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***Evaluation of the School Breakfast
Program Pilot Project:
Final Report***



United States
Department of
Agriculture

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Chapter One

Introduction

In 1998, Congress authorized the School Breakfast Program Pilot Project (SBPP) to study the implementation and effects of providing universal free school breakfast in six school districts across the United States. The six school districts chosen from among the 386 that applied for the pilot are:

- Boise, Idaho: Independent School District of Boise City;
- Columbiana, Alabama: Shelby County Board of Education;
- Gulfport, Mississippi: Harrison County School District;
- Phoenix, Arizona: Washington Elementary School District;
- Santa Rosa, California: Santa Rosa City Schools; and
- Wichita, Kansas: Wichita Public Schools.

For three years, from School Year (SY) 2000-2001 through SY 2002-2003, these six school districts received federal funds to offer school breakfasts free of charge, regardless of family income, to students in a number of elementary schools that were matched on a number of characteristics, then randomly assigned to either treatment or control status. The control schools continued to offer the regular School Breakfast Program (SBP), which provides free or reduced-price breakfasts to eligible students from low-income families. Over the course of the three years of the pilot project, data were collected from all participating schools for an evaluation of the implementation and impact of providing universal-free school breakfast. In the fall of 2002, the Food and Nutrition Service (FNS) released a report of the findings after the first year of the pilot project. That report, entitled *Evaluation of the School Breakfast Program Pilot Project: Findings from the First Year of Implementation*, is available on the FNS website (<http://www.fns.usda.gov/oane/MENU/Published/CNP/CNP.HTM>).

The current report serves as the final report of findings from the SBPP. It provides impact estimates for a smaller set of outcomes, based on data collected over the remaining two years of the pilot, and integrates the findings from all three years of the SBPP. This report also presents findings from an additional set of analyses undertaken to address a set of questions that have been raised by policy makers and other stakeholders since the release of the first year report. These include analyses focused on students who do not eat breakfast (“breakfast skippers”) and those who eat a nutritionally robust or “substantive breakfast”; variations in the breakfast setting (i.e., school versus home, classroom versus other school location); characteristics of students in food insecure households; and differences in student outcomes by household income level.

The remaining sections of this chapter provide background information about the SBP; a brief summary of research on the relationship between breakfast and student outcomes; an overview of the SBPP, including a review of the conceptual model for understanding the pilot project; a summary of the findings in the interim report on Year 1 findings, and a description of the purpose and contents of this final report.

The School Breakfast Program

Congress established the SBP in 1966 as a pilot program, aimed at schools serving low-income children or located in areas where children had to travel great distances to get to school. Under SBP, USDA provides reimbursements for breakfasts served to children in public and non-profit private schools and residential care institutions. The SBP became a permanently authorized program in 1975 (Public Law 94-105), with Congress directing that it “be made available in all schools where it is needed to provide adequate nutrition for children in attendance (FNS, 2004a).” Congress emphasized the importance of the program for students in low-income areas by offering higher federal reimbursements for meals served in schools identified as having “severe need.” The severe need reimbursements are intended to offset the higher operational costs often found in low-income areas.

The SBP operates much like the National School Lunch Program (NSLP). Schools and institutions that choose to participate in the program must serve breakfasts that meet federal nutrition standards and provide free and reduced-price meals for those students determined eligible. With regard to the nutrition requirements, schools that participate in the SBP must serve breakfasts that provide, on average, at least 25 percent of the 1989 Recommended Daily Allowances (RDA) for food energy (calories), protein, iron, calcium, and vitamins A and C. Breakfasts served must also adhere to the *Dietary Guidelines for Americans*, specifically, the recommendations that no more than 30 percent of calories (food energy) come from fat, and less than 10 percent come from saturated fat (U.S. Departments of Agriculture and Health and Human Services, 2000).

In terms of eligibility, children from families with incomes at or below 130 percent of the federal poverty guidelines are eligible for free meals; those with incomes between 130 and 185 percent of poverty level are eligible for reduced-price meals; and those above 185 percent must pay full price, although their meals are still nominally subsidized by USDA. Children are determined eligible for free or reduced-price school meals if their family applies to participate and they meet these household income criteria.¹ For SY 2002-2003, the last year of the SBPP, the maximum reduced-price eligible income for a family of four was \$33,485; the maximum eligible income for free meals for a family of four was \$23,530. Children are automatically eligible for free school meals if they are members of a household that receives food stamps, or benefits under the Food Distribution Program on Indian Reservations, or, in most cases, benefits under the Temporary Assistance for Needy Families (TANF) Program.

USDA provides cash reimbursements to school districts that meet the requirements of the SBP. For SY 2002-2003, the reimbursement per breakfast served was as follows: \$1.17 for free, \$0.87 for reduced-price, and \$0.22 for paid breakfasts. These reimbursements are higher in severe need areas (i.e., \$0.23 higher per breakfast served for free and reduced-price breakfasts) and in Alaska and Hawaii. Of the 8.2 million children/students served each day in SY 2002-2003, about 6.7 million (79 percent) received free or reduced-price breakfasts (FNS, 2004b). According to FNS (2004b), about

¹ In an effort to reduce the paperwork burden for schools and school districts, Congress allows three alternative provisions to the normal requirements for determining eligibility for free and reduced price school meals and daily meal counts by school foodservice staff. Of particular interest to this study is Provision 2, which allows schools to serve school breakfast and/or lunch at no charge for three years, based on eligibility determinations and meal type counts (e.g., free, reduced price) established in a base year. Provision 3 also allows for providing universal-free school breakfast, by providing the same cash and commodity support paid to schools in a base year for three additional years.

65 percent of the breakfasts served in the SBP are reimbursed at the severe need rate. In fiscal year 2003, Congress appropriated \$1.68 billion for the SBP. About 78,000 schools and institutions now participate in the SBP.

While the SBP has grown considerably since its inception, it has continued to lag behind its counterpart, the NSLP. Over the years, policy makers and program administrators have worked to expand the availability of breakfast in schools and promote participation in the program. For example, Congress amended the Child Nutrition Act in 1989 to include start-up grants to a number of States to be utilized by schools for the non-recurring costs of starting the SBP. Three million dollars was allocated to these grants in 1990; and while the grant program was eliminated through the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (Public Law 104-193), the number of schools and institutions offering the SBP has grown considerably. Since 1990, the number of children served by the SBP has doubled (FNS, 2004b).

Despite this progress, the SBP still serves fewer students in fewer schools than the NSLP, which currently operates in approximately 100,000 schools and residential child care institutions, and serves 26 million students each day (FNS, 2004c). Recent reports suggest that many who are eligible for free and reduced-price breakfasts do not participate. In a recent analysis, the Food Research and Action Center (2003) compared participation in the SBP and NSLP. The authors report that nationally only about 42 students received free or reduced-price breakfast for every 100 receiving free or reduced-price lunch. Rossi (1998) analyzed data collected in 1992 from the first School Nutrition Dietary Assessment Study (SNDA-I) and concluded that only 29 percent of the children eligible for free and reduced-price breakfasts were actually eating them.

