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### **Food Assistance Through the School System: Evaluation of the *Food for Kids* Backpack Program**

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**FOOD ASSISTANCE THROUGH THE SCHOOL SYSTEM:  
EVALUATION OF THE *FOOD FOR KIDS* BACKPACK PROGRAM\***

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**FOOD ASSISTANCE THROUGH THE SCHOOL SYSTEM:  
EVALUATION OF THE *FOOD FOR KIDS* BACKPACK PROGRAM**

**Abstract.** Numerous public and private initiatives in the United States work to mitigate food insecurity and its unwelcome repercussions for children’s health and well-being. An increasingly popular program seeks to reduce hunger among school-aged children by distributing ready-to-eat food in backpacks for participating students to take home for evening and weekend meals. This study assesses the impact of food assistance in backpacks on school-level indicators of student behavior and academic performance. Sample statistics from unique surveys made available by the Arkansas Rice Depot, the faith-based food bank that originated the *Food for Kids* backpack program, demonstrate improvements in participating students’ self-esteem and behavior at school. Further evidence from generalized least squares estimations using school report card data indicate a positive and significant program impact on eighth grade standardized test scores in math and literacy.

**Key words.** Food insecurity, hunger, food bank, nutrition, test scores.

## I. INTRODUCTION

Although the United States ranks as one of the wealthiest nations in the world, food insecurity and hunger within the country remain a major concern. In a widely cited statistic from the U.S. Department of Agriculture, in 2003, 11.2 percent of American households were considered food insecure and did not have access at all times to enough food for active and healthy living (Nord *et al.* 2004). About one third of these households experienced the most severe kind of food insecurity in which at least one household member went hungry at least some time during the year because the household could not afford to purchase sufficient food. Also in 2003, children in 207,000 households were not shielded from going hungry (Nord *et al.* 2004). Considerable evidence points to the negative impacts of food insecurity on children's well-being, especially if the food insecurity is accompanied by hunger. The lack of a healthy and regular diet for children can result in unwanted weight loss, fatigue, headaches, and more frequent illness. Food insecurity can potentially affect children's school performance through a number of channels, including inability to concentrate, lack of suitable nutrients for cognitive development, poor relationships with other people at school, and stress and anxiety about getting enough to eat.<sup>1</sup>

Numerous public and private initiatives in the United States work to mitigate food insecurity and its unwelcome repercussions for children's health and well-being. The federal government has established a wide-reaching set of programs to target children living in food-insecure households. Among the largest of these programs, the National School Lunch Program and the School Breakfast Program provide free or reduced-price meals to eligible children during the school day.<sup>2</sup> Other large federal programs to assist children from low-income households include the Food Stamp Program and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC).<sup>3</sup> Food-

insecure children are also reached through the assistance of private community agencies such as food pantries and soup kitchens, many of which are supported by faith-based organizations.<sup>4</sup> However, children may live in households with parents who are unwilling or unable to seek these types of food assistance. In response to this gap in program coverage and parental care, an increasingly popular initiative seeks to reduce hunger among school-aged children by distributing easy-to-prepare food in backpacks for participating students to take home for evening and weekend meals.

The idea of providing food assistance in backpacks originated in Little Rock, Arkansas with a faith-based food bank called the Arkansas Rice Depot. Since its design and implementation in 1995, the Rice Depot's *Food for Kids* backpack program has been replicated in numerous other states, including New York, California, and Pennsylvania. The *Food for Kids* program has gained considerable media attention at the national level, and the Rice Depot staff continues to receive requests from other organizations for blueprints on how to implement a backpack program.<sup>5</sup> America's Second Harvest, the nation's fifth biggest nonprofit charitable organization and the biggest food assistance organization, has also adopted the backpack program in its arsenal of tools for fighting hunger among children.

Despite the growing importance and popularity of the backpack program, it has received no attention in the scholarly literature on the impact of food assistance programs. Similarly, little previous research has examined how community organizations in urban areas initiate and sustain food assistance in surrounding rural areas.<sup>6</sup> This study seeks to broaden our understanding of the food policy safety net by assessing the impact of the backpack program on school-level indicators of student behavior and academic performance. The *Food for Kids* program constitutes an ideal test case for the effectiveness of the backpack program not only because it was the first of its kind, but

also because Arkansas faces a number of challenges relative to other states that increase the incidence of childhood hunger. Arkansas has among the highest rates of overall poverty and childhood poverty in the nation, the lowest personal income per capita, above average rates of food insecurity and teen pregnancy, and one of the lowest rankings for women's status.<sup>7</sup> These challenges and needs have placed the Rice Depot in the position of devising innovative solutions to food insecurity and hunger.

The analysis contributes new evidence on the underlying reasons for children's status as food insecure and the impact of the backpack program on participating students' well-being. Sample statistics from unique school-level surveys made available by the Arkansas Rice Depot indicate that the *Food for Kids* program reaches children who have slipped through the safety net of other food assistance programs. For example, most schools providing backpack program assistance are located in areas served by a food pantry, yet children still appear to be hungry or worried about food when they come to school. Survey responses indicate a number of reasons for why children are facing food insecurity, including busy working parents who cannot make ends meet, as well as parents who suffer from drug addiction and mental problems.<sup>8</sup> The survey results provide evidence of multiple benefits for participating students' well-being, including better relationships with school personnel, higher self-esteem, fewer worries, and more interest in school. Further evidence from generalized least squares estimations using school report card data indicate a positive and significant program impact on eighth grade standardized test scores in math and literacy.

## II. BACKGROUND

Food insecurity constitutes a particularly large challenge in Arkansas relative to other states. Despite its nickname as the "Land of Opportunity," Arkansas remains one of the poorest states in

the nation, with a poverty rate of 18.5 percent compared to the U.S. average of 12.5 percent (FRAC 2005). The difference compared to the national average is even more pronounced for the poverty rate for children, which amounts to 28.8 percent in Arkansas and 16.9 percent for the U.S. average. Mississippi, Louisiana, and Oklahoma, all of which border Arkansas, also rank among the poorest states in the nation. Furthermore, 15.5 percent of Arkansas households are considered food insecure, compared to 11.2 percent of households nationally, and the share of Arkansas households who are food insecure with hunger is also higher than the national figure (4.7 percent versus 3.5 percent).<sup>9</sup>

Childhood food insecurity in Arkansas remains a difficult and worrisome problem, even with the aid of public and private food assistance programs. More than twice as many students receive free or reduced-price lunches compared to students who pay fully for their lunches, and Arkansas ranks as one of the neediest states in terms of low-income students who receive federal assistance from the summer nutrition program (FRAC 2005). Arkansas has also experienced above average increases in Food Stamp Program participation since 1999, which is consistent with evidence in Ziliak *et al.* (2003) that food stamps serve as an important means for consumption smoothing among low-income households in times of poor macroeconomic conditions. In addition, the state has seen large reductions in welfare caseloads since welfare reform, which could be linked to an increase in child maltreatment.<sup>10</sup>

In the early 1980s as signs of food insecurity among Arkansas households were becoming more apparent, the Arkansas Interfaith Hunger Task Force founded the Arkansas Rice Depot as an independent, faith-based, nonprofit organization to provide hunger relief. The Rice Depot is the only statewide food bank that provides food to schools, churches, and other community organizations at no charge.<sup>11</sup> Individuals seeking food assistance are served through food pantries, community hunger

agencies, and soup kitchens run by these organizations. The Rice Depot, with a number of warehouse drop sites across the state, distributes more than five million pounds of food per year. Arkansas Rice Depot's funds are raised through individual, church, corporate, and agency contributions, although some foundations and corporations have restrictions preventing them from donating funds to faith-based organizations.

The Arkansas Rice Depot initiated the *Food for Kids* program in the mid-1990s in response to a request for help from a local school district, where a school nurse interpreted student complaints of headaches, dizziness, and stomachaches as signs of malnourishment. Some of the children were also demonstrating disruptive behavior or indifference in class. At first, the Rice Depot provided children who appeared to be going hungry with bags of groceries. However, after the children encountered teasing from their peers, the Rice Depot introduced the idea of food provision through backpacks. The pilot program began in 1995 at an elementary school in Little Rock and quickly spread to other public schools throughout the state. By 2004/5, participating schools came from nearly all of Arkansas' 75 counties. As shown in Figure 1, the program has expanded by an average of more than 40 new schools every year. The figure also includes attrition rates among participating schools, which are extremely low. Of the 421 total schools that enrolled in the program, only six had become inactive by the 2004/05 school year, for a current net coverage of 415 schools. This coverage amounts to almost 40 percent of Arkansas' 1130 schools. One of the largest jumps in coverage occurred during the 1998/99 school year as the program gained recognition, with 68 additional schools receiving food distributions from the Rice Depot. Other relatively large jumps in new participating schools have occurred after 2002 in response to fund-raising efforts by the food bank. According to Rice Depot records, in recent academic years the program has been assisting

more than 14,000 food-insecure children annually.

