Federal Food Policy and Childhood Obesity: Part of the Problem or Solution?

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Abstract

Amid growing concern about childhood obesity, the U.S. spends billions of dollars on food assistance—providing meals and subsidizing food purchases. We examine the relationship between food assistance and Body Mass Index (BMI) for low-income, young children: a primary target population for federal food programs and for efforts to prevent childhood obesity. Our findings indicate that food assistance may contribute to the childhood obesity problem in cities with high food prices. We also find that subsidized meals at school or daycare are beneficial for children’s weight status, and argue that expanding access to subsidized meals may be the most effective tool to combat childhood obesity for poor children.
Introduction

With approximately one-third of U.S. children overweight and 16% obese (1), childhood overweight is a significant public health issue, and overweight children are more likely to develop serious health problems (2-7). Notably, children are struggling with weight problems at earlier ages, particularly low-income children (8, 9). Since overweight children are more likely to become overweight adolescents and adults (10-12), preventing obesity early in childhood is the most cost-effective solution for the epidemic (13, 14).

To combat the “obesity epidemic” among America’s young children, policymakers are experimenting with a range of novel policy proposals such as regulating food served in schools, taxing snack foods, and limiting advertising to children (15-17). Although these proposals garner much of the media attention on anti-obesity policy, in reality the federal government is already deeply engaged in food policy through its $53 billion annual expenditure in food assistance programs.

During early childhood, low-income children may participate in all of the primary federal food assistance programs. This receipt often begins with the Special Supplemental Nutrition Program for Women, Infants, and
Children (WIC), which primarily provides vouchers for nutritious foods to pregnant women and children up to age five who are at nutritional risk. If a child’s family income is below 130 percent of the federal poverty line (FPL), the family may receive assistance in the form of an electronic benefits card which may be used to purchase virtually any food item as part of the Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program. If a child attends a child care, healthy snacks and meals may be provided through the Child and Adult Care Food Program. Once they reach school-age, low-income children may receive meals as part of the School Breakfast Program or National School Lunch Program.

Since federal food assistance programs, by design, intervene early in children’s lives and serve the low-income children who are most likely to be overweight (18), they hold real potential to combat the obesity epidemic by reversing early risk factors and setting in place healthy weight trajectories. The reach of these programs is wide: one-half of all U.S. children will participate in the supplemental nutrition program (formerly known as Food Stamps) alone, including 90% of African-American children (19). There is also reason, however, to question the ability of the programs to combat the obesity epidemic
These programs were originally designed to encourage food expenditures at a time when alleviating hunger – rather than the prevention of obesity – was the primary policy objective (21). Indeed, mounting evidence suggests that the Supplemental Nutrition Assistance Program may be associated with increased Body Mass Index (BMI) for adult women (22-25).

To help inform this debate, we examine new data on young children, ages 3 and 5, who comprise a primary target population for the various federal food assistance programs. Since children may receive food assistance through multiple federal programs during early childhood and since each program may have a unique effect on children’s weight, we examine the effect of each type of food assistance, controlling for simultaneous participation in the other programs. The young children in our sample are drawn from twenty of America’s larger cities with varied costs-of-living, giving us contextual variation within which we can compare effects of program participation.

Federal Food Assistance Programs and Children’s Weight: What Do We Know?

Despite the potential for federal food assistance programs to assist in efforts to combat childhood obesity,
research documenting the effects of these programs on children’s weight is surprisingly limited and has produced mixed results (26). Hofferth and Curtin (27) found no relationship between receipt of three food assistance programs and older children’s BMI. However, other research points to a relationship between receipt of federal food assistance and children’s weight status. Among very young children, Bitler et al. found that — accounting for characteristics associated with enrolling in the program — infants and toddlers who participated in the Special Supplemental Nutrition Program for Women, Infants, and Children had healthier weight-for-age (28).

