



# Low-income Children's participation in the National School Lunch Program and household food insufficiency



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## ABSTRACT

Assessing the impact of the National School Lunch Program (NSLP) on household food insufficiency is critical to improve the implementation of public food assistance and to improve the nutrition intake of low-income children and their families. To examine the association of receiving free/reduced-price lunch from the NSLP with household food insufficiency among low-income children and their families in the United States, the study used data from four longitudinal panels of the Survey of Income and Program Participation (SIPP; 1996, 2001, 2004, and 2008), which collected information on household food insufficiency covering both summer and non-summer months. The sample included 15,241 households with at least one child (aged 5–18) receiving free/reduced-price lunch from the NSLP. A dichotomous measure describes whether households have sufficient food to eat in the observed months. Fixed-effects regression analysis suggests that the food insufficiency rate is .7 (95%CI: .1, 1.2) percentage points higher in summer months among NSLP recipients. Since low-income families cannot participate in the NSLP in summer when the school is not in session, the result indicates the NSLP participation is associated with a reduction of food insufficiency risk by nearly 14%. The NSLP plays a significant role to protect low-income children and their families from food insufficiency. It is important to increase access to school meal programs among children at risk of food insufficiency in order to ensure adequate nutrition and to mitigate the health problems associated with malnourishment among children.

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## 1. Introduction

A growing number of children and their families in the United States face the risk of food insufficiency, an important indicator of household food hardship (Alaimo et al., 2001) measuring whether families can get enough food for their members. Food insufficiency was the most commonly used indicator of household food hardship before the standardized Food Insecurity Scale (FIS) was developed by the US Department of Agriculture in the late 1990s. The measure of food insufficiency is closest to the most severe form of food insecurity (very low food security) measured by the FIS (Nam et al., 2015). In 2013, nearly 20% of households with children reported food insecurity (including both low and very low food security) at some time during the year (Coleman-Jensen et al., 2014). Extensive literature has shown adverse impacts of inadequate food on

children's nutritional, psychological, and educational outcomes (Alaimo et al., 2001; Gundersen & Ziliak, 2014; Kleinman et al., 1998; Rose-Jacobs et al., 2008; Roustit et al., 2012; Weinreb et al., 2002; Whitaker et al., 2006).

To ensure adequate nutrition among low-income, school-aged children, several federally-funded food assistance programs target this vulnerable population, including the Supplemental Nutrition Assistance Program (SNAP), the NSLP, the School Breakfast Program (SBP), and the Summer Food Service Program (SFSP). The present study specifically focuses on the NSLP and examines its association with household food insufficiency. As one of the largest nutrition assistance programs for school-aged children in the United States, the NSLP operates in public schools, nonprofit private schools, and residential child care institutions. The NSLP costs roughly \$11.6 billion a year and provides nutritional and low-cost or free lunches to more than 31 million children (USDA Food and Nutrition Service, 2012). Children from families with income at or below 130% of the US federal poverty level are eligible for free meals; those from families with income between 130% and 185% of the poverty level are eligible for reduced-price meals at a rate of less than 40 cents

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(USDA Food and Nutrition Service, 2012). In the 2002–2003 school year, nearly three quarters of eligible children received the benefits of free/reduced-price lunch (Dahl & Scholz, 2011). It is estimated that more than 21 million, or 39% of all school-age children, receive a free/reduced-price lunch from the NSLP (Bartfeld, 2013).

Limited studies examined the extent to which school meal programs, such as the NSLP, affect households' food insecurity or insufficiency (Arteaga & Heflin, 2014; Bartfeld & Dunifon, 2006; Bartfeld et al., 2009; Bartfeld & Ryu, 2011; Gao et al., 2012; Gundersen et al., 2012; Kabbani & Kmeid, 2005). If the program reduces low-income caregivers' expenditure on children's food consumption, it may lower the risk of food insufficiency for the household through transfer of resources to other members' food consumption. The empirical literature has suggested the NSLP participation is associated with higher odds of having adequate food among school-age children (Arteaga & Heflin, 2014; Gundersen et al., 2012; Kabbani & Kmeid, 2005), with some inconsistent findings from other research (Gao et al., 2012). Gundersen et al. (2012) found that NSLP participation was associated with a reduction of 6 percentage points in low household food security. Using the kindergarten cut-off age as an instrumental variable, Arteaga and Heflin (2014) suggested that children who received free/reduced-price lunch through the NSLP had a much lower probability of food insecurity compared to households whose children paid for their own lunch. A third study (Kabbani & Kmeid, 2005) showed that the NSLP may provide a greater protection to those receiving a free lunch than to those receiving a reduced price lunch. Another one (Gao et al., 2012) instead used whether students had enough time to eat school lunch or not as an instrumental variable but did not find a significant association between the NSLP and food insecurity.