Many reasons have been cited in recent years for this underutilization of the SBP, including a perceived stigma that program participation is associated with being poor, bus and cafeteria schedules, and school districts' perceived costs of running the SBP (Food Research and Action Center, 2003). Some advocates and policy makers have argued the need to make SBP more attractive and accessible. In particular, advocates have been calling for provision of universal-free school breakfast, which they believe reduces administrative burdens on the school and school districts; reduces the perceived stigma, since breakfasts are made available at no charge to students from households of all incomes; and increases participation (Food Research and Action Center, 2003).

Research on the Relationship Between Breakfast and Student Outcomes

The report on the first year of findings from the SBPP (McLaughlin et al., 2002) provides a brief overview of the research linking breakfast and nutrition, cognitive functioning, academic performance and behavior. This will not be repeated here. In addition, two USDA-funded reviews released in 1999 (Briefel et al.) and 2001 (Jacobson et al.) provide a more in-depth assessment of the literature on these links, and include studies done in the United States as well as developing countries under a variety of circumstances. Jacobson and his colleagues provide a useful summary of the status of the research:

The literature suggests a relationship between eating breakfast, improved dietary status, and enhanced cognitive performance. Although the literature is suggestive of positive educational benefits, no study has been able to definitively conclude that eating a *school*

breakfast results in improvements in long-term or short-term cognition or learning and academic achievement. The inconclusive findings reflect limitations of the studies...(page 3).

Among the problems with the research cited are differences in the breakfast interventions studied, small sample sizes, samples that are not nationally representative, the use of non-experimental designs that are subject to selection bias, limited attention to any one outcome across studies, and tests of significance that do not adequately account for the small sample size of schools.

Universal-Free School Breakfast Initiatives

The report of the first year findings also describes several state and school district initiatives to implement and evaluate universal-free school breakfast. While there have been no newly initiated evaluations of universal-free school breakfast since the first report, a large number of states are reporting the availability of universal-free school breakfast. In its most recent publication reviewing the status of the federal SBP, the Food Research and Action Center (2003) stated that at least 40 states have schools or school districts with universal-free school breakfast programs. At least some of these programs take advantage of Provision 2 and/or 3 of the National School Lunch Act, which allows schools to provide free breakfasts for all students based on eligibility determinations and meal counts from a baseline year.

New York City, Cleveland, and Kansas City, Missouri are three of the largest school districts reporting universal-free school breakfast. Some states provide or have provided funding for universal-free school breakfast in certain schools or grades. Illinois provides funds for a universal-free school breakfast program for schools with 80 percent or more students eligible for free or reduced-price meals. Massachusetts provided \$5.3 million towards universal-free school breakfast in fiscal year 2003. In North Carolina, the state provides funding for free breakfasts to kindergarten students.

Two of the state universal-free school breakfast initiatives are of particular relevance, as they included evaluations with outcome measures similar to those studied in the SBPP evaluation. Maryland provides funding for “Maryland Meals for Achievement,” which allocates about \$1.9 million for universal-free school breakfast for schools in which 40 percent or more of the students are eligible for free and reduced-price meals. Of the 22 school systems in Maryland, 18 applied for the program and at least one school in each was selected (Maryland State Department of Education, 2002). The state mandated evaluation component of Meals for Achievement has been dropped, although there has been some attempt to track participation trends.² The latest evaluation findings from this effort after the third year of the program were reported in Murphy and Pagano (2001). These authors report a 45-percentage point increase in breakfast participation when schools served breakfast in the classroom. In-classroom breakfast was also associated with improvements in staff perceptions of student behavior and the school learning environment. Rates of tardiness and suspensions for disciplinary incidents were significantly lower than those in demographically similar schools. Standardized test scores were significantly higher for universal-free schools, although the sample size was small (i.e., 10 treatment and 10 comparison schools). No differences were found for attendance, visits to the school nurse, or referrals to the principal’s office for discipline.

² Personal communication with Kimberly Kerry, Maryland State Department of Education, March 19, 2004.

Minnesota funded “The Fast Break to Learning,” a universal-free school breakfast program, from 1999 until 2003, when the state legislature repealed funding. In SY 2001-2002, 422 out of 500 schools that were eligible chose to participate. Researchers from the University of Minnesota have evaluated Fast Break, comparing students in elementary schools that chose to participate in Fast Break to those that were eligible but chose not to (i.e., controls), and have separately published the results of each year’s findings. In a recent evaluation of Fast Break (Peterson et al., 2003), researchers found that participation steadily increased for the Fast Break schools over the course of the evaluation. Participation in Fast Break schools increased 17 percentage points, from 39 percent in 1998-1999 to 56 percent in 2001-2002, compared to a 4 percentage point increase for control schools (an increase from 17 to 21 percent). Notably, they found greater increases when they focused on students who were eligible for free lunch. These students increased participation by 37 percentage points, from 28 percent in 1998-1999 to 65 percent in 2001-2002. The Minnesota researchers also found that schools that served breakfast after the start of the school day had higher participation rates than schools that served breakfast before the school day started (87 percent compared with 51 percent, respectively).

When researchers compared academic outcomes for Fast Break and control school students, they found no significant differences between the two groups on achievement test scores (reading and math) or attendance. Note that this evaluation did not use a randomized experimental design. The schools decided whether or not to participate in Fast Break. Thus, there are likely to be differences between the Fast Break and control schools that might influence the outcomes over and above the provision of universal-free school breakfast. The researchers do report that the schools differed on some measured characteristics: control schools tended to be more suburban and have fewer students eligible for free and reduced-price meals than Fast Break schools. Attempts to control for these measured differences between the two groups, such as comparing only Title I schools³ in each group, also failed to uncover any improvements in academic achievement associated with universal-free school breakfast.

The Minnesota researchers also looked at incidences of visits to the school nurse and to the principal for disciplinary problems. Baseline data were obtained in SY 2000-2001 from a sample of elementary schools that were eligible to participate in Fast Break, but did not do so until 2001-2002. The second round of data, collected in Spring 2002, was thus after one year of program implementation. In this pre/post analysis, there were no significant differences in either the average number of school nurse visits or disciplinary incidents reported.

The School Breakfast Pilot Project

In an effort to determine the effects of offering free breakfast to all students, regardless of income, in 1998 Congress authorized the Secretary of Agriculture to conduct a pilot project in six school districts (Public Law 105-336, section 109). In addition to stipulating the number of demonstration sites, the legislation specified that the pilot project should last three years, and include urban and rural elementary schools that had families with varying income levels. The legislation also called for an evaluation of the pilot project that would provide valid results.

³ Title I is the federal education program providing funding for schools to improve learning for students at risk of educational failure, particularly schools serving large concentrations of children in poverty.

FNS conducted a competitive grant process for school district participation in the SBPP, and chose the six school districts listed at the beginning of the chapter from the 386 districts that applied to participate in the demonstration.

Each of the chosen school districts committed to taking part in the pilot project and evaluation for three years. Participating elementary schools in the six districts were randomly assigned either to the treatment group, which offered universal-free school breakfast, regardless of household income, or to the control group, which continued to provide the regular SBP. While the federal nutrition standards for breakfast needed to be maintained in all schools, school districts were given wide latitude to implement universal-free school breakfast in the treatment schools in a way that worked best in their local community (e.g., timing and location of breakfasts). The school districts were reimbursed for all breakfasts served in treatment schools at the federal reimbursement rate for free breakfasts. Requirements for the evaluation included providing school record data for the baseline year prior to SBPP implementation and for the three years of the SBPP, taking part in interviews, and facilitating data collection from students and staff. In addition, the school districts were required to maintain the integrity of random assignment of their schools to treatment or control status over the three years of the pilot.

