

Are WIC and School Meal Programs Effectively Reaching Those in Need? Trends in Children's Early and Continuous Use of Federal Nutritional Policy

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Introduction

For the 20% of American children who live in poverty, and the 23% of children who live in food insecure households, nutritional policy provides an essential safety net against hunger and its negative effects on children's development. Rather than targeting one particular micronutrient deficiency, federal nutrition assistance programs provide the benefit of steadily available food from the food groups essential for physical and cognitive development. Their effects on dietary quality and the reduction of micronutrient deficiencies are strong and positive (Bitler and Currie 2005). Furthermore, there is a strong influence of nutrition on cognitive development and socioeconomic inequality (Behrman et al. 2009). Using longitudinal data from the Survey of Income and Program Participation (SIPP), this research will examine whether children's exposure to nutritional policy has remained steady or increased as families' economic need has increased during the Great Recession that officially began in December of 2007 (National Bureau of Economic Research 2008). Three programs form the basis of my investigation: the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), the National School Breakfast Program (SBP) and the National School Lunch Program (NSLP). Together, these programs increase children's access to nutritious food from the prenatal period until the completion of secondary school. Greater detail about each program is provided later in the abstract.

Though it is established that more mothers and children have enrolled in federal nutritional programs in the last five years (Connor et al. 2011; USDA 2011), it is unclear whether this increase has been experienced equally by children of all ages, and by mothers in all racial/ethnic and socioeconomic groups. Prior to the recession, for example, infants were more likely to receive WIC benefits than pregnant women or older children (Tiehan and Jackowitz 2008). A primary goal of this analysis is to use individual-level data to not only identify trends in participation, but to examine whether increases in participation have been stratified among eligible mothers and children. To identify "critical" periods of intervention, I draw from the social stratification and child development literatures, which inform our understanding of the value of early intervention, as well as the lasting effects of both early and continuous intervention (Jonsson 2010). Examining whether federal nutritional policies are reaching serving the children most in need has clear policy significance.

Using appropriate quantitative techniques, I will ask:

- 1) a) Whether participation in WIC increased between 2004 and 2011 for four groups of children: those exposed in utero, during the postnatal period (0-6 months), as older infants (6-12 months), and between ages 1-5.
b) Whether use of SBP and NSLP increased between 2004 and 2011 for children and adolescents.
- 2) Whether the duration of WIC, SBP and NSLP participation has increased since the beginning of the recession.
- 3) Whether these increases have been experienced equally across socioeconomic and racial/ethnic groups.

Background

Nutritional Policy and Children's Health and Academic Progress

The specific research proposed here supplements an existing project on the role of nutritional policy in generating early academic and social inequality. Two findings motivate my interest in examining participation in U.S. nutritional policy as a marker of children's health environments. First, nutritional policy has strong positive effects on birth outcomes and the quality of children's diets. Mothers who participate in WIC are more likely to have babies with a healthy birthweight and to breastfeed their infants (Bitler and Currie 2005, Kowaleski-Jones and Duncan 2002). These effects are most pronounced—but not limited to—the most disadvantaged mothers and children, including mothers receiving other forms of public assistance and single mothers (Bitler and Currie 2005). Later in childhood, children in the National School Breakfast Program consume fewer calories from fat, more fiber, iron and potassium, and demonstrate fewer micronutrient deficiencies (Bhattacharya, Currie and Haider 2006). Secondly, a relevant but distinct literature demonstrates that child nutrition has durable cognitive, academic and socioeconomic effects (Behrman et al. 2009). Nutrient deficiency is negatively related to cognitive development, academic achievement, education and earnings (see Haas and Brownlie 2001, Thomas and Frankenberg 2002 for reviews), with the bulk of research in developing settings where poor nutrition is prevalent. Nutritional intake is also strongly consequential for children in developed nations, when nutrition is measured by iron-deficiency anemia or height (Case and Paxson 2008). Anemic children in the U.S. who receive iron supplementation, for example, increase their test performance and learning capacity (Grantham-McGregor and Ani 2001), with the primary pathway believed to operate physiologically through changes in the structure and function of the central nervous system, and structurally through a heightened ability to focus in the classroom (Roncagliolo et al. 1998). This research is complemented by evidence linking other markers of child health to education (Conley and Bennett 2000), earnings and labor force participation in adulthood (Jackson 2010; Palloni 2006). Such research highlights the role of nutrition in producing or reducing cognitive, academic and socioeconomic inequality, even in a setting of relative wealth.