The *Food for Kids* program provides schools with backpacks and ready-to-eat food based on school requests for assistance. Recipient schools in turn utilize student need criteria to select participating students. Not all students who qualify for free or reduced lunches qualify for *Food for Kids*. At the same time, a child who is not on free or reduced lunch may still be eligible for *Food for Kids*. School personnel who serve as program coordinators place children in the program if they observe a child is having educational, behavioral, or physical problems in school and they suspect that the cause is hunger at home. The program is intended only for those students and siblings at home who school personnel suspect would otherwise go hungry. The food sent home is easy to open and prepare so that young children can fix their own evening and weekend meals in the absence of a parent. Some students are provided high-energy snacks during the school day. Children who eat no breakfast at home and are dropped off too late in the mornings for the school breakfast program receive a *Food for Kids* snack to tide them over until lunch. Also, children who come to school without their own food for afternoon snack time are provided with *Food for Kids* snacks.

Food items include cereal, shelf stable milk, granola bars, cereal bars, cheese crackers, peanut butter crackers, little sausages, baked beans, spaghettios, ravioli, canned soup, chili, fruit cups, dried fruits, and pudding cups. Fresh fruits and vegetables are distributed whenever possible, although the short shelf life limits the possibility of including much fresh produce in the food distribution schedule. The Rice Depot purchases all the backpack program food itself from discount stores, with a 2005 budget of more than \$3,000 per week and \$185,000 for the year. Although most of the assistance is food, the Rice Depot also helps to distribute personal care kits that are put together by other charitable organizations. These kits include personal hygiene products, household cleansers,

and emergency care items for children whose parents are not meeting their basic needs.

Since its implementation, the *Food for Kids* program has been replicated in almost twenty other states across the nation, including bigger states such as California, New York, and Texas. America's Second Harvest, the nation's largest nonprofit food assistance organization, is largely responsible for the program's growth in other states, with two dozen affiliates having adopted the program by 2004.<sup>12</sup> Promotional literature from America's Second Harvest does cite the Arkansas origins of the backpack program but does not recognize the Rice Depot initiative as a best practice. America's Second Harvest has been raising funds so that more of its affiliated food banks and charity groups can provide food assistance through the backpack program.

The program is not without its limitations. Rice Depot records indicate that in recent years, food distribution and food content by school have not been very uniform in terms of number of deliveries per year or food types per delivery. Distributions have been based more on a "squeaky wheel system" in which the Rice Depot has given what it had available at the time. Schools also vary in the frequency of distributions due to fluctuations in their demand for assistance, which in turn depends on the number of students in the program and school storage space for the food deliveries. Some schools call the Rice Depot every month for a food delivery, while other schools only request one or two shipments a year. The food bank aims to set up a more deliberate and uniform system of frequency, amounts, and types of foods. Plans for a new delivery system based on standardized routes and delivery dates will help more schools find the program accessible in a systematic way. In addition, a number of schools have asked for deliveries containing more fresh produce, more nutrient-enriched foods, foods with lower sugar and fat content, and more meat. Schools' requests for foods with longer expiration dates point to the logistical difficulties of delivering fresh, healthy

foods on a timely basis to such a large number of schools across the state.<sup>13</sup>

### III. ANALYSIS OF DESCRIPTIVE STATISTICS FROM SURVEY DATA

The descriptive analysis is based on data for all participating schools that returned a survey to the Arkansas Rice Depot for the 2002-03 and 2003-04 academic years. The Rice Depot designed the survey instrument and sent copies to all schools who requested support in those years. The surveys were completed by school nurses, counselors, and principals designated as the *Food for Kids* program coordinator for each school. These school-level surveys allow us to construct a unique primary data set of program indicators. In 2002-03, 332 schools participated in the *Food for Kids* program, and 249 schools returned their completed surveys to the Rice Depot (for a response rate of 75 percent). In the following academic year, 366 schools participated in the program and 225 schools completed surveys (for a response rate of 61 percent).

Failure for some schools to respond occurred for several reasons. First, time constraints at the end of the school year, when the surveys are mailed out, limit the ability of already busy school personnel to complete the paperwork. Similarly, time constraints at the Rice Depot limit the ability of food bank personnel to follow-up with individual schools for obtaining surveys. These time constraints were particularly tight in the summer of 2004 when the Rice Depot engaged in a major fund-raising drive, helping to explain the lower response rate in that year. Second, the Rice Depot is not enforcing its requirement that schools complete a survey in order to continue receiving food deliveries, nor are there other formal incentives to complete the survey. Finally, schools vary considerably in their degree of participation in the program. According to Rice Depot records, the schools with more frequent deliveries adhere more closely to the program guidelines and submit completed surveys.

The survey instrument has been undergoing revisions, with improved questions about program need and impact, as well as stronger incentives for survey completion. Despite these corrections, the surveys are still subject to potential biases that result from the way the data are collected. The school personnel who fill out the surveys generally exercise a fair amount of autonomy in selecting participants, so these personnel are likely to believe that the backpack program is helpful for those students whom they selected. Closely related, the nurses and counselors may be more likely to report positive outcomes if they perceive that future assistance depends on a demonstrated impact. Moreover, non-randomness among the non-responders may be a problem if those personnel who are not impressed with the outcomes of the program are less likely to respond to the survey. However, the extremely low attrition rate (six out of 421 schools over the lifetime of the program) suggests that the non-response rate is due to time constraints among school personnel rather than systematic dissatisfaction among recipient schools.

While the survey does not follow individual students, it does provide evaluations by school personnel of student behaviors and needs. The surveys are fairly short, with questions falling into three categories. The first category pertains to how many children receive assistance and how the food is distributed. The second category pertains to why children are placed in the program and how the program affects participating children. Although respondents are asked to rank the importance of the reasons for program placement, they are not asked to rank program impacts in order of importance. The final category of questions pertains to how the *Food for Kids* program could better serve student needs and how the implementation could be improved. This final part of the survey also asks the respondent to include a letter with a personal account describing why some students need the program and what changes the respondent has observed among participating children.

A considerable proportion of students in Arkansas attend schools that are served by the *Food for Kids* program and represented in the sample of schools returning surveys. As shown in Table 1, of Arkansas's total student population of 449,000 students in 2002-03, almost one quarter attended schools in the *Food for Kids* survey sample. The share is slightly lower for 2003-04 due to the lower survey response rate. The enrollment figures indicate that more than 60 percent of all children in schools served by *Food for Kids* attend elementary school. Hence the program is disproportionately targeting elementary school children and reaching households with fewer resources. It is likely that parents of elementary-school aged children are, on average, younger themselves than parents of middle school and high school students. One could reasonably argue that in disproportionately assisting elementary-school children, the backpack program is reaching households where the income-earners have fewer years of experience and tenure, lower-ranking occupations, and lower earnings compared to households with older children. In targeting children of elementary-school age, the program is also reaching those younger children who are less able than older children to prepare their own meals when they are home alone. In addition, a number of middle school and high school students receiving food assistance are also feeding their younger siblings at home.

One of the biggest changes between 2002-03 and 2003-04 is an increase in the number of pregnant teens and teen moms served by the *Food for Kids* program. Table 1 shows that during this period, the number of pregnant teens served by the program jumped from 171 to 350, and the number of teen moms rose from 225 to 381. If anything, this increase is understated since a higher number of schools in 2003-04 did not complete their surveys. Given that the Arkansas population of girls aged 10-17 who gave birth remained fairly stable at about 2000 per year during this period, most of the large increase can be explained by a greater uptake of pregnant teens and teen moms utilizing the

program. A number of elementary schools report that they assist pregnant teens and teen moms. Follow-up questions to these schools indicate that in almost all cases their recipient counts cover the total number of children receiving assistance, including siblings of children enrolled at the school.

Table 1 further indicates that on average, the program distributes food assistance to more than 50 students in each participating school, which amounts to an average of 18 percent of participating schools' student bodies. In total, more than 14,000 students received assistance in the sample schools during the 2002-03 school year. The apparent drop in the total number of students assisted the subsequent year is due to the lower survey response rate since Rice Depot records indicate that program coverage across total number of schools actually expanded during the period. Across all schools, about three quarters of the food delivered by the Rice Depot goes home for evening and weekend meals.<sup>14</sup> The other 26 percent is distributed at school in the form of snacks for children who miss the breakfast program and do not have afternoon snack food from home. Further analysis shows that the schools are distributed fairly evenly across geographical entities, with about one third of schools in rural areas, one third of schools in small towns, and another third of schools in mid-size and larger cities. Thus, *Food for Kids* appears to be achieving its objective of reaching hungry children throughout the state. Almost 30 percent of students on free and reduced lunches are assisted through *Food for Kids*, with the highest proportions seen at the high school level.

