference group. Because a positive coefficient represents an increased likelihood of leaving each program, a positive coefficient implies shorter program receipt (and a negative coefficient implies longer program receipt). Model 1 shows that children who entered FSP and WIC in recent years tend to receive each service for a shorter period of time than do children who entered in the earlier years of the study period. For both FSP and WIC models, the recent year dummy variables are positive and statistically significant. However, when the size of the coefficients between FSP and WIC are compared, the decrease in spells of program participation since 1997 entry cohort has been greater for FSP than for WIC.

African American children tend to receive both FSP and WIC for longer periods. However, the effect is substantially larger for FSP, suggesting that the difference in duration between African American children and white children is greater in FSP than in WIC. Another interesting finding is the effect of living in Chicago. The effect of living in Chicago is different between FSP and WIC. Controlling for other background variables, duration of FSP receipt is longer for Chicago children compared with children in other parts of the state. For WIC, the opposite is the case; Chicago children tend to receive WIC for a shorter period of time.

The findings on the effects of age at entry indicate that children who enter both programs at very early ages (birth to 6 months) receive each service for a longer period than do those who enter at later ages (particularly those who enter at age 2 and older). Community poverty also has a significant effect on the patterns of program duration. Children living in high poverty areas are more likely to rely on both services for longer periods of time.

Model 2 adds the variable “being on AFDC/TANF,” which is coded as a time-varying covariate, as explained in the method section. This variable measures the differences in the duration of service receipt for those who were also receiving AFDC/TANF and for those who were only receiving FSP or WIC. The findings on the estimated coefficients indicate that there is a high level of interaction between both FSP and WIC service duration and the cash

assistance (AFDC/TANF) program. The duration in each program is significantly different between those who were receiving AFDC/TANF and those who were only receiving either FSP or WIC. Children who were receiving food assistance programs combined with cash aid tend to experience longer durations in both FSP and WIC. In other words, children who were using the food assistance programs in combination with cash aid are much less likely to leave the food assistance programs. When the size of the coefficients between FSP and WIC are compared, the effect of receiving AFDC/TANF is much larger for FSP service duration. The difference in duration of FSP between those receiving FSP in combination with cash aid and those receiving only FSP is greater than that of WIC duration between those receiving WIC in combination with cash aid and those receiving only WIC.

When the “being on AFDC/TANF” variable is added to the FSP model in Model 2, the entry cohort year effect becomes somewhat smaller. This suggests that the large reduction in the duration of FSP over time found in Model 1 can be partly explained by the fact that children of recent entry cohorts are less likely to be receiving AFDC/TANF. Adding the AFDC/TANF variable also changes the coefficients on race-ethnicity and region variables significantly. The direction of the effects of both variables reverses, and they are statistically significant. After controlling for being on AFDC/TANF, FSP duration for African American children and those living in Chicago tends to be shorter than that of their counterparts. This suggests that the longer FSP duration found for African American and Chicago children in Model 1 is due to the fact that African American and Chicago children are more likely to be receiving AFDC/TANF while receiving FSP. Once AFDC/TANF is controlled, in fact, we find that FSP duration for those two groups of children is shorter than their counterparts.

Contrary to the findings with FSP models, adding the AFDC/TANF variable to the WIC model changed the coefficients of the other variables very little. Overall, the findings on the duration patterns are consistent with those of program entry patterns in that there is a higher level of program interaction between FSP and cash assistance than between WIC and cash assistance.

Incidence of health problems

Table 5 presents the results from the logistic regression model used to estimate the odds that a Medicaid-eligible child is diagnosed with a specific health problem during the first four years of life. The models include demographic characteristics such as year of birth, gender, race-ethnicity, and region (Chicago). To control for socioeconomic factors, we included the community poverty rate. Of particular interest is the effect of participating in WIC on the likelihood of being diagnosed with a health problem in the first four years of life.