Existing research does not evaluate nutritional policy while accounting for the fact that policy exposure coincides with highly sensitive periods of cognitive development, when children form the ability to analyze, evaluate and retain information. Understanding the role of WIC in affecting academic achievement is complicated by a central tenet of life course theory: developmental pathways are sensitive to not only the quality, but also the timing and duration of children's exposure to particular environments (Elder 1998). The early life cycle, particularly before birth through age three, is a highly sensitive period of brain development, with many neural circuits affected by experiences during that time (Knudsen 2004). Beyond the prenatal period, infants' nutritional environments also have effects on academic achievement. Anemia during infancy, for example, may decrease auditory brain stem response, an indicator of central nervous system development (Roncagliolo et al. 1998). And Hoddinot et al. (2008) find that nutritional intervention before age three, but not between ages three and six, has strong and positive effects on Guatemalan men's hourly wages in adulthood. Nutritional policy may have the strongest effects when participation begins early and persists.

The Current Investigation: Background about the Programs

This research describes participation in an effort to inform the larger project described above: who participates in federal nutritional programs, and for how long? All three programs work to maintain proper nutrition among low-income children, with WIC providing supplements to

pregnant women and young children (0-5), and SBP/NSLP providing full price, reduced-cost or free breakfast and lunch to school-aged children (5-18) in public and private schools. In contrast to the federal food stamp program (or SNAP), nutritional content from major food groups is federally mandated for WIC, SBP and NSLP. WIC is fully federally funded and administered by states, and SBP and NSLP receive both federal and state funds. The programs provide steadily available nutritious food, rather than targeting one deficiency. Target families are at or below 185% of the federal poverty threshold and, in the case of WIC, women must also demonstrate that they are nutritionally at risk. All three programs also now have an eligibility rule whereby women who participate in other federal assistance programs (SNAP, TANF, Medicaid) are automatically eligible.

Examining Participation across the Age Distribution

Participation in WIC, SBP and NSLP is high. In 2006, about 50% of U.S. infants participated in WIC, and about 25% of pregnant women, postpartum women (up to six months after birth) and children ages 1-4 (Oliveira and Frazao 2009). School meal participation is similarly high. NSLP, for example, generally serves about 60% of school-age children in varying degrees of subsidization, with more than half of lunches served (e.g., 56% in 2002) to children eligible for free or reduced-price meals (USDA 2008, 2010). Moreover, participation has increased alongside economic hardship since the beginning of the recession in late 2007. WIC enrollment increased by 5% from 2008 to 2010 (Connor et al. 2011), while NSLP enrollment increased by 17% between 2006 and 2010, with higher increases in some states (Dillon 2011; USDA 2011).

While overall increases in participation are clear, what remains poorly understood is whether increasing participation has been experienced equally by all mothers and children. Prior to the recession, for example, infants were more likely to receive WIC benefits than pregnant women or older children (Oliveira and Frazao 2009), and eligible Hispanic women enrolled later in their pregnancies than their peers (Tiehan and Jackowitz 2008). Younger children were also more likely to participate in school breakfast and lunch programs (Newman and Ralston 2006). A thorough evaluation of the nutritional safety net's effectiveness for all mothers and children requires microdata that simultaneously track participation and individuals' characteristics over time.