Evaluation of the School Breakfast Pilot Project

The legislation authorizing the SBPP required that the evaluation address the following objectives:

1. Document the methods used by schools to implement universal-free school breakfast.
2. Assess the effect that universal-free school breakfast has on paperwork, costs, and other administrative requirements placed on schools.
3. Assess the effects of universal-free school breakfast on student participation.
4. Assess the effects of universal-free school breakfast on student outcomes, including dietary intake, school attendance and tardiness, classroom behavior and discipline, and academic achievement.⁴

As a first step in responding to this legislative mandate, FNS funded an effort to develop a comprehensive and rigorous design for studying the SBPP. The evaluation design chosen through this process, an experimental design with random assignment, is described more fully in *Universal-Free School Breakfast Program Evaluation Design Project: Final Evaluation Design* (Ponza et al., 1999), available on the FNS website.⁵ This design document served as the framework for the current evaluation.

Seventy-nine elementary schools participating in the evaluation were randomly assigned to provide universal-free school breakfast (treatment), and 74 elementary schools were assigned to continue with

⁴ The legislation combines the first two and second two objectives. They are separated here to in order to parallel the structure of the discussion of the results in later sections of the report.

⁵ <http://www.fns.usda.gov/oane/MENU/Published/CNP/CNP.HTM>

the regular SBP (control).⁶ Separate studies of SBPP implementation and impact were included in the evaluation to address objectives 1 and 2, and objectives 3 and 4, respectively. In Spring 2001, near the end of the first year of the SBPP (SY 2000-2001), about 4,300 students across the treatment and control schools were measured on dietary intake, cognitive function, and height and weight. Data were also collected from parents, teachers, and school records, including those on student health status, behavior and discipline, social/emotional functioning, school breakfast participation, academic achievement, and school attendance and tardiness. In Spring 2001, site visits were also made to each of the six school districts and telephone interviews were completed with key stakeholders in the SBPP, including district administrators, School Food Authority (SFA) directors, principals, cafeteria managers, teachers, and custodians. The results of the first year of data collection for both studies are reported in McLaughlin et al. (2002).

In subsequent years of the SBPP, SYs 2001-2002 and 2002-2003, a more limited set of data was collected on the original sample of students and schools from school records. These data included school breakfast participation, academic achievement, school attendance and tardiness, and school-level incidents of visits to the school nurse for health reasons and to the principal for disciplinary reasons. A second set of site visits and telephone interviews with stakeholders was completed in Spring 2003. Respondents for this set of interviews included school district administrators, SFA directors, principals, and cafeteria managers. The results of these subsequent data collections are the focus of this report.

Conceptual Model

Two conceptual models were developed for this evaluation. One focused on understanding the pathways involved in implementation of universal-free school breakfast and the second on its expected impacts. These models were presented in the report on the findings on the first year of implementation (McLaughlin et al., 2002), but are repeated here because they are equally useful in thinking about the data collection and findings in the subsequent two years of the pilot. Note that there is some overlap in the components of the two models, including student participation in universal-free school breakfast, as these components are important in thinking about implementation and impacts.

Implementation Model

Exhibit 1.1 depicts the pathways involved in the application and selection of the six districts for the SBPP demonstration, the implementation of the SBPP, and expected outcomes associated with implementation. FNS announced the demonstration in the Federal Register (A); and then the district (D) and the SFA (B), which runs the school meal programs in the district, decided to apply for the SBPP (C). FNS chose six districts (F), and meetings were held in Washington, D.C. and in each site in the summer of 2000 (E). Briefings were also provided to the school districts after the report on the first year findings (McLaughlin et al., 2002) were released in Fall 2002, and the report was made available to the districts. These results, included in (E), could influence SBPP implementation in subsequent years. School districts also learned about universal-free school breakfast programs being implemented in other locales (e.g., Maryland, Minnesota) through other sources, such as reports, and

⁶ In some districts, schools with different grade configurations (e.g., K-2, 3-5) were combined to form one school unit for sampling. In addition, in three school districts, two treatment school units were paired with one control group unit. Thus, there were a total of 79 schools in the treatment group and 74 in the control group.

telephone conversations (G). The implementation of universal-free school breakfast (I)—such as where breakfast was served, what was served, how much the program was promoted, what training was needed—was influenced by the characteristics of the school (H), including such things as the physical space available for serving breakfast to a greater number of students, transportation and class schedules, and principal support for this new effort. Providing universal-free school breakfast was expected to affect a host of outcomes, including the costs of providing school breakfasts (J); school operations (K); program participation (L); menu composition (M); and stakeholder attitudes about school breakfast (N).

Impact Model

Exhibit 1.2 presents the model for studying the pathways by which the SBPP would be expected to affect school and student outcomes. This model depicts the implementation of universal-free school breakfast (A) with other “fixed” or given factors, such as characteristics of the student, family, and school (B and C).⁷ The critical role of the Implementation Study in the impact evaluation was to define the way that the SBPP was developed in each site and assess whether differences in implementation across sites may have affected the desired school and student outcomes.