In two of the three health problem categories we examined (failure to thrive and nutritional deficiencies), participating in WIC significantly decreased the odds of being diagnosed. Children who participated in WIC were about 36 percent less likely to be diagnosed with failure to thrive than children who had not participated. The effect of WIC participation was even stronger for nutritional deficiencies, where participation lowered the odds of diagnosis by 74 percent. Participation in WIC showed no effect on the likelihood of being diagnosed with anemia.¹⁵

Birth year effects vary across the models. Children born since 1992 have been significantly more likely to be diagnosed with failure to thrive. On the other hand, there has been a significant decline in the incidence of anemia among children born since 1993. Gender appears to be a factor in failure to thrive; females are significantly less likely to be diagnosed with this condition. Children from Chicago were 2.2 times more likely to be diagnosed with anemia than children from the rest of the state.

Race effects also vary across conditions. Race has relatively little effect on the odds of nutritional deficiencies. Only African American children had significantly higher odds of being diagnosed with nutritional deficiencies than white children (odds ratio 2.03). Both African American and Hispanic children were significantly more likely to be diagnosed with anemia. The effect was greatest among Hispanic children, who were 2.12 times more likely to be diagnosed compared with white children. African American children had 1.18 times the odds of being diagnosed with anemia than white children. Failure to thrive was less common among African American and Hispanic children. The effect was strongest among Hispanic children who were 52 percent less likely to be diagnosed with failure to thrive than white children. The community poverty rate did not have a significant effect on the odds of having any of the health conditions.

Receipt of preventive health care services

A proportional hazards model was used to estimate the likelihood that Medicaid-eligible children received a well-child care EPSDT service. The model estimates the hazard rate of first EPSDT exam; the hazard rate describes the instantaneous probability of receiving the service at a particular time given that one has not yet received the service. The model included all children new to the Medicaid program between 1991 and 1997. Again, the effect of WIC on the likelihood of well-child care services was of particular interest. By using a proportional hazards model to estimate the time until first EPSDT service, we were able to control for varying lengths of time spent in the Medicaid program and right-censored observations. The model also allowed us to specify the receipt of WIC as a time-varying covariate, taking the value of 1 when a child was participating in the WIC program and 0 when a child was not participating. In addition, we controlled for demographic characteristics, including year of entry to the program, gender, race, age at entry, region of origin, and the community poverty rate.

The estimated risk ratios are presented in Table 6. The risk ratio describes the estimated hazard rate of children with a particular characteristic in relation to a reference group. A risk ratio above 1 indicates that children with a particular characteristic are at greater risk of having a first EPSDT exam compared with other children after controlling for the effect of other covariates. A risk ratio below 1 indicates that children have a lower risk of having the well-child exam when compared with other children.

Participating in WIC was found to have a significant, positive effect on the likelihood of receiving an EPSDT well-child care service. Children who participated in WIC were 36 percent more likely to receive their first EPSDT service when compared with children who did not participate in WIC. Year of entry to Medicaid also had a significant effect on the likelihood of a child having his or her first EPSDT exam. Since 1992, each cohort of children entering

Medicaid has been 27 percent to 47 percent more likely than the than the 1991 cohort to receive a first EPSDT exam.

A child's race or ethnicity also had an effect on the likelihood of receiving an EPSDT exam. African American children were 20 percent less likely to have an EPSDT exam than white children. In contrast, Hispanic children were 8 percent more likely to have a well-child exam. Children who entered Medicaid before age 2 were significantly more likely to have a first EPSDT exam compared with children ages 2-5. We found the strongest effect for children who entered Medicaid within their first 6 months of life. These children were just over twice as likely to have a first EPSDT exam compared with children over age 2 on entry to Medicaid. Children from Chicago were less likely to have a first EPSDT exam than were children living in other parts of the state. Living in poorer communities in Illinois was associated with a greater likelihood of having an EPSDT exam. Children living in areas with at least 10 percent poverty were 23 percent to 27 percent more likely to receive an EPSDT exam. In summary, participating in WIC increased the likelihood of receiving an EPSDT exam, as did year of entry to Medicaid (after 1991), and age at Medicaid entry (younger than 2).