Data

Of the several individual-level data sources available for tracking mothers' and children's participation in federal nutritional programs, the Survey of Income and Program Participation (SIPP) is the best suited for my purposes. SIPP is a longitudinal survey, conducted by the Census Bureau, that began in 1984 with the goal of monitoring individuals' sociodemographic characteristics and monthly program participation. The survey is made up of a series of panels, each of which has several waves. Each sample within a panel is interviewed every four months (each interview comprises a wave within a panel), when respondents provide information about the previous four months. In order to capture patterns pre and post-recession, I will use available data from the 2004 and 2008 panels. The 2004 panel began in February 2004 with approximately 51,000 households, and ran until January of 2008. The 2008 panel began with 52,000 households in September 2008 and will run until December of 2012.

Measures

An important benefit of SIPP data compared to other microdata spanning the pre and post recession period is its measurement of children's birth month and year, as well as monthly income and monthly (person-specific) participation in WIC, SBP and NSLP and other federal programs. It

is therefore possible to measure eligibility and participation on a monthly basis, which is not possible with data from the Current Population Survey and some administrative sources. Using information on children's age, I separate four groups of WIC *age-eligible children*: in utero exposure, postnatal (0-6 months), older infancy (6 months-1 year), and ages 1-5. SBP and NSLP age-eligible children are those aged 5-18. WIC, SBP and NSLP *participation* are assessed monthly, producing approximately four years of continuous participation data for the 2004 panel, and approximately three years for the 2008 panel.

In addition to examining child age and participation in WIC, SBP and NSLP, in some analyses I measure several other individual-level characteristics available in the SIPP, including maternal race and ethnicity, child sex, maternal educational attainment (less than high school, high school, some college and college or higher), the number of children in the household, the household poverty ratio, and mothers' participation in other federal programs (Medicaid, TANF, and SNAP, the federal food stamp program). Together with the household poverty ratio, measures of other program participation will allow me to construct a measure of eligibility that is made up of both income-based and automatic qualification. Finally, in some analyses I include an indicator of the state of residence, in order to control for state-level differences in program administration (e.g., timing of benefit distribution, income documentation requirements, and nutritional risk assessments). Because item non-response and respondent attrition will be a concern in analyzing SIPP, I will examine selective attrition by policy eligibility and participation status.

Methods

The analysis consists of two main parts: a) an analysis of participation and its determinants over time, and b) an analysis of changes in participation duration across the 2004 and 2008 panels.

Participation and Its Determinants

I will begin by addressing the first research question—who participates? The first part of the analysis is descriptive and will entail a description of pre and post-recession participation rates, using the 2004 and 2008 panels. I will begin by documenting that eligibility has increased across the 2004 and 2008 panels. Next, I will examine the percentage of the four groups of WIC-eligible children (in utero, postpartum, older infant, children) that participated in each four-month wave of the 2004 and 2008 panels. I will calculate the average monthly participation in each four-month wave of each panel among both the total population (all respondents in the allowable age/fertility groups) and those eligible. Do infants remain overrepresented among participants, or have other children—those exposed prenatally, or non-infant children—disproportionately increased their participation? I will also examine whether free or reduced-price SBP and NSLP participation increased in the same time period (for both the total population and among those eligible).

After documenting changes in participation among several groups of children, I will examine whether this pattern is stratified by socioeconomic status and race/ethnicity among eligible families. Have the most socioeconomically needy families—those at the bottom of the income and educational distributions—increased their participation, especially at the earliest ages, to the same degree as their peers? Have black, Hispanic, Asian and non-Hispanic white children benefited equally from participation at all ages?

In order to more rigorously evaluate any socioeconomic and racial/ethnic stratification of participation patterns, I will next examine the determinants of ever participating within age groups among the four groups of WIC-eligible children, as well as among SBP and NSLP age-eligible

children and adolescents (ages 5-18). Using logistic regression, I will estimate a model that takes the following form:

$$\log\left[\frac{p_i}{1-p_i}\right] = \beta_0 + \beta_1 X_m$$

where $\log\left[\frac{p_{ih}}{1-p_{ih}}\right]$ equals the log odds of p , the probability that each child, i , participates in WIC or

SBP/NSLP. X_{ih} is a vector of mother-level characteristics, including education and race/ethnicity.