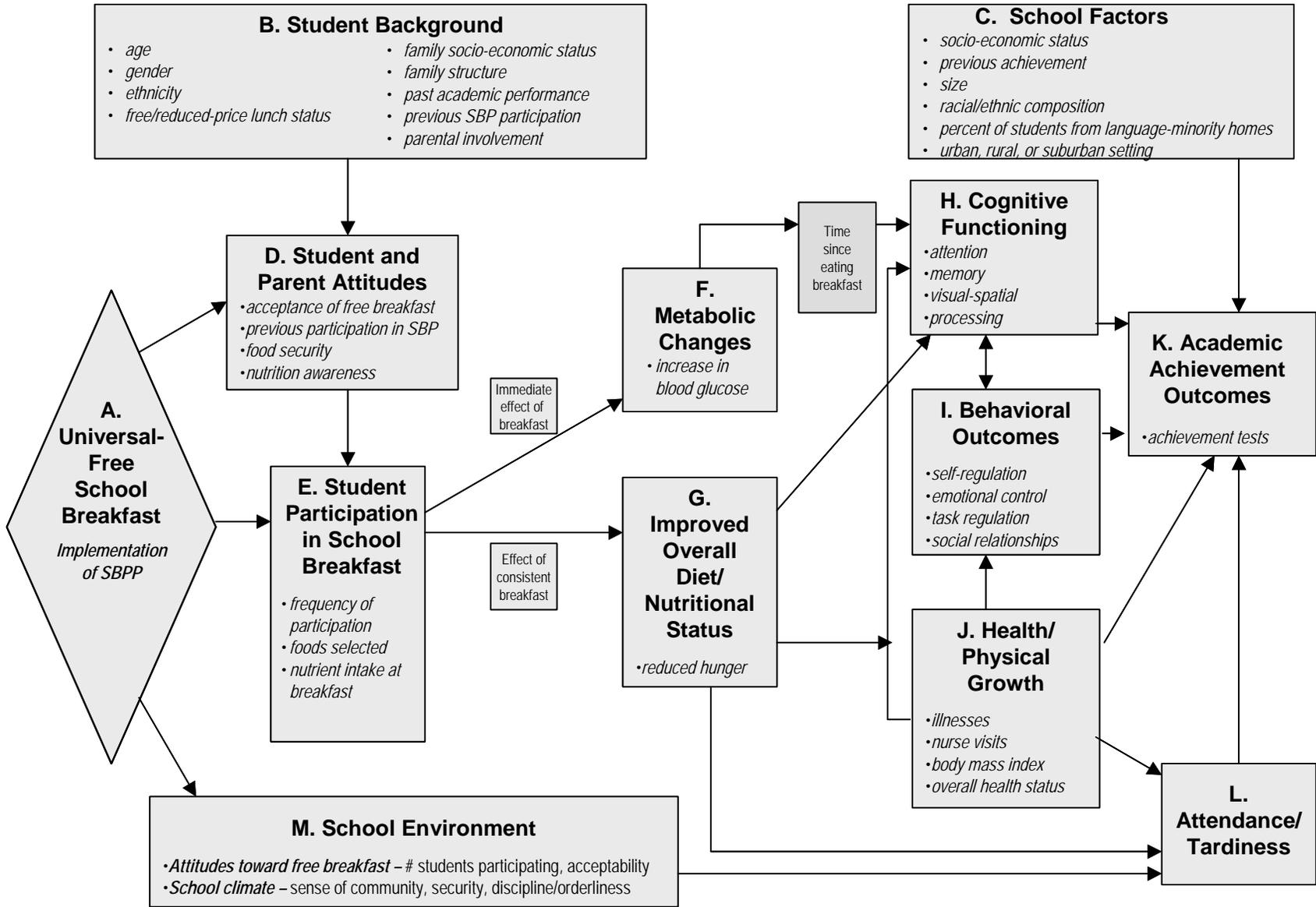
Attitudes of the students and their parents (D) are influenced by the students’ background, but can also be influenced by their experience with universal-free school breakfast. The implementation of the program as well as student and school factors are believed to influence student participation in school breakfast (E), which in turn is hypothesized to have immediate effects following consumption of school breakfast on a given day (F), as well as more long-term effects based on consistent school breakfast participation (G). The more immediate pathway for the effects of breakfast to influence student outcomes is through metabolic changes, such as an increase in blood glucose, that affect student attention and cognitive functions important for completing schoolwork (H), including the ability to store information in memory and process visual-spatial information. Consistent participation in school breakfast is hypothesized to improve a child’s overall diet and nutritional status (G). This would positively influence a student’s health (J) by improving overall health, reducing the number of illnesses, improving body mass index, and reducing visits to the school nurse for illnesses. Potential longer-term outcomes include improved behavior (I) (e.g., increased self-regulation, emotional control, and improved social relationships), improved attendance and tardiness (L), and improved academic achievement outcomes (K).

Note also that the school environment is expected to change as a result of the implementation of universal-free school breakfast (M). This change, reported in other studies of universal-free school breakfast, would be expected to include such characteristics as the school’s sense of community, number of disciplinary problems, and overall attitudes toward school breakfast.

It should be noted that the main policy question addressed in this evaluation was whether or not the availability of universal-free school breakfast in elementary schools increased participation and improved other student and school outcomes *relative to students in schools participating in the regular SBP*. The question was *not* how students in universal-free schools do relative to students that

⁷ Some of the student background characteristics, such as previous academic achievement, have a direct effect on academic achievement outcomes. To keep the model focused on the pathways of universal-free school breakfast, however, this link is not depicted.

Exhibit 1.2: Pathways of Universal-Free School Breakfast to School and Student Outcomes



do not eat breakfast. Thus, it was not an evaluation of how important breakfast is to the student outcomes measured. Instead the primary question asked was whether or not the outcomes for students in elementary schools with universal-free school breakfast are more positive than those of similar students in schools offering the regular SBP.

Purpose and Organization of the Report

As noted above, the primary purpose of this final report from the SBPP is to present the results of the implementation and impact of universal-free school breakfast during the final two years of the pilot project. This document also reports on analyses looking across all three years of the pilot and the year before the pilot (i.e., the baseline year). This longitudinal view is relevant, for example, when looking at the effects of SBPP on school district operations or at its impact on outcomes such as school-level participation. Finally, this document also reports on additional analyses conducted in response to questions raised by the findings in the first report.

The report is divided into two parts. Part I describes the Implementation Study, including the study design and methodology (Chapter Two), and the results of the implementation data collection in the second and third year of the SBPP (Chapter Three). Part II presents the Impact Study: Chapter Four describes the design and methodology; Chapter Five presents the findings from the second and third years of impact data collection; and Chapter Six provides the results from analyses conducted in response to questions from policymakers and stakeholders on the report of the first year of findings (McLaughlin et al., 2002). These include analyses of outcomes for students who ate robust or substantive breakfasts, students who skipped breakfast, students who ate breakfast at school versus home or in the classroom at school, and for students in households with different income levels. Demographic characteristics of students with varying patterns of school breakfast participation and food insecurity status are described in Chapter Six as well. Chapter Seven discusses the overall findings and conclusions from the evaluation.

Chapter Two

Implementation Study Design and Methodology

This chapter describes the design and methodology used in assessing implementation during the third and final year of the School Breakfast Program Pilot Project (SBPP). The objectives and research questions, the universes that were surveyed, data collection methodology, and the analytic approach are described.

Objectives and Research Questions

As described in Chapter One, the objectives of the Implementation Study were to (1) document the methods used by schools to implement a universal-free school breakfast; and (2) to assess the effect that universal-free school breakfast has on paperwork, costs, and other administrative requirements placed on schools. To help address these objectives in the third and final year of data collection, the evaluation set out to:

- Review how the schools implemented universal-free school breakfast in Years 2 and 3 of the pilot (School Years 2001-2002 and 2002-2003);
- Identify any changes in implementation that occurred following the first year of the pilot; and
- Assess the effect of implementation on program operations and performance.

A summary of the research questions addressed in the Implementation Study appears in Exhibit 2.1. Questions are grouped under the major topics that were the focus of study. The source (or sources) of information used in addressing each question is also identified.

Design

The findings reported here follow an earlier assessment conducted near the end of the first year of implementation of the SBPP. In that assessment, information was collected through interviews with key stakeholders, a self-administered teacher survey, a breakfast menu survey of cafeteria managers, focus groups with students, and school records. Results of that assessment can be found in the report of the first year of findings (McLaughlin et al., 2002). The information gathered for this report was collected from a more restricted universe than the earlier study. As indicated, the primary purpose of this analysis was to describe the implementation process and to assess its impacts. Information on implementation during the final year of the pilot was collected using the methods listed below.

- **In-person interviews with school district administrators** focusing on the involvement of district administrators in the pilot and its perceived district-level impacts.
- **In-person interviews with School Food Authority (SFA) directors** discussing SBPP implementation in the second and third years and perceived impacts.
- **Interviews with school principals**, in person or by telephone, regarding implementation in the second and third years, perceived impacts, and school discipline.