Federally-subsidized school meals have the potential to enhance children’s nutrition, as the meals must adhere to nutritional requirements. For example, one study that estimated effects of both the Supplemental Nutrition Assistance Program and the National School Lunch Program found that for girls living in food insecure households (households without access to adequate food), participation in the programs reduced weight gain (29). One careful analysis found the School Breakfast Program to have a positive effect on children’s nutritional quality (30). Another study found, however, that children who regularly ate a school lunch had much higher rates of obesity (31),
although this may have been due to other characteristics relating to food preferences (32).

These mixed findings stem from research that treats receipt of federal food assistance as the same experience across different contexts. However, even though eligibility is set at the federal level, the meaning and experience of these benefits may differ in places where food, as well as other expenses, is more or less expensive. This type of contextual effect was identified by Zhang and Chen (25), who illustrated how local food prices contributed to body mass index (BMI) for adult women receiving Supplemental Nutrition Assistance. These findings provided a powerful incentive for our current analysis.

**How Cost-of-Living May Shape the Effects of Federal Food Assistance**

Underlying any relationship between food assistance and childhood obesity is the possibility that the use, value, and effects of food assistance vary in places with high versus low costs-of-living. When cost-of-living is high, eligible families likely experience greater need than eligible families in other communities. As a result, a poverty-line income of $18,310 (for a family of three) can be stretched much further in a low-cost-of-living city such as Nashville than in a high-cost-of-living setting such as
Boston. This increased difficulty making ends meet may lead more eligible families to participate in food assistance programs (33), and may make receipt of food assistance more critical for promoting children’s well-being.

One important aspect of cost-of-living is captured in food prices. When the local cost of food is higher, the same food assistance benefit simply buys less food (34, 35). This may lead to substitution of less expensive, unhealthy foods for more expensive, healthier foods (36). Recent evidence suggests that the diets of low-income Americans are sensitive to price changes such that lower prices for fruits and vegetables result in more consumption by adults (37) and smaller increases in BMI for children (38, 39).

**Expectations**

Given the different intentions and delivery mechanisms of these programs, we distinguish among our expectations for how each program may shape children’s weight trajectories. Most important is the degree to which the program provides food assistance in general, or limits this assistance to particular types of foods. For example, the Special Supplemental Nutrition Program for Women, Infants, and Children specifies the types of food that may be
purchased, and includes nutrition education. And the school lunch and breakfast programs have nutritional guidelines that must be followed. Therefore, we expect a more protective effect (a negative relationship with BMI) for these programs due to their more prescriptive guidelines regarding the foods that can be purchased for or provided to young children. In contrast, Supplemental Nutrition Assistance recipients have more flexibility over consumption choices; thus, we expect this program to do less to prevent gains in BMI. For the same reason, we expect local food prices to play a larger role in shaping the relationship between this program and children’s BMI than for the other forms of food assistance.

**Data**

We examine direct and context-dependent effects of changes in federal food program participation on young children’s weight status (BMI) using data from the longitudinal Fragile Families and Child Wellbeing Survey (FFCWS), waves III and IV. Participating parents and infants were recruited in 1998-1999 in twenty large U.S. cities (with populations of 200,000 or more) and sampled via a stratified random sampling process. Families were surveyed for the first time in the hospital within 48 hours of the child’s birth and followed-up when the child was 1
year, 3 years, and 5 years old. At the 3- and 5-year follow-ups (Waves III and IV), a portion of the sample also participated in the In-Home Longitudinal Study of Pre-School Aged Children (for more information about the study, please visit http://www.fragilefamilies.princeton.edu/).

For this paper, we limited the sample to low-income (below 185% of FPL) children born to U.S.-born parents who participated in the In-Home portion of the study at both age 3 (2001-2002) and age 5 (2003-2004) and for whom we had valid child and mother BMI measurements at both time points (N=681). Children’s height and weight data were gathered by trained researchers using standard techniques. BMI for the children was calculated and converted to the sex-specific BMI-for-age percentiles issued by the National Center for Health Statistics of the Centers for Disease Control and Prevention (40). Other child-, mother-, and family-demographic characteristics were gathered via self-report from mothers at each time point. Descriptive statistics for this sample are presented in Exhibit 1.

