Design Flaws: The effect of the coverage gap in food assistance programs on children’s well-being

Extended Abstract

Introduction and Problem Statement

Federal food and nutritional safety net program services are delivered in various forms, including vouchers, (near) cash supplements and directly as food. Services may be available only to specific members of the household or to the entire household. Households gain eligibility through income, but children’s eligibility for a specific program may depend upon their age and the income level of others in their day-care or school. The result of this hodge-podge of food and nutritional programs is that different households with similar income levels and numbers of children may be receiving substantially different bundles of food assistance. The Supplemental Nutrition Assistance Program (SNAP) is the sole program that provides consistent nutritional assistance across the life course.

While variation may occur across the entire childhood period, there is a significant transition in the types of food and nutrition programs for which children qualify as they reach age five and become age eligible to enter kindergarten. Before age five, children are age eligible for WIC and may receive nutritional assistance through child care programs such as the Child and Adult Care Food Program (CACFP). The impact of WIC has been well documented; studies show WIC participation has had moderate, positive effects on birth outcomes, i.e., decreased preterm birth and increased birth weight (Bitler & Currie, 2005; Figlio, Hamersma & Roth, 2009; Foster, Jiang, & Gibson-Davis, 2010; Hoynes, Page, & Stevens, 2011; Kowaleski-Jones & Duncan, 2002); reduced infant mortality rates for African-Americans (Khanani et al., 2010); and
increased intake of three of the four key nutrients in early childhood (Yen, 2010). Participation in the WIC program has been also associated with improved cognitive and behavioral outcomes at home and in school (Jackson, 2015; Hicks, Langham, & Takenaka, 1982).

After age five, children are no longer eligible for WIC and are much less likely to have contact with a child care center that participates in CACFP. Analyses by Arteaga, Heflin and Gable (2012) using the Early Childhood Longitudinal Study-Birth Cohort and a regression discontinuity design found that household food insecurity increases when children reach month 61 and age out of eligibility for WIC. In a follow-up study, Arteaga & Heflin (2014) used variation in states’ kindergarten age eligibility cutoff date and found NSLP participation protects against food insecurity during the transition to kindergarten.

The NSLP is administered at the school level and upwards of 97% of public schools participate. The NSLP provides lunch during the school day and snacks to children during afterschool programs. However, the value of the nutritional benefit varies, depending on number of instruction days; the school calendar (i.e., whether schools follow a traditional calendar with summers off or go year-round with a month off every three months); and the availability of the Summer Food Service Program, which serves meals during “vacation” months. In fiscal year 2011, over 31 million students received a free or reduced-price lunch daily; 12.1 million students received breakfast. However, according to Dahl and Scholz (2011), participation rates among eligible children are only 50 percent for the School Breakfast Program (SBP) and 75 percent for the NSLP. Empirical studies evaluating the NSLP’s effects on school outcomes are limited (Currie, 2003), but evidence suggests that participation in the NSLP is associated with higher educational attainment but does not improve students’ behavior or cognitive outcomes (Dunifon and Kowaleski-Jones, 2003; Hinrichs, 2010).
WIC and NSLP have been individually studied, but researchers and nutrition policy-makers still know little about how WIC and NSLP function together to affect a child’s well-being. This proposal will fill an important gap in the literature by studying the effects of transitions in program participation, particularly at a key point in children’s lives: school entry. We are specifically interested in examining the effects of the duration of the gap in program eligibility for WIC and NSLP, i.e., the coverage gap length. To the best of our knowledge, there are no studies that examine the coverage gap length for WIC and NSLP. Our research will use an innovative approach that exploits exogenous age eligibility rules that determine exit from WIC and access to NSLP to identify the coverage gap length’s effect on child well-being.