Exhibit 2.1

Implementation Research Questions

Topic/Question	Respondent/ Data Source
<p>Institutional Changes/Unusual Events</p> <ul style="list-style-type: none"> • Were there any changes in the curriculum or methods of instruction over the past two years that might have affected achievement test scores? • Were there any unusual events over the past two years that might have affected the school meal programs? • Were there any major events or program changes within individual schools over the past two years that might have affected school operations or academic achievement? 	<p>District Administrators, Principals SFA Directors, Cafeteria Managers Principals</p>
<p>Program Promotion</p> <ul style="list-style-type: none"> • Were any special efforts made to promote school breakfast over the past two years? • Was the level of effort used in promoting universal-free school breakfast about right? 	<p>SFA Directors, Principals SFA Directors</p>
<p>Breakfast Setting</p> <ul style="list-style-type: none"> • How many schools taking part in the SBPP in each district have students eating breakfast in each of the major location options? • Who determines where breakfast is eaten? • Has there been a change in where breakfast is eaten since the first year of the SBPP? • Have there been any particular problems associated with eating breakfast in the classroom? • How do teachers whose students eat breakfast in the classroom feel about the program? • Where in the school is breakfast served and eaten? • If breakfast is eaten in the classroom, what are the mechanics of delivery, serving, trash removal, and record keeping and who is responsible for each task? 	<p>SFA Directors SFA Directors SFA Directors, Cafeteria Managers SFA Directors, Cafeteria Managers SFA Directors Cafeteria Managers Cafeteria Managers</p>
<p>Breakfast Composition</p> <ul style="list-style-type: none"> • Who determines the composition of the breakfast that is served? • Was the same breakfast menu offered in all schools taking part in the SBPP? • Were there any changes in the composition of the breakfast menus over the past two years? • Is an identical breakfast served to all students? 	<p>SFA Directors SFA Directors SFA Directors, Cafeteria Managers Cafeteria Managers</p>
<p>Cafeteria Operations</p> <ul style="list-style-type: none"> • What menu planning system does the district use? • Is serving space and/or serving time an important constraint to an effective breakfast program? • How much time is provided for students to eat breakfast? • Is offer versus serve available? • Is à la carte available? • Are foods available from other on-campus sources during breakfast? 	<p>SFA Directors SFA Directors, Principals Cafeteria Managers Cafeteria Managers Cafeteria Managers Cafeteria Managers</p>

Exhibit 2.1

Implementation Research Questions

Topic/Question	Respondent/ Data Source
<p>Changes in Breakfast Operations</p> <ul style="list-style-type: none"> • What, if any, changes were made in how the SBPP was implemented over the past two years? • Were there any changes in the price of paid or reduced-priced breakfasts in control schools over the past two years? • Over the past two years, have there been any changes in: <ul style="list-style-type: none"> -- time of breakfast service? -- length of time breakfast served? -- breakfast service staffing? -- breakfast supervision? -- location breakfast served? -- location breakfast eaten? -- related expenditures? 	<p>SFA Directors</p> <p>SFA Directors</p> <p>Principals</p>
<p>Program Impacts</p> <ul style="list-style-type: none"> • At the district level, were there any parent/community issues regarding implementation of the SBPP? • What impact did the SBPP have on paperwork or administrative requirements? • What impact did the SBPP have on the District’s educational program? • Did school staff bring any issues regarding the SBPP to the attention of district administrators? • Were any further changes in foodservice staffing required over the past two years due to the SBPP? • How did the availability of universal-free school breakfast affect the rate of participation in school breakfast in the second and third years of the pilot and how does this compare to participation in the first year? • How do the breakfast setting, the share of students eligible for free and reduced-price meals, and the district affect the rate of participation in the school breakfast program? • To the extent rates of participation in school breakfast vary among treatment and control schools, what are the principal reasons? • Is offering universal-free school breakfast in elementary schools perceived to have contributed to increased breakfast participation in middle schools or secondary schools or to increased school lunch participation in elementary schools? • How did the rate of participation for the district in the school lunch program change over the past two years? • Have there been any problems with the accuracy or integrity of record keeping with universal-free school breakfast? • How difficult was it to implement universal-free school breakfast? What were the greatest challenges? 	<p>District Administrators</p> <p>District Administrators, Principals, SFA Directors, Cafeteria Managers</p> <p>District Administrators</p> <p>District Administrators</p> <p>SFA Directors, Principals, Cafeteria Managers</p> <p>SFA Directors</p> <p>District Records</p> <p>District Records</p> <p>SFA Directors</p> <p>SFA Directors</p> <p>SFA Directors, District Records</p> <p>SFA Directors, Principals</p> <p>SFA Directors</p>

Exhibit 2.1

Implementation Research Questions

Topic/Question	Respondent/ Data Source
<ul style="list-style-type: none"> • What effect did universal-free school breakfast have on costs and revenues over the past two years? • Have any changes in the amount of individual plate waste at breakfast been perceived over the past three years? 	SFA Directors, Principals Cafeteria Managers
<p>School Discipline</p> <ul style="list-style-type: none"> • Are elementary school principals provided guidelines prescribing disciplinary actions to be taken? • How does the rate of disciplinary actions in this school compare with that of other elementary schools? • To the extent the rate of disciplinary actions vary among schools, what is responsible for this variation? • How many students are sent to the school office for disciplinary reasons in a typical week? • Do disciplinary incidents typically occur more in one part of the day than another? • What are the principal reasons for disciplinary visits to the school office? • In which school settings are disciplinary incidents most likely to occur? • Has there been any change in the incidence of disciplinary actions over the past three years? • Does the school have a written policy on discipline? 	District Administrators Principals Principals Principals Principals Principals Principals Principals
<p>Stakeholder Attitudes</p> <ul style="list-style-type: none"> • What is the attitude of cafeteria staff toward the School Breakfast Program? • How has the availability of universal-free school breakfast affected the attitude of key stakeholders toward the School Breakfast Program? • Has the attitude of school staff and/or students toward school breakfast changed over the period that universal-free school breakfast was offered? 	Cafeteria Managers SFA Director Principals, Cafeteria Managers
<p>Future Plans</p> <ul style="list-style-type: none"> • With the SBPP coming to an end, what, if any, concerns are there relative to returning to the traditional School Breakfast Program? • Does the district plan any changes in its School Breakfast Program following conclusion of the SBPP? 	Principals, Cafeteria Managers District Administrators, SFA Directors

- **Interviews with cafeteria managers**, in person or by telephone, regarding breakfast service, operational issues, nature of the meals offered, and perceived impacts.
- **School records** used to calculate school lunch and breakfast participation rates, including enrollment, number of breakfasts and lunches served for the school year, and number of breakfast and lunch serving days for school years (SY's) 2001-2002 and 2002-2003, the second and third years of implementation.

Data Collection

Sample

Interviews were conducted with the entire universe of school district administrators (six), SFA directors (six), school principals (153), and cafeteria managers (154) from elementary schools taking part in the study.¹ On-site visits were made to 24 schools (four per school district, three treatment schools and one control school). Three of the four schools in each district had also been visited during data collection in the first year of implementation. The schools visited were selected primarily on the basis of their representativeness of other schools in the district. A few treatment schools using innovative techniques, such as serving breakfast in the classroom, were among the schools receiving on-site visits.

Schedule

The on-site interviews were conducted over a period of two days in each district in April 2003. Following completion of the on-site data collection, telephone interviews were conducted with the principals and cafeteria managers of the remaining schools during May and early June 2003. Staff who had participated in data collection during the first year of SBPP implementation and who had conducted on-site interviews supervised the telephone interviews.