One common challenge to assess the impact of food assistance programs on food insufficiency is a potential selection bias that households without enough food are more likely to participate in these programs (Nord & Golla, 2009). In general regression analyses, the program participation variable often is positively associated with food insufficiency due to this bias (Nord & Golla, 2009). The NSLP provides services during the school year but not summer months when school is not in session. The unavailability of the NSLP program in summer is not caused by parents' self-selection. The seasonal pattern of the NSLP participation is not correlated with parents' self-selection, and, therefore, is useful to address the selection bias in nutrition assistance program evaluation. If the NSLP participation reduces the risk of food insufficiency, households eligible for the NSLP benefits are more likely to experience food insufficiency in the summer when the NSLP is not available.

There are two potential limitations of this strategy due to confounding factors. The seasonal difference in the NSLP participation may be confounded with other seasonal trends, such as child care arrangement and employment status in summer (Brady et al., 2002; Capizzano, 2002). A second potential confounder is the Summer Food Service Program (SFSP) and related Seamless Summer Option (SSO) which are entitlement programs offering free meals and snacks to low-income children in the summer when school is not in session (USDA Food and Nutrition Service, 2015). These summer meal programs are small relative to the NSLP. In fiscal year 2014, an average of 2.5 million children participated in the SFSP daily, with a total federal cost of \$464 million (USDA Food and Nutrition Service, 2015). Some NSLP recipients may utilize summer meal programs and reduce their risk of food insufficiency in summer.

Despite these limitations, the seasonal difference in the NSLP participation seems a promising strategy to identify program impacts. Few studies have taken advantage of this feature on program participation to assess the NSLP impacts on food insecurity or

insufficiency. Based on a cross-sectional design, Nord and Roming (2006) defined September as the summer month and found a lower level of food security in summer for households with children than those without a child. The study only used September as the summer month because data in other summer months were not available. Another study (Huang et al., 2015) applied growth-curve analyses to describe trajectories of food insufficiency over time for both the NSLP recipients and eligible nonrecipients. It suggested an increase of food insufficiency rate in summer for the NSLP recipients but not for eligible nonrecipients. Based on previous literature, we test the association between the seasonal variation in the NSLP participation and food insufficiency among those receiving free/reduced-price lunches. Our study defines summer months as June, July, and August and uses individual households' longitudinal data over four calendar months. We apply a fixed-effects model on longitudinal household data to control for the unobserved selection bias.

## 2. Methods

### 2.1. Data and sample

We used data from four panels (1996, 2001, 2004, and 2008) of the SIPP, a longitudinal and nationally representative household survey operated by the U.S. Census Bureau with sample size ranging from about 37,000 to 52,000 households (US Census Bureau, 2001). The detailed information of the SIPP can be found at the webpage of <http://www.census.gov/sipp/>. In each panel, the SIPP followed the same households in multiple waves of interviews. There were 12 waves for the 1996 and 2004 panels, 9 waves for the 2001 panel, and 16 panels for the 2008 panel. The time interval between each pair of waves was four months, and each interview then collected information in the last four months (i.e., the reference period of each wave). In order to ease the data collection process and spread the work evenly, the SIPP sample was randomly divided into four rotation groups with nearly equal size. Each rotation group was interviewed in a separate month, and the same wave of interviews thus was conducted in four consecutive calendar months for these rotation groups, respectively. The reference period of each wave covered different calendar months for four rotation groups. For instance, the 1996 SIPP panel has 12 waves of interviews conducted from April 1996 to March 2000. As shown in Table 1, the wave 8 interview of the 1996 panel was conducted in August 1998 for the first rotation group to collect information from April to July. The same interview was conducted instead in November 1998 for the fourth rotation group to collect information from July to October.

Since the 1996 panel, the SIPP included a household food insufficiency question in at least one wave of interviews (see Table 1). Given the survey feature that four rotation groups had different calendar months as the reference period, the SIPP thus collected the information on food insufficiency across seven calendar months for four groups together. If summer months were defined as June, July, and August (months 6–8 in Table 1), the first rotation group of the 1996 panel had the information on food insufficiency from April to July, including two summer months, while the second group had the information from May to August with three summer months.

We created a sample including households with children aged 5–18 years and with at least one child receiving free/reduced-price lunch from the NSLP one wave before the information of food insufficiency was collected. We did so because the number of summer months in the wave when the information of food insufficiency was collected may affect children's NSLP participation status and household food insufficiency simultaneously in that wave, and becomes a confounding factor for evaluating the NSLP

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