[Exhibit 1 about here]

Since children and families may use multiple food assistance programs concurrently, we generated both a general measure indicating whether a child received any form of food assistance as well as three indicator
variables, each identifying receipt of one type of food assistance: (1) the Special Supplemental Nutrition Program for Women, Infants, and Children, (2) Supplemental Nutrition Assistance Program, and (3) Child Care/School Meals (provided in a child care, preschool, kindergarten, or summer care setting, funded by federal dollars). In this sample of low-income children (Exhibit 1), 90% participated in at least one food assistance program at age 3, rising to 93% at age 5. Considering each type of food assistance: participation in the Special Supplemental Nutrition Program for Women, Infants, and Children declined from age 3 (50%) to age 5 (44%); Supplemental Nutrition Assistance Program participation rates remained fairly stable — 71% at age 3 and 72% at age 5; and child care/school meals, provided to 41% of children at age 3, nearly doubled at age 5 with 80% receiving federally-subsidized meals at daycare, preschool, or kindergarten.

To explore differences in cost-of-living, we used 2003 American Chamber of Commerce Researchers Association (ACCRA) data to classify cities into those with, on average, high and low grocery prices, defined as those with ACCRA-generated grocery cost-of-living indices above or below 103. In our sample of 20 cities, we coded the following as having relatively-low food prices: Austin,
Baltimore, Corpus Christi, Indianapolis, Milwaukee, Nashville, Norfolk, Pittsburgh, San Antonio, and Toledo. Those classified as high cost-of-living are: Boston, Chicago, Detroit, Jacksonville, New York City, Newark, Oakland, Philadelphia, Richmond, and San Jose.

**Analytic Strategy**

Because we know that many of the same characteristics affecting children’s weight also influence whether or not families are eligible for and use federal food assistance programs, we had to use a modeling strategy that could account for these “selection effects.” To do this, we capitalize on the fact that our data include information on children, and their families, when they are three-years-old, as well as five-years-old. We pooled together these two waves of data collection (681 children observed twice for a total sample size of 1,362) and included individual-level fixed-effects to absorb the influence of stable characteristics of children and families (i.e. race, parenting capacity) in order to isolate changes in individual children’s participation in food assistance.

Exhibit 2 presents the dynamics in program participation across the two time points at ages three and five. Only 3% of this low-income sample received no form of food assistance, with most (87%) receiving food assistance
at both time points. But, the cases most central to our analysis are those that switched status during the two time points (taking up or moving off of food assistance). For the overall measure of food assistance, only 10% of the sample changed status. Yet, when we look at the results by program, larger proportions of the sample changed status between the two time points: 25% for Special Supplemental Nutrition Program for Women, Infants, and Children, 24% for Supplemental Nutrition Assistance Program, and 49% for childcare/school meals.

[Exhibit 2 about here]

To capture other factors that may have also changed between age three and age five, we controlled for a range of dynamic characteristics that could influence either use of food assistance or children’s BMI. These factors included the child’s age; whether the child attended daycare, preschool, or kindergarten; family structure (married vs. cohabiting or single); maternal education (did not graduate high school vs. high school degree and/or some college); maternal employment (does not work outside the home vs. works part-time or works full-time); the mother’s BMI; the mother’s BMI squared in case the effect is not linear; the household’s income-to-poverty ratio; Temporary Aid to Needy Families receipt; whether the family lives in
public housing; and food insecurity (based on the USDA 18-item scale which measures a household’s access to food) (42). Our results were not sensitive to alternative specifications for our control variables.

Results

Exhibit 3 presents the coefficients from individual-level fixed effects models examining, first, the basic relationship between transitions into and out of different food assistance programs and young children’s BMI (top panel), and then re-estimating these relationships for those living in cities with low food prices (middle panel) versus high food prices (bottom panel).