Once a child starts school, in part, the potential benefit of the NSLP and SBP depends on how school districts administer kindergarten, since children must be present at school to access meals provided on-site. In 2010-2011, 83 percent of US kindergarteners attended full-day programs. However, there is significant variation in full-day attendance by region (most common in south—98 percent; least common in west—69 percent), race (96 percent Black, 78 percent White, 88 percent Hispanic, and 77 percent of Asian) and family income level (90 percent of children whose families are below the federal poverty line attended full-day programs, compared with 79 percent of children from more affluent families).

Research Objectives/Questions

- *Research question #1. What is the impact of the coverage gap length of food and nutritional programs on language and literacy, mathematical thinking, social skills and BMI for a kindergarten age child?*
Research question #2. Does the effect of duration of program exposure to food programs, i.e., coverage gap length, on child’s cognitive skills, social skills and nutritional status fade out by spring of the kindergarten year, once children are exposed to the NSLP?

Children who participate in WIC can only be enrolled until 60 months of age. USDA reports there are no category errors due to over-age children receiving WIC benefits (USDA, 2012). In order to access the NSLP program, children must be enrolled in a formal kindergarten program. Kindergarten enrollment is largely based on turning age 5 by a cut-off point, which varies by state, from July 31 in Nebraska to January 1 in Connecticut. For all children who participated in WIC, we will use variation in child’s age relative to state kindergarten entry cut-off date to create a variable representing the number of months since the child was 60 months old and aged out of WIC, to the time she entered school and gained access to the NSLP. By instrumenting the ‘coverage gap length’ using state’s exogenous variation on age-eligibility rules and state’s first day of school, we address potential selection biases that might have arisen if unobserved parental decisions or beliefs influenced the coverage gap length and child’s outcomes. Thus, this indicator promises to be a good instrument to predict the actual duration of ‘coverage gap length’.

Hypotheses to be evaluated

These two research questions generate four hypotheses that the research will test:

Hypothesis 1A. An increase in the coverage gap length of food and nutritional programs for kindergarten-age children will lead to a reduction in scores for reading and math upon kindergarten entry.
Hypothesis 1B. A rise in the coverage gap length of food and nutritional programs for kindergarten-age children will lead to a reduction in a child’s body mass index upon kindergarten entry.

Hypothesis 2A. The effects of the coverage gap length of food and nutritional programs will fade out by spring of kindergarten year, once children are exposed to the NSLP, if children attend a full-day program.

Hypothesis 2B. The effects of the coverage gap length of food and nutritional programs will not fully fade out by spring of kindergarten year if children attend a half-day program.

In the ECLS-K, indicators of child’s well-being are collected in both spring and fall during the first year of data collection. Therefore, hypotheses 1A and 1B will use data from fall 2010 and hypotheses 2A and 2B will use information from both fall 2010 and spring 2011.

Research Methods and Data Analysis

Analysis of this research question will rely upon data from the Early Childhood Longitudinal Study- Kindergarten (ECLS-K: 2011). The ECLS-K: 2011 is a nationally representative sample of about 18,000 children, selected from both public and private schools, who attended either full-day or part-day kindergarten in 2010-11, and followed through the fifth grade. The ECLS-K includes information that was collected in the fall and spring of kindergarten, first grade and second grade. The ECLS-K is a good data choice for this project because it has a large sample size. About 4,000 children who start kindergarten fall at or below 200% of the poverty level. This sample size provides enough statistical power to estimate effects of the impact of the ‘coverage gap length’ of food programs.

Research Question #1
**What is the impact of the coverage gap length of food and nutritional programs on language and literacy, mathematical thinking, social skills and BMI upon kindergarten entry?**

Using data from the fall interview at kindergarten entry, the ECLS-K includes information on child outcome measures, birthdate, and WIC participation prior to kindergarten entrance. The ECLS-K will be supplemented with information on state kindergarten age cut-off dates, as well as information on the start day of the school year. The ECLS-K: 2011’s fall data is collected at the beginning of the school year, which is the perfect time to investigate the nutritional assistance coverage gap length. Since we are interested in learning whether the coverage gap length has an effect on child outcomes, the ideal time to measure child outcomes is at the point of school entry when children first gain access to NSLP.