Survey results further suggest that *Food for Kids* is reaching children who have slipped through the safety net of other public and private food assistance programs. Figure 2 reports three sets of frequency distributions for reasons that program coordinators cite for placing children in the backpack program in 2002-03.<sup>15</sup> The survey instrument offers nine possible reasons for program placement and asks respondents to rank these reasons in order of importance. The panels in Figure

2 illustrate how often schools gave each reason a ranking of most important (1), second most important (2), and so on. A notable result from the figure is the overwhelming number of schools who report that a lack of local food pantries is not an applicable reason for placing children in the program. While most schools providing *Food for Kids* assistance are located in areas served by community food agencies, children still appear to be hungry or concerned about food when they arrive to school. School personnel cite a number of reasons for why the children are facing food insecurity. Most of these reasons involve insufficient income to purchase adequate food and are similar to the questions on behaviors and experiences that the Current Population Survey Food Security Supplement uses to identify households as food insecure (Nord *et al.* 2004).

One important reason for why children appear to need assistance is that the children's parents work but cannot make ends meet. As illustrated in the figure, more than 40 percent of schools (103 out of 249 sample schools) rank the "parents work but cannot make ends meet" as the top reason for program placement. Another 23 percent of schools (57 out of 249 sample schools) ranked "parents do not work" as the number one reason for placing a child in the program. School personnel also report drug addiction and mental problems as an important determinant of why children in their schools are facing food insecurity. Not only do drug and mental problems limit parents' willingness and ability to provide direct care for a child, but these problems also constrain parents' ability to perform as productive members of the labor force. Lower wages and fewer hours worked, as well as money diverted to drug use, all translate into less income for food expenditures. Given that problems such as drug addiction and mental illness can be difficult for school personnel to detect, it is likely that our results underestimate the importance of parental drug abuse in explaining children's food insecurity.

In other cases, grandparents are the primary care-givers and problems with disability or poor health prevent them from adequately feeding the children. Survey responses suggest that a lack of income rather than a lack of knowledge of good nutrition is the main reason why some grandparents have trouble in providing sufficient food. Respondents indicate that some of these grandparents are afraid to ask for help from local food pantries because they fear having to give up the child to foster care. Note that the distribution analysis for 2003-04 (not reported), looks quite similar and yields the same conclusions, as does using the distribution results to construct mean and median rankings of the importance of particular reasons.

A follow-up question that appears only in the 2003-04 survey indicates that the majority of schools have at least one food pantry nearby. Most church and community food pantries stay open every day of the week and many are open on the weekends, and parents can pick up foods at convenient times. *Food for Kids* is not intended to take the place of food pantries. Program eligibility requirements stipulate that children be placed on the program if the parent will not or cannot provide their children with food. In cases where other options for food assistance are available, continued food insecurity among children may result from parents being too proud to accept food assistance, parents unwilling to make the effort to get food assistance due to emotional or drug problems, or parents not having enough time to fill out forms or stand in line due to multiple job obligations. In an effort to gain more information about parental behaviors, the Rice Depot amended its 2003-04 survey to include a new question asking respondents to approximate the share of parents who cannot feed their children due to illness or lack of economic means, and the share of parents who will not feed their children due to drug addiction or unwillingness to work. Results indicate that 68 percent of children on *Food for Kids* live in households where the parents cannot

feed their children due to a lack of means, and 32 percent of children live in households where parents will not feed their children due to a lack of willingness.

Results also point to a range of benefits for children receiving assistance from the backpack program. As shown in Figure 3 for 2002-03, the vast majority of schools report that participating children demonstrate more trusting and better relationships with school personnel. At least 80 percent of schools respond that they observed participating children demonstrate better relationships with school staff. Because survey respondents are able to select multiple options for observed program impacts, the percentages in Figure 3 for each year do not sum to 100 percent. A similarly high share of schools report that students gain higher self-esteem and appear more secure. Participating students also show more interest in school, appear less worried, and develop better relationships with their classmates. Because the educational environment improves as behavioral problems in the classroom decline, many of these benefits affect all the students in the classroom, not just the *Food for Kids* students. A possible explanation for why “improved grades” ranked lowest among the observed benefits is that the school nurses and counselors did not have direct access to students’ academic records when they were completing the surveys. These nurses and counselors are likely to have reported on their own relationships with the participating students and may have had less detailed knowledge of the students’ grades. The descriptive analysis for 2003-04 yields a very similar distribution of reported benefits.

While the 2002-03 survey does not ask for more than a checkmark on the various program impacts observed, the 2003-04 survey asks respondents to approximate the number of students who demonstrate each of the listed options. Responses to this new question yield similar conclusions regarding the importance of particular benefits. The average number of students per school showing

particular outcomes is greatest for the “less worried,” “healthier,” and “better self esteem” responses. On average, 32 students per school appear less worried and also more healthy. Similarly, an average of 29 students per school demonstrate higher self-esteem, and 27 students per school experience more trusting relationships with school personnel. Program coordinators report that an average of 18 students per school have better grades as a result of the backpack program.

#### IV. REGRESSION ANALYSIS FOR TEST SCORE AND BEHAVIORAL IMPACTS

We further evaluate the backpack program by using panel data estimation techniques to examine how test scores and behavioral measures for schools participating in the *Food for Kids* program compare to nonparticipating schools. To conduct these tests, we coded all participating schools (regardless of whether or not they had completed a Rice Depot survey questionnaire) with their start dates and their Local Education Authority (LEA) codes.<sup>16</sup> We then merged this group of participating schools into a report card data set for all schools in Arkansas for 2001-02 through 2003-04. The report card data include school-level standardized test scores for the Arkansas Benchmark Exams in mathematics and in literacy. The exams are administered every March to students in the fourth, sixth, and eighth grades. Because the test scores are organized by LEA codes, we were able to merge the list of schools participating in *Food for Kids* with the list of scores for all schools that administered the exams.<sup>17</sup> We utilized information on mean scores as well as the share of students who scored at particular levels (below basic, basic, proficient, or advanced). The report card data set also provides school-level information on various student behavioral indicators and school characteristics for every school. Table 2 reports sample means for each of these variables.

Table 2's sample means show a large statewide jump in test scores across participating and nonparticipating schools, which is generally attributed to implementation of the No Child Left

Behind (NCLB) act of 2001. Although numerous states had begun reforming their accountability standards before the NCLB, Arkansas ranked among states that had less thorough accountability systems before the NCLB (Hoxby 2004). The jump in test scores in Arkansas following more stringent accountability plans is consistent with results for Virginia, where some schools appear to have increased the calorie content of school lunches on test days in an effort to help improve student performance (Figlio and Winicki 2005).

As indicated by these sample means, participating and nonparticipating schools exhibit some differences, but they are not very large. At the aggregate level in 2001-02, schools receiving assistance from *Food for Kids* tend to have either lower or very similar mean scores in math and literacy across grade levels. Yet in most cases participating schools show a larger jump in average benchmark exam scores during the period compared to nonparticipating schools, resulting in comparable or slightly higher test scores for participating schools. This table of sample means also shows that schools participating in *Food for Kids* have a higher share of students receiving free and price-reduced lunches, with a difference of about two to three percentage points. The average number of students per teacher is slightly higher at participating schools, as is the county-level per capita income. The higher income is attributed to the relatively higher representation of participating schools compared to nonparticipating schools in urban counties with higher per capita incomes.

Because the mean characteristics do not tell a very compelling story about program impacts, we turn to more formal regression techniques to better capture the degree to which program participation is associated with school performance. To estimate the model with cross sectional data for schools over time, we start with Ordinary Least Squares (OLS) estimates using the cross sections stacked by year and a set of year dummy variables. However, individual schools may have time-

invariant characteristics that are associated with test score outcomes, so the OLS estimates are compared with results from a Generalized Least Squares (GLS) estimation procedure that corrects for fixed effects. Because the school-level test scores are averages of scores that were taken from larger populations of students, it is possible that the school-specific constant terms are randomly distributed across schools (Greene, 1997). To handle this issue, we also test whether a random effects model is a more appropriate GLS estimation technique. The random-effects estimator is a matrix-weighted average of estimates produced by the fixed-effects estimator (which uses OLS for a regression that differences out fixed effects within schools), and the between estimator (which uses OLS for a regression that averages each school's observations over time). Because we expect any program adoption effects on test performance to occur with a lag, all models are estimated with data from the beginning year (2001-02) and the end year (2003-04). For each grade and subject, we estimate two GLS models, one that does not include a dummy variable for the end year and one that does. The end-year dummy is expected to capture the inter-temporal variation that occurs for all schools, regardless of program participation, due to implementation of the No Child Left Behind act.

The OLS and GLS procedures are used to estimate the following equation:

$$S_{it} = \beta_0 + \beta_1 P_{it} + \beta_2 X_{it} + \epsilon_{it}. \quad (1)$$

The notation  $S_{it}$  denotes the test score variable, which we measure as the log of the odds ratio for students who score at or above the proficient level on the relevant benchmark exam (for math or literacy in grade four, six, or eight). The notation  $P_{it}$  denotes a dummy variable for whether or not a school participates in the *Food for Kids* program in each year, and  $X_{it}$  denotes a set of control characteristics. These characteristics include the percent of students on free and reduced lunch, total

student enrollment, the ratio of students to teachers, the county per capita income, total expenditures per student, and the average teacher salary. A similar equation is estimated to determine program impacts on indicators of student behavior. These indicators include rates of student attendance, expulsion, assaults, and dropouts.