Conclusion

The primary purpose of this study has been to examine the patterns of program participation in FSP and WIC and the effects of WIC on young children's health outcomes. In particular, we focused on recent trends in the patterns of interaction between the food assistance programs and AFDC/TANF to illuminate the effects of welfare reform on the food assistance participation patterns. We find that there have been significant changes both in FSP and WIC participation during the time when welfare reform was being implemented in Illinois. Although food stamp receipt among young children declined considerably during the study period, WIC participation has increased. The data indicate that most of the decrease in FSP participation was driven by drops in entries to cash assistance, while the increase in WIC participation can mainly be attributed to increases in the population receiving WIC only. We also find that service receipt duration for both FSP and WIC has become shorter in recent years, although the change was more noticeable in FSP durations than WIC durations. We also find that there is a higher level of program interaction between FSP and cash assistance than between WIC and cash assistance. Taken together, the findings suggest that, although families with young children are foregoing food stamps—which are closely linked to cash welfare programs—they may be turning to WIC for essential food items for their young children.

The findings on the effects of WIC on health outcomes in large part support our hypothesis of the positive effect of WIC receipt. We find that children receiving WIC are more likely to receive preventive health care services through EPSDT services in Illinois. Among those children enrolled in Medicaid, WIC children are significantly less likely to be diagnosed with health problems associated with inadequate nutrition than those not participating in WIC.

We believe that the findings of this study have a number of policy implications. Welfare reform has changed the basic structure of the safety net for low-income families with children. Given the flexibility to design and implement antipoverty programs, states are now searching for more effective ways of assisting low-income families. Given the significant number of young

children served by FSP and WIC, along with the rapid changes in the participation patterns across the programs during welfare reform, a better understanding of the relationships among food stamps, WIC, and TANF is critical to informed decision-making concerning policy and program changes. It is our hope that this paper has addressed these issues directly. Traditionally, cash assistance and FSP have been regarded as “welfare” programs, while WIC has been regarded as a “public health” program. Because of this, there has been no concerted effort to coordinate the two sets of programs that intend to assist low-income families with young children. The findings in our study suggest that there might be a growing need for a higher level of coordination among FSP, TANF, and WIC given the changes in the participation patterns since welfare reform.

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Notes

¹ The income eligibility of 130 percent poverty line does not apply to the elderly.

² Legal immigrants also saw eligibility curtailed.

³ The monthly AFDC/TANF, Medicaid, food stamp, and WIC receipt information is used to construct the spell of service receipt. In constructing the service spells, we treat periods of service receipt that include one-month periods off as continuous spells of program receipt.

⁴ We were unable to obtain birth certificate data with identifying information that could be linked at the individual level to the program participation records.

⁵ Obviously, the patterns of in- and out-state migration can affect the estimated program participation rates. Detailed migration data for young children are not available to correct this problem.

⁶ We define new program entrants as those who have not participated in FSP or WIC for the previous year. The monthly FSP and WIC administrative data we used for this study only date to 1990. This allows us to select the 1991 entry cohort without service receipt in 1990. We applied the same one year rule for each entry cohort.

⁷ For the proportional hazard models, we use 3 percent random sample for the analyses.

⁸ Again, we used the same definition of the first entry as FSP and WIC.

⁹ For similar types of analysis using aggregate-level data that are cross-classified according to demographic and other factors, see Breslow & Day, 1975; James & Segal, 1982; and Frome, 1983.

¹⁰ Although such measures at smaller geographic levels (such as zip code or census tract) might be more appropriate to capture the effect of “community,” we were unable to disaggregate the birth certificate data to smaller geographic level because we employ aggregate-level birth certificate data as the baseline population estimates. Further classification of baseline data into smaller geographic levels would increase the problem of migration of birth cohorts on the participation rates.

¹¹ We used address information at the time of the first FSP and WIC entry to identify the zip code of the child.

¹² It should be noted that we are not examining incidence in the entire population of Illinois children. Rather, we are examining incidence among those children who were eligible for Medicaid. Also, we cannot speak to the issue of medical “need” among children based on our incidence measure because we are unable to capture those children on Medicaid who did not seek medical services.

¹³ Communication with Illinois Department of Human Services officials.