In order to examine the effect of the ‘coverage gap length’ among kindergarten-age children on child outcomes in the areas of health, social skills, mathematical thinking and language and literacy, we start with a naïve model (equation 1). Here, using OLS, the outcomes of child i living in state s (CHILD<sub>is</sub>) are functions of demographic controls at the child, family and state level (X<sub>c,i</sub>, X<sub>f,i</sub> and X<sub>s,i</sub>) and the WIC-NSLP’s coverage gap length (DUR<sub>i</sub>)

\[
\text{CHILD}_{is} = \beta_0 + \beta_1 \text{DUR}_{is} + \beta_2 X_{c, is} + \beta_3 X_{f, is} + \beta_4 X_{s, is} + \epsilon_{is}
\]  \hspace{1cm} (1)

DUR<sub>is</sub> is a variable that we create in the following way: DUR<sub>is</sub> = AgeBS<sub>is</sub> – 60, where AgeBS<sub>is</sub> is the age of child i at the beginning of the school year in state s, and 60 is the age when a child ages out of WIC. For example, if the academic year starts in September 1 in state s, and the child is 66 months old at that time; that means that the coverage gap length for the child is 6 months.

However, equation (1) does not address selection issues that may bias estimates of the coverage gap length’s effects on child outcomes. Remember that the DUR<sub>is</sub> is defined as the
duration of non-exposure to WIC and NSLP, i.e., coverage gap length. However, it is possible that some parents may decide to delay kindergarten entry for a child that meets the cutoff date (perhaps because they believe the child is not mature enough) or it is possible that parents persuade a school to admit their child even if she is too young according to formal guidelines. In other words, parental decisions, a variable that we cannot observe, may affect the actual coverage gap length and child’s outcomes at the same time, and thus bias our results. To address this issue, we instrument DUR using age eligibility rules for both programs. In order to access the NSLP program, a child must be enrolled in a formal kindergarten program and kindergarten eligibility is based on the state’s age eligibility rule. These rules are exogenous to parental decisions and it is unlikely that parents could manipulate them – birth’s certificates are required and it will be difficult to falsify them - or to foresee five years in advance what the binding state’s age eligibility rule will be for kindergarten entrance. Therefore, we believe this instrument is correlated with DUR but is not directly correlated with child’s outcomes. We use a two-stage instrumental variable approach and in the first stage, we estimate coverage gap length as follows:

\[ DUR_{is} = \gamma_0 + \gamma_1 (\text{Est}_\text{AgeBS}_{is} - 60) + \gamma_2 Xc_{is} + \gamma_3 Xf_{is} + \gamma_4 Xs_{is} + \mu_{is} \]  (2)

Where Est_AgeBS_{is} is the estimated age of child i at the beginning of the academic year when the child starts kindergarten for the first time in state s. We create Est_AgeBS, using both child’s birthdate, state’s age eligibility rule and state’s first day of school. For example, if the state’s rule is that the child should be 5 by November 1, the child’s birthdate is October 1 and school starts on September 1, it means the estimated age when the child should start school, given the age’s eligibility rule, would be 58 months. Thus, the value of the instrument, Est_AgeBS – 60 is -2, because during 2 months, the child has access to both food and nutritional programs (i.e., WIC and NSLP).
In the second stage, we regress child’s outcomes on the predicted values for \( DUR_{is} \) from the first stage, as follows:

\[
\text{CHILD}_{is} = \alpha_0 + \alpha_1 \hat{DUR}_{is} + \alpha_2 X_{c_{is}} + \alpha_3 X_{f_{is}} + \alpha_4 X_{s_{is}} + \epsilon_{is} \tag{3}
\]

In all our regressions, standard errors are clustered at the state level. Our main analysis uses a sample size of all children who ever received WIC (i.e., treatment on the treated analyses). We will test the robustness of our results by expanding the sample size to all children who were WIC eligible at the point of kindergarten entry, that is, who satisfied the poverty eligibility measure, Medicaid participation or TANF participation (i.e., intent to treat analyses).