Estimation results for math scores, found in Table 3, indicate a positive and statistically significant program impact in the eighth grade. The Ordinary Least Squares results indicate that schools that participate in *Food for Kids* have significantly higher odds that students will perform at or above proficiency on the standardized math exam in eighth grade. This result holds after controlling for variation in other school characteristics and for contemporaneous effects in 2003-04 common to all schools. The fixed effects models further indicate that after further controlling for time invariant characteristics associated with individual schools, program adoption during the period of analysis is associated with a positive and statistically significant increase in student performance at or above proficiency in eighth grade math. The program impacts are positive for math test scores in grades four and six, but these results are precisely estimated in just one out of the six models for these other grades.

Results are similar in Table 4 for benchmark literacy exam scores, with a positive and statistically significant program impact for eighth grade scores but not in the other grades. A possible explanation for observing these results in math and literacy only in eighth grade and not before is that younger children are particularly dependent on multiple forms of nourishment for school performance. The *Food for Kids* program may provide at-risk children with physical nourishment in terms of food sustenance, but if the food insecurity issues are indicative of dysfunctional families and a lack of parental involvement in child care, the test scores will not

change much for younger children. Older students are more autonomous and, on the margin, will respond in terms of test performance if participation in the *Food for Kids* program is now providing them with improved access to food resources. Building on this argument, spillover effects in the classroom as a result of improved classroom environments may be more apparent in the eighth grade compared to earlier grades.

By far the largest determinant of test scores in the OLS models is the share of students on free and reduced lunch, a measure that is commonly used as a proxy for students' family background and income. Hence test performances across grades are lower in schools that have higher proportions of low-income students who participate in the free and reduced lunch program. In contrast, the negative coefficient on the county income variable in the OLS specifications appears to be picking up effects of living in urban areas. Schools in relatively dense urban areas such as Little Rock have higher county-level incomes but lower propensities to score at or above proficiency on standardized tests. In both the OLS and the fixed effects models, another important determinant of test scores across grades is the dummy variable for 2003-04, which is picking up the effects of implementing the No Child Left Behind act. This increased accountability led to a strong improvement in test scores for both math and literacy in all grades, across participating and non-participating schools.

The final set of regression results are found in Table 5, which reports determinants of student behavioral outcomes. Although the sample means indicate a narrowing in the gap between participating and non-participating schools in behavioral outcomes, these effects were not readily picked up with more formal statistical techniques. The program participation dummy variable has a positive impact on school attendance rates, but the point estimate is imprecise. Similarly, further regressions using student assault rates and student dropout rates (not reported) failed to yield a

precisely estimated *Food for Kids* program impact. The only behavioral indicator for which the regressions show a significant program impact was expulsion from school. As reported in Table 5, schools that began to participate in *Food for Kids* during the period of analysis were likely to see a small drop in expulsion rates.

## V. QUALITATIVE ANALYSIS

The survey instrument asks school personnel serving as *Food for Kids* coordinators to include a statement describing the program need and impact, and most respondents complied. These comments by school officials add another dimension to understanding the backpack program. Collectively, these written responses indicate that school personnel are quite pleased with the program and thankful for the assistance. They frequently make comments about how much the children appreciate receiving the food, the tremendous impact the program has on the lives of their students, and how proud the children feel to be helping their family by bringing food home. Respondents also commend the Rice Depot with statements about the program's excellent objectives and the staff's hard work.

Letters accompanying the surveys indicate that numerous participating children live in single-parent households and the parent is having trouble coping. Often the children are left home alone or with siblings while the parent works, with little guidance in food preparation or few food options from which to choose. For example, a high school counselor writes:

One student was having health problems and we weren't sure what was going on. We soon learned that his mother had left the home and his father had given him the responsibility of the younger children. He had no idea how to do that or how to feed them in the evenings. Money and food were in short supply. When we learned that his "stomach" problems were due to worry, we stepped in with food for kids and provided things that he was able to cook in the evenings.

Several statements provide clear images of the domestic situations in which some children live and the extent to which the backpack food is helping other household members. One elementary school principal writes of three children from a particular family:

They are living in the home of the mother's grandparents. The parents seem to need guidance in how to care for the children, not just for meals but also in teaching them good hygiene. These children were in need of coats which we provided through our Coats for Kids Program. One day when the kindergarten girl was being picked up early, she asked if she could have her food backpack. As I was packing it, she said we need some peanut butter because that is the only thing that Grandpa can eat. He doesn't have any teeth.

Other statements describe why participating children are slipping through the safety net of pre-existing programs and how *Food for Kids* is helping them to eat something before the school cafeteria offers the next meal. In this category of remarks, a school counselor writes:

Without Food for Kids, many of our students would not have anything to eat from lunch one day to lunch the next day. We have a breakfast program but many of our students get themselves and their siblings up and ready for school. These students are habitually late and miss breakfast. Their parents have little concern for their child's meals. I am able to feed these students breakfast or at least give them a snack to supplement their needs until lunch time. I have experienced hungry children who are very angry. When given something to eat, these same angry children become cooperative, compliant, and are then able to finish their work.

Numerous school officials write that *Food for Kids* assistance is being used for households who are experiencing temporary hardships and emergencies, including house fires, a sudden loss of work, parental illness, or the absence of a parent. For example, a school counselor writes, "One family, in particular, found it difficult to make ends meet with the father away in the war. We were able to provide more than one box for backpack snacks that the children benefitted from while mom

worked an extra job in the evenings.” Also in this category of remarks, a school principal writes, “The American Greetings Factory closed in March of this year and those parents were considered for this program for this school year.” In another letter, a household in which the father had a major surgery did not qualify for any assistance immediately and *Food for Kids* provided short-term help. For some families, the temporary hardship comes regularly at the end of the month when finances and food run low. In such cases, a child “comes in and gets only enough to help her family make it through till the first,” according to a school counselor. The program has also assisted children who are temporarily homeless, as exemplified by this statement from a school social worker:

A 7 year old boy said, “I live in a hotel.” ... After talking with him I found out there was a 3 year old sister and his mother was pregnant. They ate out of vending machines every night, because his mother was saving money for a deposit on an apartment. His mom was a Taxi Cab Driver . . . After school she stopped by to pickup a family box. Before she left she hugged me and said, “now my kids can eat healthy.”

Most statements adhere closely to the survey’s focus on the backpack program and its impact on children. One drawback is that this approach does not yield much information about how the school systems handle situations in which children are facing severe neglect and need help from social services in addition to food assistance. However, a few letters do provide evidence that school and local officials are intervening on behalf of children in particularly difficult situations. For example, the following statement describes a child’s bleak situation, the impact of *Food for Kids*, and ultimately a change in living arrangements:

At first we were unsure how needy this child was but as we learned more about the family it became apparent to us that this child is only eating during school hours. He came to school dirty and unable to focus in the classroom. He often ended up in the

nurse's office complaining of a stomach ache. We finally realized this child was an ideal candidate for the Food for Kids program. He comes in every afternoon and loads his backpack with snacks for him and his brother. Over time we have seen him less and less come to the nurse and his is able to relate better to his teacher as well as the staff in the office. He seems less worried about when and where he will eat next. He has recently moved to a new family and has only flourished from this situation.

Another series of comments signals the importance that school personnel attach to the notion that participating students can maintain their dignity by bringing food home in attractive backpacks and not having to beg for food from neighbors. One letter cites a statement from a student expressing his appreciation for the backpack idea so that no one has to know what is inside. The student says that the kids "tease me about my clothes, but they don't have to know that I don't have enough food to eat." Closely related, school personnel want participating children to develop a sense of responsibility in helping to distribute the food rather than passively accept the free food. As an example of these ideas, a school counselor writes:

Some of the recipients of the program have also become my assistants to fill and distribute the bags. The older students feel like they are "working" for their bags. They seem to like the idea of earning the bag, rather than needing a handout. They also enjoy making decisions on the content of each bag and distributing them to the younger children. They are always concerned about the weight of each bag for the smaller children who carry them on the bus.

Most of the letters comment on some aspect of program benefits. The following comment by a school counselor is illustrative of these types of responses: "I have seen a tremendous change in these students levels of self-esteem. They feel good about themselves and are more trusting of the adults here at school. They believe they are cared about and that means so much in the life of a child." As a final example of a comment that communicates the program impacts described in the

quantitative analysis, a counselor writes:

When he first came to me and asked for food he was very reserved and seemed embarrassed about asking. Once he warmed up to me, he began asking for overwhelming amounts of food. I figured out that he was hoarding these items because he was unsure of when he would eat next. Once I re-assured him that our supply at school was continuous he seemed to be less stressed or worried about when he might get to eat again. This amazing child has come a long way and I contribute a lot of his success to this fine program. He has made new friends and loves to come to school. His grades have improved and his behavior is better, according to his classroom teacher. Thank you so much for your support in helping this child to develop into what he needs to be.