Analytic Approach

Key stakeholders within each participating school district and school were interviewed to determine selected parameters of the setting within which the pilot was implemented; how it was implemented; if any changes were made in the school meals program during implementation and, if so, why; and stakeholder perceptions of program impact. Where appropriate, results of these interviews are compared with the results of interviews conducted during the first year of the pilot (SY 2000-2001). Implementation and performance measures for control and treatment schools are compared. Within the treatment school category, these measures are also compared on the basis of whether breakfast was eaten in the classroom or elsewhere, usually the cafeteria. Aggregate measures for all participating schools (control and treatment) in each district are also compared across districts. Statistically significant differences are noted throughout these comparisons. While the comparisons between treatment and control schools were made within the experimental design framework, treatment schools were not randomly assigned to breakfast location, classroom or non-classroom, and thus these comparisons are non-experimental. Schools with classroom breakfast may be

¹ There were 153 schools in the original sample. In one district, some grades were reassigned to a newly constructed school, which was added to the study, bringing the total in Year 3 to 154.

fundamentally different from those with non-classroom breakfast and the results from these analyses reflect a combination of the effects of universal-free school breakfast and these pre-existing differences.

Implementation Study findings are presented in the next chapter. Detailed tables appear in Appendix A. The instruments used in the Implementation Study data collection are found in Appendix I.

Chapter Three

Implementation of the School Breakfast Pilot Project

Implementation of the SBPP during its initial year of operation was evaluated in an earlier report (McLaughlin et al., 2002). This chapter focuses on implementation during the second and third years of the pilot, SY 2001-2002 and SY 2002-2003. It builds on findings of the first year of this evaluation, assessing changes in how universal-free school breakfast was implemented and the implications of the treatment for the participating elementary schools. Results of the Impact Study are presented in Part II of this report. Before examining the second and third years of the pilot, we briefly review the major findings of the first year.

Summary of the First Year Findings

Information on implementation was collected in Spring 2001 through interviews with school district and school staff from the 79 treatment and 74 control schools. Key findings from the first year, organized by objective, are as follows:

Document the various ways in which schools chose to implement universal-free school breakfast.

- Overall, the implementation of the SBPP went smoothly. Despite a short start-up schedule, most schools were able to implement universal-free school breakfast in a matter of weeks without major problems.
- Determining where breakfast should be eaten, notably in the classroom or some other location, turned out to be a key decision, as participation was much higher in schools where breakfast was eaten in the classroom. In these schools, average breakfast participation was 66 percent, compared with 28 percent in schools where breakfast was eaten in other locations.
- The adoption of universal-free school breakfast was viewed favorably by most key stakeholders, including administrators, school staff, parents, and students.
- On the basis of interviews with principals and teachers and focus groups of students, there was little evidence found of a stigma that associated school breakfast participation with low-income status in the elementary schools in this study.
- While the possible loss of teacher preparation time or instruction time was a concern for schools considering serving breakfast in the classroom, interviews with principals and teachers in schools with classroom breakfast revealed that it had relatively little effect on teacher preparation or instruction time.

Assess the effect that universal-free school breakfast has on paperwork, costs and other administrative requirements.

- The effect of universal-free school breakfast on paperwork was unclear after the first year since most of the paperwork in that first year was required by the evaluation rather than by

implementation of universal-free school breakfast. This topic was therefore revisited in Year 3 (see below).

- There was no evidence from the review of school breakfast menus that the implementation of universal-free school breakfast had an effect on schools' compliance with the SBP nutrition standards or the degree to which breakfasts met other dietary recommendations.
- Schools offering universal-free school breakfast required increased staffing due to higher rates of school breakfast participation and the increased workload for cafeteria staff and those supervising students during breakfast.
- Despite increased staffing, higher rates of school breakfast participation resulted in lower per-meal labor costs in treatment schools as the increased scale resulted in more efficient utilization of labor. The combined food and labor costs per breakfast were about 11 percent lower in treatment than control schools (\$0.80 and \$0.90, respectively), and even lower in treatment schools where breakfast was eaten in the classroom compared to control schools (\$0.74 compared with \$0.90, or 18 percent lower).

Reporting the Second and Third Year Findings

Findings in this chapter are reported separately for control and treatment schools and within the treatment school category, by whether breakfast was eaten in the classroom or elsewhere (usually, but not always, the cafeteria). Findings are also reported by school district. The empirical basis for the analysis can be found in the tables appearing in Appendix A. References to these tables appear in parentheses throughout the text. Where appropriate, findings from the first year evaluation are compared with those from the interviews conducted in SY 2002-2003, the third and final year of the pilot.

This chapter is divided into six sections. In it, we:

- Describe the schools and districts that participated in the SBPP;
- Review key features of implementation during the second and third years of the pilot;
- Assess the impact of universal-free school breakfast on school operations in the second and third years;
- Describe school discipline as applied in the SBPP elementary schools;
- Evaluate stakeholder attitudes toward universal-free school breakfast; and
- Describe the plans and concerns of the participating schools as they look to the future.

Each section is subdivided into topics of relevance to this evaluation. Most topics are introduced by a brief description of the context. For those topics that were treated in the survey conducted in SY 2000-2001, earlier findings are briefly reviewed as a basis of comparison for the information collected in SY 2002-2003. Where appropriate, results for control and treatment schools are compared and their differences, if any, are evaluated for statistical significance. Since one of the principal objectives of this chapter is to document how universal-free school breakfast was implemented, much of the focus is on the treatment schools, including differences between treatment schools where breakfast was eaten in the classroom and those where it was eaten in the cafeteria. As

noted in Chapter Two, the analyses comparing treatment classroom and cafeteria breakfast settings are non-experimental in nature and are thus not as definitive as analyses between treatment and control schools conducted within the experimental design framework.

Summary of the Findings from the Second and Third Years

The key findings of this chapter are as follows:

- All 153 elementary schools in the original study remained in the study throughout the three years it was conducted with few changes or disruptions.
- Treatment schools experienced significantly higher rates of school breakfast participation than control schools in the first year of the pilot and maintained these higher rates in the second and third years.
- Treatment schools where breakfast was eaten in the classroom experienced the highest rate of participation throughout the study, though the number of schools where breakfast was eaten in this location fell from 18 (23 percent of the treatment group schools) in the first year to 14 (18 percent) in the third year.
- There was comparatively little evidence that implementation of universal-free school breakfast had any measurable impact on administrative paperwork, not surprisingly, or that it materially affected individual plate waste at breakfast.
- Promotion of the SBP was somewhat more prominent in the second and third years of the pilot than in the first year.
- Use of *offer versus serve* declined substantially over the period of study in both control and treatment schools, falling from 75 percent of all schools in the first year to 51 percent in the third year. Nearly all of this decline was attributable to changes in one school district.
- The share of control schools offering à la carte items at breakfast fell from 50 percent in the first year of the pilot to 27 percent in the third year, while the share of treatment schools offering à la carte was nearly unchanged (33 percent versus 30 percent). A declining share of schools offering à la carte was evident in five of the six school districts.
- Staffing requirements in treatment schools, after rising in the initial year of the pilot in response to increased participation, stabilized during the second and third years.
- While principals reported that the incidence of disciplinary problems was higher for treatment schools than for control schools, and was significantly higher in treatment schools serving breakfast in the classroom, their perceptions of the timing, location, circumstances, and trends over time in these incidents appeared to be unrelated to the availability of universal-free school breakfast.
- Universal-free school breakfast was implemented with relative ease. It was given high marks by most of those affected, particularly students, administrators, and cafeteria personnel. Some teachers and custodians, particularly those in schools serving breakfast in the classroom, were less supportive.
- With the pilot nearing its end and treatment schools about to return to the traditional SBP, many principals and cafeteria managers voiced concerns that participation in the school

breakfast program would fall to pre-pilot levels and that some students would now go without breakfast.