Hypothesis 1A will be confirmed if we find that \( \alpha_1 \) is negative and statistically significant, meaning that \( DUR_{is} \) negatively affects child’s cognitive and social emotional skills, and disproven if we find that \( \beta_1 \) is not statistically significant. Similar, hypothesis 1B will be confirmed if we find that \( \alpha_1 \) is negative and statistically significant, meaning that \( DUR_{is} \) negatively affects child’s BMI, and disproven if we find that \( \beta_1 \) is not statistically significant.

Research question # 2

*Does the effect of duration of program exposure to food programs, i.e., coverage gap length, on child’s cognitive skills, social skills and nutritional status fade out by spring of kindergarten year, once children are exposed to the NSLP?*

To examine this question, we use an approach that is similar to the approach for research question #1. In the first stage, we estimate \( \hat{DUR}_{is} \) using controls from the fall of 2010, which is exactly the same way it was estimated in equation 2. In the second stage, we regress child’s outcomes, measured in spring of 2011, on the predicted values for \( DUR \), as follows:

\[
\text{CHILD}_{spring_{is}} = \beta_0 + \beta_1 \hat{DUR}_{is} + \beta_2 X_{c_{fall_{is}}} + \beta_3 X_{f_{fall_{is}}} + \beta_4 X_{s_{fall_{is}}} + \epsilon_{is} \tag{4}
\]
By the spring, children would have been receiving free or reduced priced lunch for about seven months. In part, the potential benefit of the NSLP depends on how school districts administer kindergarten, since children must be present at school to access meals provided on-site. This means that school lunch participation depends largely on whether a child attends a full-day program or a half-day program. Because of that, we will conduct our analysis for two subgroups: children attending a full-day program and children attending a half-day program.

Hypothesis 2A will be confirmed if we find that $\alpha_1$ (coefficient of DUR on equation 3) is statistically greater than $\beta_1$ (coefficient of DUR on equation 4); in other words, we expect the effects of DUR to fade out by the spring if children attend a full-day program. To test hypothesis 2A, we will only use the subgroup of children who attended full-day kindergarten. Hypothesis 2B will be confirmed if $\alpha_1$ (coefficient of DUR on equation 3) is statistically equal to $\beta_1$ (coefficient of DUR on equation 4). In other words, we expect the effects of DUR to persist if the child attends a half-day program, assuming lower access to both school breakfast and lunch programs.

**Anticipated Results of the Research and Policy Implications**

Age eligibility rules for WIC and kindergarten entry mean that many children experience a gap where, for several months and up to a year, they are not eligible for WIC or the NSLP. This creates a coverage gap length that has an unknown impact on a child’s well-being. Results from this study will help nutrition policy-makers understand the impact that the coverage gap length has on children’s outcomes. Our proposed analyses uses the nationally representative ECLS-K to provide a comprehensive picture of how having limited access to food and nutritional programs during the time when a child transitions to kindergarten shapes the contours of child’s well-being over the course of childhood. Given the heightened scrutiny that all social spending is
facing in today’s political climate, research is needed that speaks with a clear, data-driven message about how nutritional assistance programs improve BMI and increase child’s social and cognitive skills. Furthermore, our exploration of heterogeneous treatment effects by half-day and full-day kindergarten will allow us to speak to the issue of how limited access to food and nutritional programs before the child enters school and after she turns 5 years of age affects children differently, depending on their school’s particular kindergarten set-up. This more nuanced analysis will provide policy-makers with much clearer guidance on how nutrition policies actually unfold in children’s lives to affect their well-being.

References