## VI. CONCLUDING REMARKS

This study has documented reasons why children in Arkansas appear to be facing food insecurity, the improvement in eighth grade math and literacy test scores for schools participating in the program, and the multiple impacts of the *Food for Kids* backpack program on children's well-being. The backpack program is designed to assist children for whom government subsidized breakfast and lunch programs are not enough. Instead of overlapping with the efforts of food pantries and soup kitchens, the backpack program appears to be meeting the food needs of those children who may otherwise go hungry. The Rice Depot asks participating schools to refer families who appear to be food insecure to a local food pantry. These food pantries are generally open at times that are convenient to working parents, and they offer a much larger assortment of foods than the *Food for Kids* program. Food pantries and other private food assistance programs operate under the premise that parents will take care of their children. But some parents are not able to properly feed their children due to some combination of reasons related to insufficient economic means, illness, drug addiction, or a lack of willingness. The lack of willingness, in turn, can be related to

issues such as stigma associated with using food assistance programs, administrative red tape, scheduling priorities, and confusion about requirements and forms (Kissane 2003).

Findings support the argument that the backpack program is an effective way to improve students' sense of self-worth and their relationships with others at school. Issues of self-esteem are crucial to understanding the link between food insecurity and school performance. For some at-risk students, fairly small changes in nourishment can make a big difference, and the *Food for Kids* program makes food resources more accessible at a time of day when these students ordinarily have trouble getting access to food. The decrease in behavior problems and improved class environment are contributing to program impacts for all the students in the classroom, not just the students receiving food assistance. The findings support the continued growth and replication of the backpack program in order to support the educational progress, physical health, and emotional development of children who face food insecurity. This objective would be consistent with the American Dietetic Association's official position on child nutrition programs. The Association states that all children should have access to appropriate food and nutrition programs for securing a food supply that promotes physical, cognitive, and social development (Stang and Bayerl 2003). Results from the *Food for Kids* evaluation provide a solid rationale for utilizing the backpack program as a tool for meeting these goals.

**Table 1.** Indicators of *Food for Kids* Program Assistance

Panel A. Indicators of Schools that Returned *Food for Kids* Surveys

|                    | <i>Number of Schools in Sample</i> |         | <i>Number of Schools in Arkansas</i> |         | <i>Enrollment in Sample Schools</i> |         | <i>Enrollment in Arkansas</i> |         |
|--------------------|------------------------------------|---------|--------------------------------------|---------|-------------------------------------|---------|-------------------------------|---------|
|                    | 2002-03                            | 2003-04 | 2002-03                              | 2003-04 | 2002-03                             | 2003-04 | 2002-03                       | 2003-04 |
| Elementary Schools | 166                                | 150     | 604                                  | 608     | 64,197                              | 58,383  | 206,749                       | 208,225 |
| Middle Schools     | 39                                 | 28      | 186                                  | 183     | 18,716                              | 14,022  | 109,105                       | 110,000 |
| High Schools       | 44                                 | 47      | 341                                  | 339     | 20,466                              | 20,251  | 133,317                       | 133,812 |
| Total              | 249                                | 225     | 1131                                 | 1130    | 103,379                             | 92,656  | 449,171                       | 452,037 |

Panel B. Indicators of Assistance

|                    | <i>Total # of Children Assisted</i> |         | <i>Avg. # of Children Assisted per School</i> |         | <i>% of Students Assisted in Total Enrollment</i> |         | <i>Total # of Pregnant Teens Assisted</i> |         | <i>Total # of Teen Moms Assisted</i> |         |
|--------------------|-------------------------------------|---------|---|---------|---|---------|---|---------|--------------------------------------|---------|
|                    | 2002-03                             | 2003-04 | 2002-03                                       | 2003-04 | 2002-03   | 2003-04 | 2002-03                                   | 2003-04 | 2002-03                              | 2003-04 |
| Elementary Schools | 9,995                               | 7,730   | 60  | 52      | 19%   | 15%     | 14  | 16      | 46                                   | 48      |
| Middle Schools     | 2,674                               | 1,817   | 69  | 65      | 15%   | 13%     | 11  | 17      | 1                                    | 6       |
| High Schools       | 1,576                               | 2,195   | 36  | 47      | 16%   | 18%     | 146                                       | 317     | 178                                  | 327     |
| Total              | 14,245                              | 11,742  | 57  | 52      | 18%   | 15%     | 171                                       | 350     | 225                                  | 381     |

Panel C. Geographical Distribution

|            | <i>Total # Schools</i> |         | <i>Share of Schools</i> |         |
|------------|------------------------|---------|-------------------------|---------|
|            | 2002-03                | 2003-04 | 2002-03                 | 2003-04 |
| Rural      | 92                     | 77      | 37%                     | 34%     |
| Small Town | 96                     | 76      | 39%                     | 34%     |
| City       | 61                     | 72      | 24%                     | 32%     |
| Total      | 249                    | 225     | 100%                    | 100%    |

Panel D. Distribution of Food

| <i>Food Going Home</i> |         | <i>Food for School Snacks</i> |         |
|------------------------|---------|-------------------------------|---------|
| 2002-03                | 2003-04 | 2002-03                       | 2003-04 |
| 75%                    | 76%     | 25%                           | 24%     |
| 66%                    | 67%     | 34%                           | 33%     |
| 74%                    | 74%     | 26%                           | 26%     |
| 74%                    | 74%     | 26%                           | 26%     |

Source: Authors' calculations from *Food for Kids* surveys.

**Table 2.** School-Level Test Scores and Sample Means by Program Participation Status

|                             | 2001-02       |                   | 2003-04       |                   |
|-----------------------------|---------------|-------------------|---------------|-------------------|
|                             | Participating | Non-Participating | Participating | Non-Participating |
| Grade 4:                    |               |                   |               |                   |
| Math Mean Test Score        | 206.4         | 212.6             | 246.1         | 246.1             |
| % Below Basic               | 28.2          | 24.9              | 17.1          | 16.6              |
| % Basic                     | 19.1          | 20.1              | 14.3          | 13.6              |
| % Proficient & Advanced     | 52.6          | 55.1              | 68.7          | 69.8              |
| Literacy Mean Test Score    | 207.5         | 208.7             | 216.9         | 216.5             |
| % Below Basic               | 11.7          | 10.5              | 5.9           | 6.4               |
| % Basic                     | 25.8          | 25.2              | 19.7          | 18.7              |
| % Proficient & Advanced     | 62.6          | 64.4              | 74.5          | 74.9              |
| Grade 6:                    |               |                   |               |                   |
| Math Mean Test Score        | 180.6         | 180.9             | 194.2         | 195.4             |
| % Below Basic               | 32.7          | 31.2              | 22.2          | 19.7              |
| % Basic                     | 29.6          | 32.7              | 32.2          | 35.9              |
| % Proficient & Advanced     | 37.7          | 36.2              | 45.5          | 44.6              |
| Literacy Mean Test Score    | 186.8         | 186.4             | 195.9         | 197.4             |
| % Below Basic               | 20.9          | 20.8              | 14.2          | 11.5              |
| % Basic                     | 48.3          | 50.0              | 41.8          | 43.7              |
| % Proficient & Advanced     | 30.8          | 29.2              | 44.0          | 44.8              |
| Grade 8:                    |               |                   |               |                   |
| Math Mean Test Score        | 169.9         | 169.9             | 183.0         | 182.2             |
| % Below Basic               | 31.1          | 30.2              | 23.6          | 22.6              |
| % Basic                     | 46.2          | 47.4              | 41.2          | 43.8              |
| % Proficient & Advanced     | 22.7          | 22.4              | 35.2          | 33.6              |
| Literacy Mean Test Score    | 189.7         | 190.3             | 207.2         | 206.9             |
| % Below Basic               | 19.1          | 16.6              | 6.6           | 7.0               |
| % Basic                     | 43.6          | 47.7              | 35.5          | 35.2              |
| % Proficient & Advanced     | 37.4          | 35.7              | 57.9          | 57.8              |
| School-wide Behavioral Data |               |                   |               |                   |
| Attendance Rate (%)         | 94.7          | 94.7              | 94.6          | 94.6              |
| Dropout Rate (%)            | 0.37          | 1.03              | 0.51          | 0.82              |
| Expulsion Rate (%)          | 0.02          | 0.12              | 0.06          | 0.14              |
| Student Assault Rate (%)    | 1.98          | 1.67              | 1.90          | 1.75              |
| Free and Reduced Lunch (%)  | 56.2          | 53.2              | 58.6          | 56.0              |
| Enrollment                  | 412.1         | 352.7             | 405.1         | 351.4             |
| Students/Teacher            | 11.6          | 10.8              | 11.1          | 10.3              |
| County Income (per capita)  | \$24,149      | \$21,657          | \$25,067      | \$22,834          |
| Expenditures/Student        | \$6,366       | \$5,905           | \$6,864       | \$6,633           |
| Average Teacher Salary      | \$36,423      | \$34,284          | \$39,886      | \$36,566          |
| Sample Sizes                |               |                   |               |                   |
| Grade 4 Scores              | 164           | 361               | 203           | 323               |
| Grade 6 Scores              | 78            | 303               | 106           | 277               |
| Grade 8 Scores              | 48            | 296               | 73            | 270               |
| All Reporting Schools       | 223           | 690               | 291           | 617               |

Sources: Arkansas Department of Education.