¹⁴ We used Kaplan-Meier method for the median estimation to control for the effect of the incomplete spells (right censoring).

¹⁵ As discussed in the method section, WIC participation occurred only before a particular diagnosis is considered as WIC receipt in the models. We also examined alternative models which indicated WIC participation that included both before and after a particular diagnosis during the first four years of life. When defined in this way, we found that WIC had either no effect or significant positive effects on the odds of being diagnosed. The findings in the alternative models suggest that in fact some WIC participation was a result of being diagnosed for a health problem. By estimating the effect of WIC participation only prior to a diagnosis in the model, we attempt to control for this selection bias.

Table 1. Patterns of Food Stamp Program, WIC, and AFDC/TANF Participation in Illinois: Birth Cohorts 1990-96

Year	1990	1991	1992	1993	1994	1995	1996
Total Births	195,499	192,318	190,923	190,709	189,182	185,801	183,079
Food Stamp Program							
<u>Ever Received from Birth to</u>							
6 months	25.7%	27.8%	29.1%	29.7%	27.6%	24.6%	23.1%
1 year	29.7%	31.7%	33.1%	33.3%	31.0%	28.0%	25.8%
2 year	34.8%	36.6%	37.7%	37.4%	34.8%	31.6%	28.8%
3 year	38.1%	39.8%	40.5%	39.9%	37.1%	33.7%	29.6%
4 year	40.6%	41.9%	42.4%	41.5%	38.5%	34.3%	29.6%
5 year	42.4%	43.4%	43.7%	42.6%	39.0%	34.3%	29.6%
WIC							
<u>Ever Received from Birth to</u>							
6 months	41.0%	42.3%	41.9%	43.0%	43.9%	43.7%	47.1%
1 year	42.9%	44.0%	43.6%	44.7%	45.4%	45.3%	48.7%
2 year	44.9%	46.0%	45.9%	47.1%	47.7%	49.7%	51.9%
3 year	46.4%	47.8%	48.0%	49.0%	51.2%	52.2%	52.9%
4 year	47.8%	49.3%	49.6%	51.8%	53.4%	53.1%	52.9%
5 year	48.7%	50.2%	51.3%	53.1%	54.2%	53.1%	52.9%
AFDC/TANF							
<u>Ever Received from Birth to</u>							
6 months	24.5%	25.4%	25.4%	26.0%	24.5%	21.6%	19.4%
1 year	27.3%	28.2%	28.5%	28.7%	26.7%	23.9%	21.3%
2 year	30.8%	31.7%	32.1%	31.8%	29.5%	26.4%	23.5%
3 year	33.1%	34.2%	34.3%	33.7%	31.2%	28.0%	24.0%
4 year	35.0%	35.8%	35.7%	34.9%	32.3%	28.4%	24.0%
5 year	36.4%	36.9%	36.6%	35.7%	32.6%	28.4%	24.0%
Any of Three Programs							
<u>Ever Received from Birth to</u>							
6 months	47.7%	49.6%	50.0%	50.8%	51.0%	49.7%	50.8%
1 year	51.7%	53.5%	53.9%	54.4%	54.3%	53.1%	53.5%
2 year	56.7%	58.4%	58.6%	58.5%	58.2%	57.4%	56.7%
3 year	60.1%	61.6%	61.3%	61.0%	61.7%	59.9%	57.8%
4 year	62.6%	63.7%	63.3%	63.8%	63.9%	60.9%	57.8%
5 year	64.3%	65.2%	65.1%	65.1%	64.7%	60.9%	57.8%

*Shaded areas represent partially censored observations

Table 2. Patterns of Food Stamp Program, WIC, and AFDC/TANF Participation by Age 2: Illinois, 1990-96 Birth Cohorts