[Exhibit 3 about here]

The first pair of models examines the effect of movement onto or off of food assistance, while the second pair of models disaggregates this measure of participation to capture whether the child (or her family) receives aid from the Special Supplemental Program for Women, Infants, and Children and/or Supplemental Nutrition Assistance Program and/or child care/school meals. We present results, first for the full sample of low-income children – those living in families with incomes less than 185% of FPL at both time points (N=681 children). These children were eligible for both reduced price lunch and the Special Supplemental
program for Women, Infants, and Children. Then we estimate parallel models for the more disadvantaged sub-set: those with family incomes at or below 130% of the Federal Poverty Line who were eligible for free lunch and for Supplemental Nutrition Assistance Program benefits.

Examining first the relationship between receiving any food assistance and children’s BMI, we find no significant relationship across the full sample of 20 cities. Yet, when we divide these city samples into those with low versus high food prices, we see a significant relationship for children with family incomes at or below 130% of Federal Poverty Line. For these children, we identify a negative relationship between receiving food assistance and BMI in cities with low food prices ($B = -16.17$, $se = 7.09$) but a positive relationship in cities with high food prices ($B = 15.01$, $se = 7.14$). These findings indicate that food assistance may contribute to the childhood obesity problem in cities with high food prices but may serve to protect children from excessive weight gain in cities with low food prices.

The second pair of models considers the potential for different influences for each form of food assistance. For the models estimated on the full sample across all 20 cities, we see only one significant relationship: a
negative impact of receiving child care/school meals on children’s BMI (B = -4.00, se = 2.00 for those <=185% FPL; B = -5.10, se = 2.27 for those <=130% of FPL), meaning that the receipt of meals at school or childcare helps children, particularly low-income children, maintain a healthy weight. When we test these relationships in the cities with low food prices, we see the same pattern for the poorer sub-set of children (B = -6.31, se = 3.06). Yet, in cities with higher food prices, we find a positive relationship between participation in the Supplemental Nutrition Assistance Program and children’s BMI (B = 7.66, se = 4.44)—suggesting that in areas where food is more expensive, participation may be contributing to the early childhood obesity problem.

[Exhibit 4 about here]

These findings are presented visually in Exhibit 4. The bars labeled “any” capture the expected change in BMI when children transition onto or off of food assistance (defined broadly to include any program). The subsequent sets of bars reflect this relationship for each form of food assistance. Note that these individual relationships are smaller because they capture the effect of each program, controlling for simultaneous receipt of the other food assistance programs.
Conclusion

Our results demonstrate that participation in federal food assistance programs can affect the BMI of young children. However, we must distinguish among the multiple food assistance programs that low-income children may receive during their early childhood years, as well as the food environment in which these programs are experienced. In particular, we find a protective effect from food assistance programs that subsidize meals as opposed to those programs that provide financial assistance to purchase food. This effect is strongest among the low-income children most at-risk for later weight problems. This finding suggests that efforts to combat childhood obesity might be enhanced by increasing access to subsidized meals through a range of strategies, including: increasing outreach to child care providers not participating in the Child and Adult Food Program, providing school-wide presumptive eligibility for Title I schools, and instituting summer food programs for school children and their families. Another anti-obesity strategy is to increase the nutritional value of food provided by all the federal food assistance programs, which would require strengthening nutritional guidelines for subsidized meals, as well as limiting access to foods of minimal
nutritional value as part of the supplemental food assistance programs.

Yet, our findings also warn of the potential for food assistance programs to exacerbate the childhood obesity problem. As mentioned above, this was most likely for the Supplemental Food Assistance Program—the program that provides the most broad food choice. In cities with high food prices—those in which Supplemental Nutrition Assistance Program benefits provide the least purchasing power—participation in the Supplemental Nutrition Assistance Program is related to increases in BMI among the poorest children. Efforts to prevent childhood obesity need to take seriously this important role of local context, in which the same federal program, with the same federal guidelines and benefit plans, can have a different effect in some parts of the country compared with others. This study highlights one such factor: food prices, although we acknowledge many others that may influence the relationship between federal food assistance and childhood obesity, such as: food availability, housing density, and local farmers markets.