**Table 3.** OLS and Fixed Effects Estimation Results for Benchmark Math Exam Scores, 2001-02 to 2003-04 (standard errors in parentheses)

|                        | <i>Grade 4 Math</i>  |                       |                     | <i>Grade 6 Math</i>  |                       |                     | <i>Grade 8 Math</i>  |                       |                     |
|------------------------|----------------------|-----------------------|---------------------|----------------------|-----------------------|---------------------|----------------------|-----------------------|---------------------|
|                        | <i>OLS</i>           | <i>FE 1</i>           | <i>FE 2</i>         | <i>OLS</i>           | <i>FE 1</i>           | <i>FE 2</i>         | <i>OLS</i>           | <i>FE 1</i>           | <i>FE 2</i>         |
| Participation in FFK   | 0.069<br>(0.056)     | 0.157<br>(0.155)      | 0.023<br>(0.144)    | 0.165**<br>(0.071)   | 0.192<br>(0.153)      | 0.113<br>(0.152)    | 0.180**<br>(0.081)   | 0.483***<br>(0.180)   | 0.364**<br>(0.174)  |
| % Free and Reduced     | -3.049***<br>(0.152) | 0.431<br>(0.782)      | -0.916<br>(0.735)   | -2.566***<br>(0.201) | 0.796<br>(0.775)      | 0.088<br>(0.780)    | -2.970***<br>(0.223) | 0.813<br>(0.748)      | -0.330<br>(0.749)   |
| Enrollment             | -0.154*<br>(0.087)   | -0.255<br>(0.404)     | -0.427<br>(0.373)   | -0.433***<br>(0.087) | -0.216<br>(0.438)     | -0.415<br>(0.432)   | -0.132<br>(0.107)    | 1.184**<br>(0.510)    | 0.470<br>(0.507)    |
| Students/Teacher       | -0.021<br>(0.020)    | 0.007<br>(0.040)      | 0.022<br>(0.037)    | 0.003<br>(0.022)     | -0.071*<br>(0.043)    | -0.053<br>(0.042)   | 0.013<br>(0.026)     | -0.108**<br>(0.045)   | -0.050<br>(0.045)   |
| County Income          | -1.048***<br>(0.194) | 4.627***<br>(0.998)   | -0.901<br>(1.096)   | -0.932***<br>(0.236) | 2.284**<br>(0.922)    | 0.145<br>(1.058)    | -1.183***<br>(0.237) | 3.773***<br>(1.049)   | 0.660<br>(1.167)    |
| Expenditures/Student   | -0.864***<br>(0.219) | 2.466***<br>(0.469)   | -0.160<br>(0.517)   | -0.931***<br>(0.253) | 0.844*<br>(0.448)     | -0.148<br>(0.507)   | -0.035<br>(0.256)    | 2.080***<br>(0.513)   | 0.680<br>(0.559)    |
| Avg. Teacher Salary    | 0.879***<br>(0.263)  | 1.246***<br>(0.463)   | -0.628<br>(0.472)   | 0.813**<br>(0.334)   | 1.692***<br>(0.579)   | 0.966<br>(0.597)    | -0.211<br>(0.383)    | -0.212<br>(0.645)     | -1.388**<br>(0.657) |
| Dummy for 2003-04      | 0.858***<br>(0.055)  |                       | 0.904***<br>(0.097) | 0.550***<br>(0.065)  |                       | 0.362***<br>(0.093) | 0.797***<br>(0.067)  |                       | 0.576***<br>(0.110) |
| Constant               | 11.907***<br>(2.221) | -79.512***<br>(7.249) | 19.932<br>(12.627)  | 12.151***<br>(3.149) | -46.792***<br>(7.584) | -7.963<br>(12.436)  | 14.957***<br>(3.533) | -60.877***<br>(8.490) | -1.436<br>(13.952)  |
| No. Observations       | 1013                 | 1013                  | 1013                | 734                  | 734                   | 734                 | 641                  | 641                   | 641                 |
| No. Groups             | ..                   | 524                   | 524                 | ..                   | 388                   | 388                 | ..                   | 343                   | 343                 |
| Within R <sup>2</sup>  | 0.447                | 0.382                 | 0.476               | 0.282                | 0.262                 | 0.293               | 0.328                | 0.365                 | 0.420               |
| Between R <sup>2</sup> | ..                   | 0.054                 | 0.088               | ..                   | 0.084                 | 0.011               | ..                   | 0.046                 | 0.002               |

Notes: The notation \* indicates statistically significant at the .10 level; \*\* at the .05 level; and \*\*\* at the .01 level (two-tailed tests). The dependent variable in each column is the log of the odds ratio for students who score at or above the proficient level on the relevant benchmark exam. All models were re-estimated with random effects but statistically significant Hausman test results favored the fixed effects estimation.

**Table 4.** OLS and Fixed Effects Estimation Results for Benchmark Literacy Exam Scores, 2001-02 to 2003-04  
(standard errors in parentheses)

|                        | <i>Grade 4 Literacy</i> |                       |                      | <i>Grade 6 Literacy</i> |                       |                     | <i>Grade 8 Literacy</i> |                        |                     |
|------------------------|-------------------------|-----------------------|----------------------|-------------------------|-----------------------|---------------------|-------------------------|------------------------|---------------------|
|                        | <i>OLS</i>              | <i>FE 1</i>           | <i>FE 2</i>          | <i>OLS</i>              | <i>FE 1</i>           | <i>FE 2</i>         | <i>OLS</i>              | <i>FE 1</i>            | <i>FE 2</i>         |
| Participation in FFK   | 0.025<br>(0.056)        | 0.156<br>(0.172)      | 0.047<br>(0.164)     | 0.022<br>(0.063)        | 0.062<br>(0.172)      | -0.104<br>(0.161)   | 0.192**<br>(0.086)      | 0.640***<br>(0.213)    | 0.393**<br>(0.195)  |
| % Free and Reduced     | -2.791***<br>(0.151)    | -0.016<br>(0.848)     | -1.034<br>(0.820)    | -2.579***<br>(0.179)    | 2.886***<br>(0.876)   | 1.437*<br>(0.834)   | -2.549***<br>(0.226)    | 2.082**<br>(0.822)     | 0.369<br>(0.772)    |
| Enrollment             | -0.143*<br>(0.087)      | -0.469<br>(0.431)     | -0.656<br>(0.411)    | -0.187**<br>(0.078)     | 1.283***<br>(0.495)   | 0.910**<br>(0.461)  | -0.216*<br>(0.111)      | 2.383***<br>(0.603)    | 1.069*<br>(0.568)   |
| Students/Teacher       | -0.007<br>(0.020)       | 0.003<br>(0.044)      | 0.018<br>(0.042)     | 0.024<br>(0.019)        | -0.124***<br>(0.048)  | -0.102**<br>(0.044) | 0.044<br>(0.027)        | -0.187***<br>(0.053)   | -0.084*<br>(0.049)  |
| County Income          | -0.958***<br>(0.191)    | 1.894*<br>(1.099)     | -2.935**<br>(1.245)  | -0.810***<br>(0.212)    | 4.410***<br>(1.039)   | 0.039<br>(1.124)    | -1.028***<br>(0.250)    | 6.996***<br>(1.237)    | 1.365<br>(1.309)    |
| Expenditures/Student   | -0.663***<br>(0.217)    | 2.073***<br>(0.520)   | -0.229<br>(0.590)    | -0.418*<br>(0.232)      | 1.122**<br>(0.528)    | -0.923*<br>(0.559)  | -0.109<br>(0.263)       | 1.503**<br>(0.601)     | -0.951<br>(0.619)   |
| Avg. Teacher Salary    | 0.950***<br>(0.259)     | 2.288***<br>(0.508)   | 0.656<br>(0.535)     | 0.066<br>(0.290)        | 2.016***<br>(0.619)   | 0.579<br>(0.604)    | 0.034<br>(0.387)        | 1.357*<br>(0.780)      | -0.872<br>(0.755)   |
| Dummy for 2003-04      | 0.712***<br>(0.055)     |                       | 0.791***<br>(0.110)  | 0.848***<br>(0.058)     |                       | 0.734***<br>(0.097) | 1.178***<br>(0.071)     |                        | 1.034***<br>(0.125) |
| Constant               | 8.613***<br>(2.190)     | -57.602***<br>(7.987) | 29.355**<br>(14.329) | 12.370***<br>(2.766)    | -83.234***<br>(8.609) | -4.259<br>(13.171)  | 12.189***<br>(3.658)    | -110.292***<br>(9.986) | -2.433<br>(15.833)  |
| No. Observations       | 1016                    | 1016                  | 1016                 | 735                     | 735                   | 735                 | 665                     | 665                    | 665                 |
| No. Groups             | ..                      | 524                   | 524                  | ..                      | 390                   | 390                 | ..                      | 351                    | 351                 |
| Within R <sup>2</sup>  | 0.401                   | 0.259                 | 0.330                | 0.377                   | 0.391                 | 0.479               | 0.383                   | 0.482                  | 0.579               |
| Between R <sup>2</sup> | ..                      | 0.040                 | 0.042                | ..                      | 0.067                 | 0.030               | ..                      | 0.013                  | 0.002               |