Description of District and School Characteristics

As noted in Chapter One, the six school districts that participated in this pilot were selected by FNS from 386 applications. The number of districts participating in the pilot was specified in the authorizing legislation. Districts were selected to be broadly representative of the universe of all districts participating in the SBP, with special attention to their economic and demographic make-up, urbanicity, and regional location. **The study was limited to elementary schools participating in the SBP.** Schools operating under “Provision 2” or “Provision 3” of FNS regulations were excluded from the project.¹ Selected characteristics of the elementary schools participating in the project for each district are shown in Exhibit 3.1.

Size and Structure

Relative to the size of other school districts, the six districts taking part in the SBPP are of moderate size.² The total district enrollment of their elementary schools ranged from around 4,000 to more than 23,000 in SY 2002-2003. Four of the districts are primarily urban in character (Boise, Santa Rosa, Phoenix, and Wichita) while the other two include a combination of urban, suburban, and rural (Harrison County and Shelby County). The Harrison County and Shelby County school districts serve substantially larger geographic areas than the other school districts and their schools are therefore more widely scattered.

The six districts experienced varying trends in the size of enrollment of their elementary schools during the period of study. In two districts (Shelby County and Phoenix), enrollment grew by 6 percent and 9 percent, respectively. The other four districts (Boise, Harrison County, Santa Rosa, and Wichita) saw declining enrollments of 4 percent to 12 percent.

Free and Reduced-Price Meal Eligibility

The district-wide share of students eligible for free and reduced-price meals ranged from a low of 26 percent to a high of 61 percent in SY 2002-2003. The share of students qualifying for free and reduced-price meals changed more in some districts than in others. In four districts, the share moved higher while in the other two it fell.

At the school level, the share of students qualifying for free and reduced-price meals varied substantially in all six school districts, ranging from as low as 5 percent to as high as 92 percent. The magnitude of variation is suggestive of the widely varying level of household income found among schools within each of these districts.

¹ As indicated in Chapter One, schools operating under Provision 2 or Provision 3 serve school breakfast and/or lunch at no charge to all students in return for less burdensome recordkeeping requirements.

² Due to budgetary and design constraints of the pilot authorization, none of the school districts taking part in the pilot were large urban, high poverty districts. As indicated in Exhibit 3.1, however, there were schools within the six districts that were high poverty, indicated by a high percentage of students eligible for free and reduced-price meals.

Exhibit 3.1**Selected Characteristics of Elementary Schools Participating in the School Breakfast Pilot Project, by District**

Characteristic	Boise	Shelby County ¹	Harrison County	Phoenix	Santa Rosa	Wichita
Number of Schools in the Evaluation						
Treatment	17	8	5	12	5	32
Control	<u>17</u>	<u>9</u>	<u>5</u>	<u>12</u>	<u>5</u>	<u>27</u>
Total	34	17	10	24	10	59
Total Enrollment						
SY 1999-2000	14,362	9,739	7,899	15,586	4,364	24,508
SY 2002-2003	13,556	10,341	6,981	16,963	3,938	23,627
Percent Change	-6%	6%	-12%	9%	-10%	-4%
Percent of Elementary School Students Approved for Free and Reduced-Price Meals ²						
SY 1999-2000	32%	24%	62%	48%	70%	59%
SY 2002-2003	37%	26%	60%	49%	60%	61%
Range in Free and Reduced-Price Eligibility Among Elementary Schools in the District, SY 2002-2003	5-80%	6-65%	33-80%	13-86%	16-86%	22-92%
SBP Participation Rate ²						
SY 1999-2000	9%	21%	33%	21%	25%	24%
SY 2002-2003	16%	32%	49%	29%	35%	31%
District Area (square miles)	46	795	581	44	34	136

¹ Two schools were new and did not have data in school district files for SY 1999-2000. At the start of SY 2001-2002 a control school split into two separate schools.

² Percent is weighted for enrollment in each school.

Sources: *Impact Study—School District Files, SY 1999-2000*; and U.S. Census Bureau: *County and City Data Book, 1990*; and *State and County Quick Facts, 2000* (district area data).

Changes in the Sample

The only change in the composition of schools taking part in the pilot occurred after Year 1 in the Shelby County school district where a new school absorbed some of the grades that had been part of one of the control schools. The new school was added to the list of control schools, increasing the total number of control schools from 74 to 75.

Implementing Universal-Free School Breakfast

The focus of this section is the implementation process in the second and third years of the pilot. The section begins with a brief review of some changes that occurred over the period of study, first at the district level and then at the school level. Following this review, particular features of implementation are examined, including program promotion, the breakfast setting, cafeteria operations, and the composition of breakfast menus.

District-Level Changes

Some degree of change in the larger setting within which the SBPP was conducted over a three-year period was to be expected. Within broad limits, districts participating in the pilot were free to make

changes in their breakfast programs as long as they preserved the integrity of the paired sample of schools offering universal-free school breakfast matched to schools offering the traditional SBP. Changes in the instructional programs, staffing, and physical facilities are ongoing in most districts.

The foodservice programs in these districts experienced relatively few operational changes over the period of study, as reported by the SFA directors. The most notable changes in how the pilot was implemented were changes in the location where breakfast was eaten in a few schools. These changes are described in greater detail below.

Two other changes warrant mention. Of the six SFA directors who had managed the foodservice operations of these districts and overseen implementation of the pilot since it began, two left their posts during this period. Both departures occurred in SY 2002-2003, the final year of the pilot. In one district, a planned transition occurred before the beginning of the school year. The other departure was unanticipated and occurred late in the school year, shortly before the end of the pilot. Another unanticipated change occurred in SY 2001-2002 when two control schools in one district were converted to “Provision 2” status. Under terms of Provision 2, these schools stopped charging students for school meals, thereby lessening the schools’ relevance as control schools for the SBPP.³

District-level changes in curricula and methods of instruction were prevalent during this period. The Elementary and Secondary Education Act of 2001, referred to as the “No Child Left Behind Act,” became law in the second year of the pilot. With its emphasis on measuring student achievement, the new law requires annual reading and math tests for all students in grades 3 through 8, though the requirement does not become mandatory until SY 2005-2006.

Five of the six school district administrators interviewed said that their districts had made important changes in the curricula and methods of instruction in their elementary schools since the new law was enacted. The changes included new programs in language arts, science, and math, and the introduction of new achievement tests. For the most part, these changes were implemented on a district-wide basis. In one district, a new instructional program was being implemented incrementally, beginning with six Title I schools (four control/two treatment) in SY 2002-2003.