I will estimate separate models for several groups while conditioning on eligibility: prenatal; postpartum; older infant; ages 1-5; and children between ages 5-18 (for examination of SBP and NSLP). SIPP panels will be pooled, with a dummy indicator included for each wave within a panel. From the regression estimates, I will calculate adjusted probabilities of participation in each time period for each group of children, conditional on having reached the maximum age in each group. This part of the analysis will also enable me to examine whether the stratification of participation has changed over time. Are Hispanic mothers still less likely to participate in WIC early in their pregnancies? Are the most poorly educated mothers participating at the same rate as their peers? In an extension of the model I will include state-level fixed effects, which will control for the linear and additive effect of state-level differences in the policy environment that are not measured, and will identify estimates from variation within states.

Duration of Participation

The final part of the analysis will examine the duration of children's participation. An important consideration in examining the performance of the federal safety net is not only the success of federal programs in enrolling children *early*, but also their ability to keep children enrolled for a long *duration*. Using discrete time hazard rate models, I will examine the time (in months) until exit from WIC and, separately, SBP and NSLP among eligible children in the 2004 and 2008 panels. A basic model is as follows:

$$\log[\Pr(y_{it} = 1 | d_{it})] = \beta_0 + \alpha_2 d_2 + \dots + \alpha_t d_t + \beta_1 X_{1i} + \beta_2 Z_{2it}$$

where the probability of exiting a program (y) for an individual (i) at month t is estimated as a function of a set of person-specific monthly dummy variables (d), time-constant variables such as education and race (X), and time-varying variables (Z) such as household composition and other program participation. The analytic sample for WIC analyses will consist of eligible children who were first exposed in utero. For SBP/NSLP analyses, the sample will include eligible children who began participating at age five. SIPP data will allow me to separate program exit due to loss of eligibility vs. non-eligibility reasons. I will pool the two SIPP panels, performing separate analyses for each panel and using Wald tests to compare coefficients across models.

Using this approach will enable me to examine whether participation spells increased between 2004 and 2011, and whether mothers in all racial/ethnic and participating socioeconomic groups have maintained a similar duration in participation.

Anticipated Results

Though increases in families' enrollment in federal nutritional programs have been documented since the beginning of the Great Recession, less is known about whether this increase has been

experienced equally by children of all ages, and by mothers in all racial/ethnic and socioeconomic groups. This research will reveal changes in children's participation across the age distribution, as well as racial/ethnic and socioeconomic stratification in patterns of participation. Increasing economic need is expected to result in increases in participation among all groups of children. However, it is less clear whether gaps in participation will narrow between the 2004 and 2008 waves—to the extent that families traditionally less likely to enroll are driven to participate in higher rates, then a narrowing of these gaps is anticipated.

This study provides an empirical assessment of direct relevance to public policy. Examining whether federal nutritional policies are effectively reaching the children most in need has the potential to inform program design and outreach to eligible populations. Policymakers are forced to confront the challenge of deciding not only how to intervene in children's development, but also when and for how long. This is of particular concern for health-focused interventions, which must grapple with the complex ways in which health deficiencies are related to sensitive periods of brain development. Nutritional policy is a useful case study for identifying which periods in child development are critical windows for investment in future socioeconomic productivity. At the same time, this research is theoretically informed—engaging literatures on child development and social stratification—and draws from central theoretical questions about life course variation in health and social inequality.

Timeline

I have completed setup of the 2004 and 2008 SIPP panels, as well as the analyses of participation and its determinants (which confirm an increase in participation after the recession, as well as highlight some important differences across age groups and sociodemographic groups. I will complete analyses of participation duration by December 2012 and will have a preliminary manuscript by January 2013, when I will present this work at the Stanford Center for Poverty and Inequality. A full manuscript will be complete well before the PAA meeting in April.

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