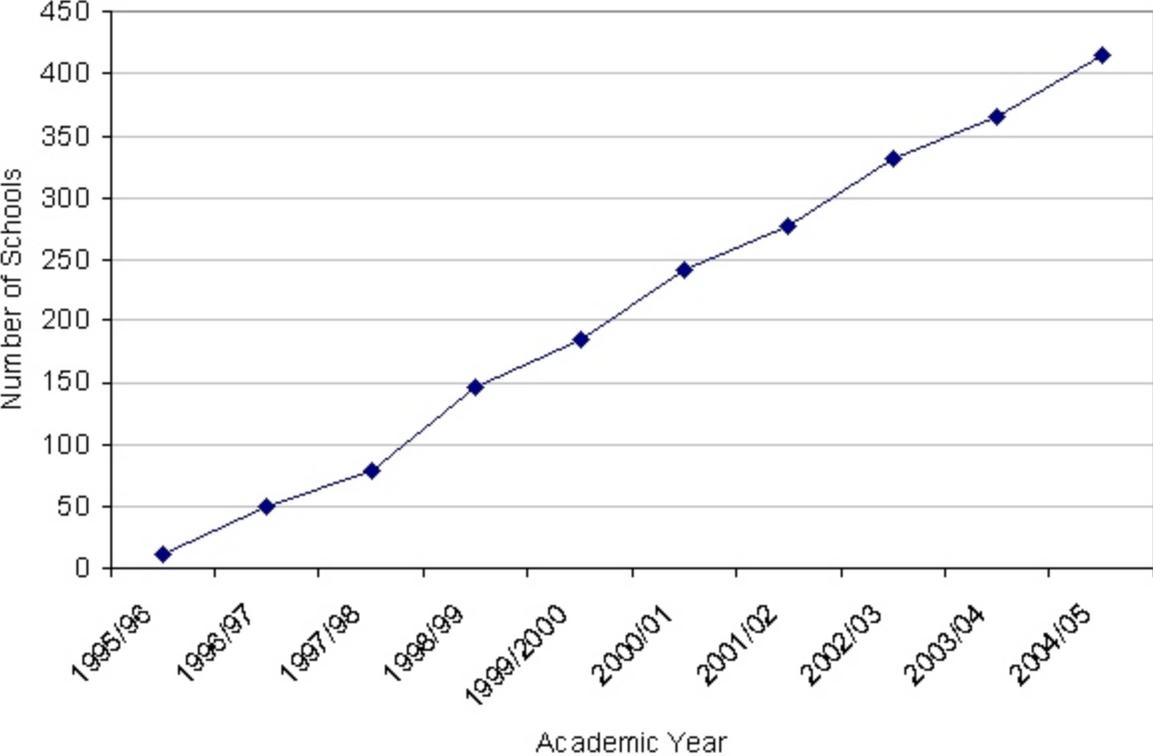
Notes: The notation \* indicates statistically significant at the .10 level; \*\* at the .05 level; and \*\*\* at the .01 level (two-tailed tests). The dependent variable in each column is the log of the odds ratio for students who score at or above the proficient level on the relevant benchmark exam. All models were re-estimated with random effects but statistically significant Hausman test results favored the fixed effects estimation.

**Table 5.** Fixed Effects and Random Effects Estimation Results for Models of Behavioral Outcomes, 2001-02 to 2003-04 (standard errors in parentheses)

|                        | <i>Attendance</i>    |                     | <i>Expulsion from School</i> |                      |
|------------------------|----------------------|---------------------|------------------------------|----------------------|
|                        | <i>FE 1</i>          | <i>FE 2</i>         | <i>RE 1</i>                  | <i>RE 2</i>          |
| Participation in FFK   | 0.023<br>(0.043)     | 0.024<br>(0.043)    | -0.071***<br>(0.020)         | -0.071***<br>(0.020) |
| % Free and Reduced     | 0.224<br>(0.190)     | 0.233<br>(0.195)    | -0.028<br>(0.053)            | -0.027<br>(0.053)    |
| Enrollment             | -0.032<br>(0.106)    | -0.028<br>(0.108)   | 0.118***<br>(0.025)          | 0.117***<br>(0.025)  |
| Students/Teacher       | -0.016<br>(0.011)    | -0.017<br>(0.011)   | -0.030***<br>(0.006)         | -0.030***<br>(0.006) |
| County Income          | -0.457*<br>(0.257)   | -0.422<br>(0.309)   | -0.076<br>(0.067)            | -0.073<br>(0.067)    |
| Expenditures/Student   | -0.324***<br>(0.122) | -0.308**<br>(0.142) | 0.157**<br>(0.069)           | 0.143**<br>(0.071)   |
| Avg. Teacher Salary    | 0.398***<br>(0.130)  | 0.409***<br>(0.141) | -0.066<br>(0.088)            | -0.085<br>(0.091)    |
| Dummy for 2003-04      |                      | -0.006<br>(0.028)   |                              | 0.012<br>(0.016)     |
| Constant               | 6.398***<br>(1.981)  | 5.767<br>(3.624)    | -0.120<br>(0.751)            | 0.154<br>(0.829)     |
| No. Observations       | 1713                 | 1713                | 1797                         | 1797                 |
| No. Groups             | 918                  | 918                 | 918                          | 918                  |
| Within R <sup>2</sup>  | 0.025                | 0.025               | 0.009                        | 0.010                |
| Between R <sup>2</sup> | 0.003                | 0.004               | 0.056                        | 0.056                |

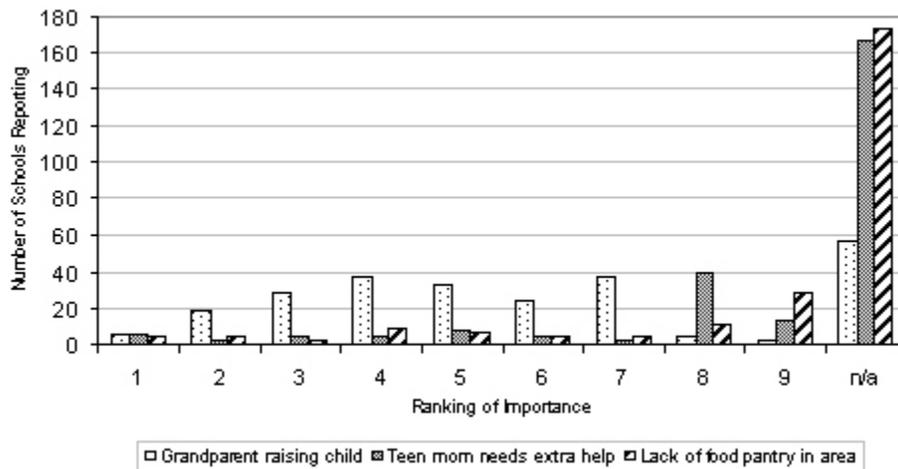
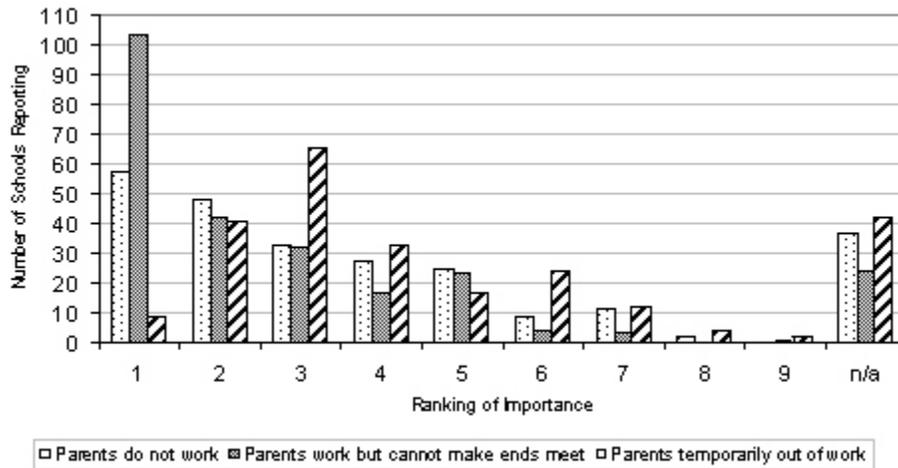
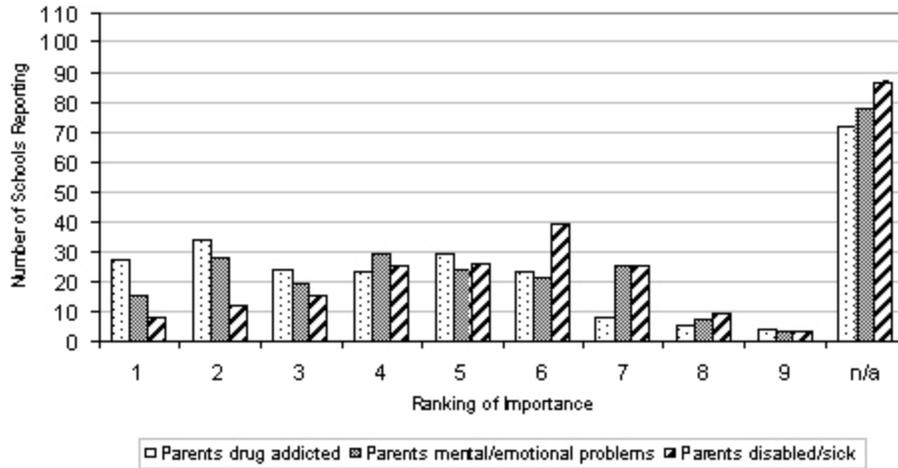
Notes: The notation \* indicates statistically significant at the .10 level; \*\* at the .05 level; and \*\*\* at the .01 level (two-tailed tests). Attendance is defined as the log of the odds ratio for average school attendance rates, and expulsion from school is the number of students expelled divided by the student population. Statistically significant Hausman test results favored the estimation of a fixed effects model for the attendance regressions. The expulsion regressions are estimated with random effects; the Hausman  $\chi^2$  statistics for model 1 is 10.80 and for model 2 is 12.72; neither are statistically significant.