Year	1990	1991	1992	1993	1994	1995	1996
Total Births	195,499	192,318	190,923	190,709	189,182	185,801	183,079
% of Children Ever Participated Before the 2nd Birthdate							
<u>Combination of Three Programs</u>							
AFDC/TANF, Food Stamp, and WIC	22.8%	23.4%	23.5%	23.8%	22.2%	21.3%	20.4%
AFDC/TANF and Food Stamp	8.0%	8.3%	8.6%	8.0%	7.4%	5.8%	3.3%
WIC and Food Stamp	2.7%	3.4%	4.0%	4.1%	4.1%	4.4%	4.6%
Food Stamp Only	1.3%	1.5%	1.6%	1.5%	1.2%	0.9%	0.7%
WIC Only	21.9%	21.8%	20.9%	21.1%	23.3%	25.1%	27.7%
Total Food Stamp	34.8%	36.6%	37.7%	37.4%	34.8%	32.3%	29.0%
Total WIC	47.4%	48.7%	48.4%	49.0%	49.6%	50.8%	52.7%
Total AFDC/TANF	30.8%	31.7%	32.1%	31.8%	29.5%	27.1%	23.7%
Total: Any of Three Programs	56.7%	58.4%	58.6%	58.5%	58.2%	57.4%	56.7%

Table 3. Estimated Relative Odds from Multinomial Logit Regression of FSP, WIC, and AFDC/TANF Program Participation by Age 2

Variable	Food Assistance(FSP/WIC) with TANF/AFDC vs. No Service	Food Assistance(FSP/WIC) Only vs. No Service	Food Assistance(FSP/WIC) Only vs. AFDC/TANF with Food Assist.
Model 1			
<u>Birth Year</u>			
1990	1.00	1.00	1.00
1991	1.07	1.07	1.00 *
1992	1.09	1.08	0.99 *
1993	1.09	1.12	1.03
1994	1.01 *	1.21	1.20
1995	0.89	1.29	1.45
1996	0.79	1.40	1.77
<u>Region</u>			
Rest	1.00	1.00	1.00
Cook	2.54	2.05	0.81
Model 2			
<u>Birth Year</u>			
1990	1.00	1.00	1.00
1991	1.07	1.08	1.00
1992	1.11	1.09	0.99
1993	1.12	1.14	1.02
1994	1.04	1.24	1.19
1995	0.92	1.32	1.44
1996	0.81	1.43	1.76
<u>Region</u>			
Rest	1.00	1.00	1.00
Cook	0.89	0.91	1.03
<u>County Poverty</u>			
1st Quartile	1.00	1.00	1.00
2nd Quartile	1.30	1.11	0.85
3rd Quartile	1.61	1.55	0.96
4th Quartile	2.01	1.91	0.95
<u>County Unemployment</u>			
1st Quartile	1.00	1.00	1.00
2nd Quartile	1.98	1.56	0.79
3rd Quartile	2.17	1.93	0.89
4th Quartile	2.91	2.25	0.77
<u>County Female Household</u>			
1st Quartile	1.00	1.00	1.00
2nd Quartile	2.63	2.58	0.98
3rd Quartile	3.25	2.88	0.89
4th Quartile	4.52	2.58	0.57

Note: Baseline levels are indicated by relative odds of 1.

*Estimates not statistically significant at the 0.05 level.

Table 4. Proportional Hazard Model Estimates: Duration of First Food Stamp and WIC Service Spells, Illinois, 1991-98