This analysis only begins to unpack the complex relationships between food assistance and children’s weight trajectories. We plan to follow these children into the
next wave of Fragile Families and Child Wellbeing Study data (collected when the children are nine years old) in order to capture the full early childhood period. But, this initial study highlights the potential for federal food assistance to serve as part of the early childhood obesity solution, as well as warns of ways in which federal policy could undermine other childhood obesity prevention efforts.

**Literature Cited**


5. Freedman DS, Mei Z, Srinivasan SR, Berenson GS, Dietz WH. Cardiovascular risk factors and excess adiposity among


EXHIBIT LIST

EXHIBIT 1 (table)
Caption/Headline: Descriptive Statistics
SOURCE: Authors’ analysis of FFCWS data.

EXHIBIT 2 (table)
Caption/Headline: Percent of FFCWS Children Receiving Federal Food Assistance
SOURCE: Authors’ analysis of FFCWS data.

EXHIBIT 3 (table)
Caption/Headline: Relationship Between Food Assistance and Child BMI
SOURCE: Authors’ analysis of FFCWS data.

EXHIBIT 4 (figure)
Caption/Headline: Relationship between BMI and Receipt of Food Assistance Program
SOURCE: Authors’ analysis of FFCWS data.
Exhibit 1: Descriptive Statistics

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<th>Mean (sd)</th>
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<td>Min.</td>
<td>Max.</td>
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<td>BMI (percentile)</td>
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<td>WIC</td>
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<td>SNAP</td>
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<td>1</td>
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<tr>
<td>CC/School Meals</td>
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Source: Authors' analysis of FFCWS data. Sample limited to those with family incomes at or below 185% of poverty line at both time points (N=681 children)
Exhibit 2: Percent of FFCWS Children Receiving Federal Food Assistance

<table>
<thead>
<tr>
<th>Food Assistance</th>
<th>Income ≤ 185% FPL</th>
<th>Income ≤ 130% FPL</th>
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<tr>
<td></td>
<td>No Receipt</td>
<td>Constant Receipt</td>
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<tr>
<td>Any program</td>
<td>3%</td>
<td>87%</td>
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<tr>
<td>WIC</td>
<td>40%</td>
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<td>SNAP</td>
<td>16%</td>
<td>59%</td>
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<tr>
<td>Meals</td>
<td>15%</td>
<td>36%</td>
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Note: Values may not equal 100% due to rounding.
Source: Authors' analysis using FFCWS data.
### Exhibit 3: Relationship between Food Assistance and Child BMI

<table>
<thead>
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<th>All Cities</th>
<th>Cities w/Low Food Prices</th>
<th>Cities w/High Food Prices</th>
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<td>Forms of Assistance</td>
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<tr>
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<td>&lt;=185%</td>
<td>&lt;=130%</td>
<td>&lt;=185%</td>
</tr>
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<td>Any Program</td>
<td>0.28</td>
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<td>-1.06</td>
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<tr>
<td></td>
<td>(3.70)</td>
<td>(5.02)</td>
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<td>WIC</td>
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<td></td>
<td></td>
<td></td>
<td>(2.42)</td>
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<td>-5.10</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(2.00)</td>
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<tr>
<td>Meals</td>
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<td></td>
<td></td>
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<td>N (children)</td>
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</table>
| Note: Coefficients from OLS regression models with individual-level fixed effects. All models also control for children's age and child care/school attendance; Mother's marital status, education, employment status, TANF receipt, and BMI; and families' income-to-poverty ratio, public housing, and food insecurity. Source: Authors' analysis using FFCWS data.
Exhibit 4: Relationship between BMI and Receipt of Food Assistance Program

Note: Bars represent coefficients from Exhibit 2 estimated for children with family incomes ≤ 130% of FPL, * = p<.05, ‡ = p<.10.
Source: Authors' analysis using FFCWS data.