**Figure 1.** Number of Schools Participating in *Food for Kids* Since Program Start Date

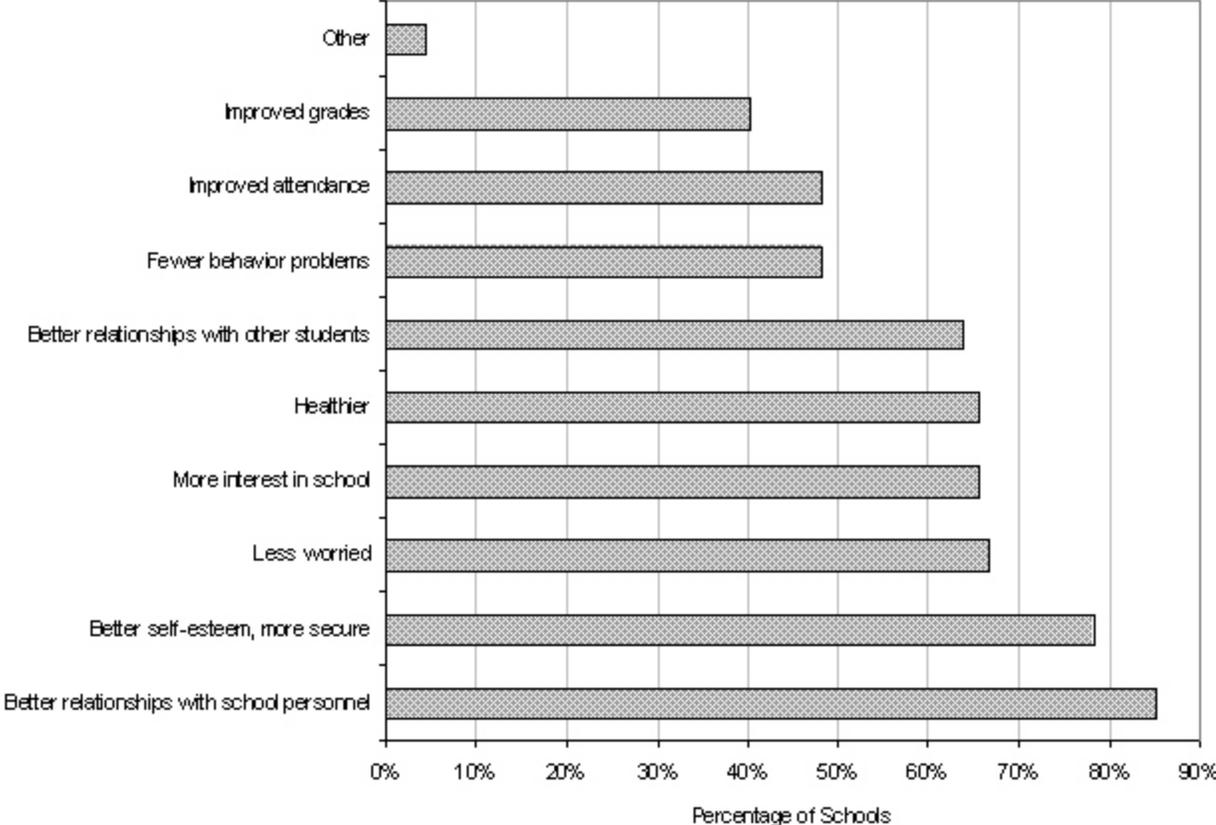


Source: Authors' tabulations from Arkansas Rice Depot records.

**Figure 2.** Reasons Children are Placed in *Food for Kids*: Frequency Distributions for 2002-03



**Figure 3.** Incidences of Schools Citing Program Impacts: Frequency Distribution for 2002-03



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## ENDNOTES

1. A number of studies have found that food insecurity has a negative impact on various child outcomes, including children's physical health, mental health, social behavior, and school performance. For example, see Kleinman *et al.* (1998), Murphy *et al.* (1998), Alaimo *et al.* (2001a,b), Weinreb *et al.* (2002), Winicki and Jemison (2003), and Ashiabi (2005). In contrast, Bhattacharya *et al.* (2004b) question the validity of the food insecurity measures used in some of this work; the authors use alternative data from the National Health and Nutrition Examination Survey and argue that neither food insecurity nor poverty can significantly predict nutritional outcomes among school-age children.
2. Numerous studies have examined the effectiveness of these school nutrition programs, with mixed results. See, for example, Long (1991); Burghardt *et al.* (1995); Devaney and Stuart (1998); Dunifon and Kowaleski-Jones (2003); and Bhattacharya *et al.* (2004a).
3. Studies to evaluate the impact of WIC and food stamps on the well-being of young people include Rose *et al.* (1998), Kennedy (1999), and Herman *et al.* (2004).
4. For studies on who attends and benefits from food pantries and soup kitchens, see Lenhart and Read (1989), Curtis and McClellan (1995), Poppendieck (1998), Biggerstaff *et al.* (2002), and Martin *et al.* (2003).
5. See, for example, David Relin, "Won't You Help Feed Them?" *Parade Magazine*, April 4, 2004; "Kids Taking Food Home From School," [www.cnn.com](http://www.cnn.com), April 15, 2004; and Marianne Hurst, "Care Packages," *Education Week*, April 28, 2004, p. 3.
6. An exception is Molnar *et al.* (2001), which uses information from interviews to evaluate the impact of an urban-based food bank in Alabama on food insecurity in surrounding rural counties.
7. See FRAC (2005) and Werschkul and Williams (2004).
8. This result is consistent with findings in Olson *et al.* (2004) that rural households with higher levels of maternal depression are more likely to be food insecure.
9. The U.S. Department of Agriculture defines food insecurity as households that at some time during the year are uncertain of having, or unable to acquire, enough food for an active, healthy life for all household members. Food insecurity with hunger occurs when a household member experiences hunger during the past year because the household lacked money for enough food (Nord *et al.* 2004).
10. See Paxson and Waldfogel (2003) for estimates of how welfare reform has affected child maltreatment.
11. Other hunger-relief organizations often charge churches and other community organizations a per pound maintenance fee.

12. Records from America's Second Harvest indicate that as of 2004, its affiliates were operating backpack programs in Arizona, California, Colorado, Connecticut, Idaho, Kentucky, Michigan, Missouri, Pennsylvania, New Mexico, New York, North Carolina, Oklahoma, Tennessee, Texas, Virginia, and Washington DC.
13. These logistical difficulties have spurred some communities to start new "farm to school" initiatives that utilize a number of planning tools and nutrition strategies to bring fresh produce directly from farmers to schools (Vallianatos *et al.* 2004)
14. In some cases food is sent home in boxes rather than backpacks. Food in backpacks is primarily intended for the children and their siblings, while food in boxes is intended for the entire family. Our analysis combines figures for food sent home in backpacks and boxes since school officials can only observe that the food goes home, not who eats it.
15. One additional response, "other," is not depicted in Figure 1 because very few schools consider this reason applicable. In those instances when "other" is chosen and respondents are prompted to fill in the reason, schools report no consistent response as to what the "other" reason is.
16. About fifteen schools among all participating schools were not assigned LEA numbers by the Arkansas Department of Education. These schools fall in a special category of alternative education centers that serve the needs of special ed students who cannot function in a traditional classroom setting due to behavior or other problems. Seven of these schools returned surveys and are included in the analysis of survey responses, but they are left out of the other computations.
17. The Arkansas Department of Education website, which provides links to annual school report cards as well as the Statewide Information System (SIS), is located at <http://arkedu.state.ar.us/>.