Variable	<u>Model 1</u>				<u>Model 2</u>			
	<u>Food Stamp</u>		<u>WIC</u>		<u>Food Stamp</u>		<u>WIC</u>	
	Parameter Estimates	p. value	Parameter Estimates	p. value	Parameter Estimates	p. value	Parameter Estimates	p. value
<u>Entry Year</u>								
1991								
1992	-0.02	0.35	0.05	0.04	-0.06	0.01	0.05	0.06
1993	0.12	0.00	0.05	0.06	0.11	0.00	0.05	0.06
1994	0.17	0.00	0.18	0.00	0.08	0.00	0.17	0.00
1995	0.28	0.00	0.35	0.00	0.13	0.00	0.34	0.00
1996	0.39	0.00	0.48	0.00	0.19	0.00	0.46	0.00
1997	0.63	0.00	0.34	0.00	0.20	0.00	0.30	0.00
1998	0.56	0.00	0.12	0.03	0.05	0.31	0.07	0.17
<u>Gender</u>								
Male								
Female	0.00	0.87	-0.02	0.10	0.04	0.02	-0.02	0.11
<u>Race/Ethnicity</u>								
White								
African American	-0.28	0.00	-0.07	0.00	0.18	0.00	-0.04	0.05
Hispanic	0.10	0.00	-0.21	0.00	0.00	0.95	-0.23	0.00
Other	-0.12	0.06	-0.09	0.03	-0.20	0.00	-0.12	0.00
<u>Region</u>								
Rest of State								
Chicago	-0.13	0.00	0.24	0.00	0.22	0.00	0.24	0.00
<u>Age at Entry</u>								
0-6 months	-0.27	0.00	-0.51	0.00	0.14	0.00	-0.52	0.00
7-11 months	0.01	0.72	-0.05	0.35	0.15	0.00	-0.06	0.23
12-23 months	0.04	0.09	-0.20	0.00	0.14	0.00	-0.21	0.00
24-60 months								
<u>Community Poverty</u>								
Less than 10%								
10% to less than 20%	-0.04	0.06	-0.13	0.00	-0.12	0.00	-0.13	0.00
20% to less than 30%	-0.12	0.00	-0.14	0.00	-0.21	0.00	-0.13	0.00
30% and higher	-0.21	0.00	-0.17	0.00	-0.23	0.00	-0.15	0.00
<u>Being on AFDC/TANF*</u>								
No								
Yes					-3.10	0.00	-0.20	0.00

* The variable, Being on AFDC/TANF, is specified as a time-varying covariate

Table 5. Logistic Regression Model Estimates:
 Estimated Odds Ratio of Health Problems, Birth Cohorts 1990-1994

Variables	Failure to Thrive	Anemia	Nutritional Deficiencies
<u>Year of Birth</u>			
1990	1.00	1.00	1.00
1991	1.34	1.04	1.00
1992	1.95 *	0.88	0.96
1993	1.35 *	0.72 *	0.75
1994	1.76 *	0.71 *	0.91
<u>Gender</u>			
Male	1.00	1.00	1.00
Female	0.69 *	1.02	0.69
<u>Race/Ethnicity</u>			
White	1.00	1.00	1.00
Black	0.74 *	1.18 *	2.03 *
Hispanic	0.48 *	2.12 *	0.61
Other	0.54	1.18	1.82
<u>Region</u>			
Rest of State	1.00	1.00	1.00
Chicago	0.82	2.20 *	1.36
<u>Received WIC</u>			
No	1.00	1.00	1.00
Yes	0.64 *	1.04	0.26 *
<u>County Poverty</u>			
Less than 10%	1.00	1.00	1.00
10-20% in pov	1.02	0.86	0.52
20-30% in pov	1.01	0.99	1.14
>30% in pov	0.75	1.11	0.68

Note: Baseline levels are indicated by relative odds of 1.

* p<.05

Table 6. Proportional Hazards Model Estimates:
 Estimated Risk of First EPSDT Screening Service, 1991-1997

Variables	Risk Ratio
<u>Entry Year</u>	
1991	1.00
1992	1.29 *
1993	1.35 *
1994	1.35 *
1995	1.38 *
1996	1.45 *
1997	1.27 *
<u>Gender</u>	
Male	1.00
Female	1.00
<u>Race/Ethnicity</u>	
White	1.00
Black	0.80 *
Hispanic	1.08 *
Other	1.07
<u>Region</u>	
Rest of State	1.00
Chicago	0.79 *
<u>Age at Entry</u>	
0-6 months	2.03 *
7-11 months	1.25 *
12-23 months	1.09 *
24-60 months	1.00
<u>Community Poverty</u>	
Less than 10%	1.00
10-20% in pov	1.23 *
20-30% in pov	1.27 *
>30% in pov	1.27 *
<u>Received WIC**</u>	
No	1.00
Yes	1.36 *

Note: Baseline levels are indicated by relative odds of 1.

* p<.05

**The variable, "Receiving WIC", is specified as a time-varying covariate.