School-Level Changes

Principals and cafeteria managers were interviewed in each of the participating schools. Both positions experienced a relatively high rate of turnover. The median tenure of cafeteria managers in all SBPP schools in SY 2002-2003 was four years (Exhibit A-28); the median tenure of principals was three years (Exhibit A-6). Nearly half of all principals (46 percent) and one-third of all cafeteria managers (33 percent) had been in their present positions less than three years. No significant differences were found between control and treatment schools in this regard. Respondents new to their positions during the past two or three years were sometimes unable to answer questions regarding changes that had occurred, resulting in a higher incidence of “don’t know” responses.

Cafeteria managers and principals were both asked if there had been any unusual events or major program changes during the last two years of the pilot. Very few cafeteria managers (7 percent in SY

³ A comparison of results with and without these schools indicated that their exclusion from the analysis had no material effect on the findings. To maintain the integrity of random assignment, these schools were kept in the study and are represented among the control schools in the tables appearing in Appendix A.

2002-2003) reported unusual events (Exhibit A-29). Most of these events were associated with school building repair or renovation.

The share of principals reporting unusual events or program changes increased somewhat during the last two years of the pilot (Exhibit A-7). Among the events or changes most frequently identified were those associated with construction, staffing changes, budget reductions, re-districting, and adoption of new academic/enrichment programs. There was no evidence that these changes had impeded implementation of the pilot or affected its outcome.

Program Promotion

Findings from the evaluation conducted during the first year of implementation indicated that there were several disincentives to aggressive promotion of the universal-free program. Among other reasons given were concerns that parents of children in control schools would feel slighted by their child not having access to free breakfasts, that promoting universal-free school breakfast would be viewed as contributing to childhood obesity, and that some parents might view offering free breakfast as infringing on parental responsibility. As a result, some administrators did little or nothing to promote the pilot beyond informing parents and students of its availability.

To determine if there had been any changes in promotional activity, SFA directors were asked if they had conducted follow-up promotion of universal-free school breakfast during the last two years of the pilot. Three of the six directors reported that they had (Exhibit A-48). When asked for their opinion of the level of effort that had been devoted to promoting universal-free school breakfast, four of the six directors said that there should have been additional promotion while two thought that the level of effort was about right.

The share of school principals reporting that a special effort had been made to promote the School Breakfast Program (SBP) during the second and third years of the pilot was up substantially from the level reported during the first year for both treatment and control schools (Exhibit A-26). During the first year, SY 2000-2001, 44.3 percent of treatment school principals and 12.3 percent of control school principals said that they had made a special effort to promote the SBP. The comparable shares during the last two years were 75.9 percent of treatment school principals and 47.3 percent of control school principals, a significant difference at the .01 level. A comparison among districts indicates that the increased promotional effort occurred in all six districts.

Breakfast Setting

School breakfast is typically served and eaten in the same location as lunch. While this is usually the school cafeteria, some schools use other parts of the school building for this purpose. Multi-purpose rooms, gymnasiums, kitchens, and even hallways are used in some schools to serve school meals. In the first year of the SBPP, 36 percent of all schools, control and treatment, reported serving breakfast somewhere other than the cafeteria.

Also, some schools serve their meals in one location while they are eaten in another location. For example, in some schools breakfast might be served in the kitchen and eaten in the cafeteria. While information was collected on both where breakfasts were served and where they were eaten, it is principally the latter that is of greatest interest to this evaluation.

One approach that appealed to some treatment schools was to permit students to eat breakfast in the classroom. This approach had been used in earlier demonstrations of universal-free school breakfast and had been found to result in substantially higher rates of participation in the breakfast program (Murphy and Pagano, 2001). During the initial year of the SBPP, 18 of the 79 treatment schools offered their students an opportunity to eat school breakfast in the classroom. Treatment schools that elected to offer breakfast in the classroom had a higher share of enrollment approved for free and reduced-price meals in SY 2000-2001 than did those that served breakfast in the cafeteria (53 percent versus 40 percent), though the difference was not statistically significant. In SY 2002-2003, the share of students approved for free and reduced-price meals in treatment schools serving breakfast in the classroom and those serving in the cafeteria had risen to 60 percent and 47 percent, respectively. Again, the difference between treatment and control schools was not statistically significant. Two control sites also provided breakfast in the classroom due to unique circumstances in these schools.

Most schools participating in the pilot provided breakfast in the same setting throughout the period of study. Of the 154 cafeteria managers responding to the survey administered in the final year, 142 said that they had provided breakfast in the same location for the entire period (Exhibit A-31).

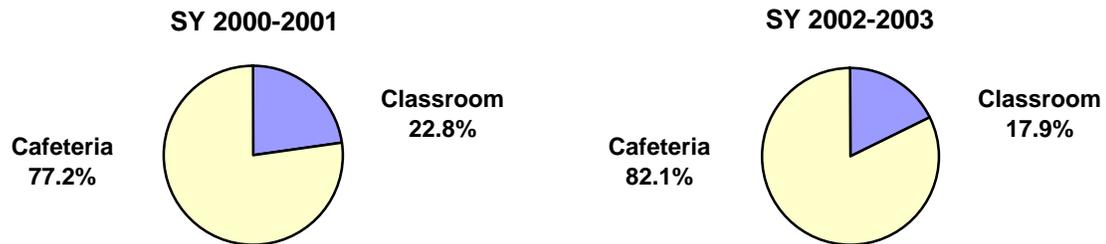
To the extent there were changes in location, there was increased use of cafeterias for both serving and eating school breakfast and a corresponding decrease in the use of other locations. In control schools, the share of schools serving breakfast in the cafeteria rose from 66 percent in the initial year of the pilot to 84 percent in SY 2002-2003 (Exhibit A-30).

Use of cafeterias by treatment schools for breakfast also increased over the period; some schools that had been offering breakfast in the classroom either returned to the cafeteria or adopted a combined classroom/cafeteria approach. Of the 18 schools where breakfast was eaten in the classroom in the first year of the pilot, five went to serving breakfast in the cafeteria, two at the beginning of the second year and three at the beginning of the third year (Exhibit A-32). One school adopted classroom feeding the first year, returned to the cafeteria the second year, and back to classroom feeding the third year. Another school gradually added classrooms to its breakfast serving, thereby shifting from cafeteria to a combination classroom/cafeteria status by the end of the pilot. The net effect of these changes was that the number of schools where breakfast was eaten in the classroom fell from 18 to 14 (from 23 percent to 18 percent of treatment schools) over the three years of the study (Exhibit 3.2).

Various reasons were given for the shift from classroom to cafeteria. In three of the schools, teachers objected to the “mess” that resulted from serving breakfast in the classroom. The decision to make a change in the other two schools was made by the same principal while serving in each school in consecutive years. In one school where this principal had served, an infestation of insects was cited as the reason for going back to the cafeteria; in the other school, the addition of a new multi-purpose room prompted the change.

School principals were asked if they considered the availability of space as a constraint in determining where breakfast was to be served in the school. A somewhat higher share of treatment than control schools responded affirmatively (15 percent versus 4 percent), though the difference was not statistically significant (Exhibit A-25). Among treatment schools, those that offered breakfast in the classroom were substantially more likely to consider the availability of space a constraint (29 percent versus 12 percent). However, the direction of causality is not clear. While the absence of

Exhibit 3.2**Treatment Schools by Location Breakfast Eaten, SY 2000-2001 and SY 2002-2003**



N = 79 for each school year.

Source: *Implementation Study—Cafeteria Manager Interview, Spring 2001 and Spring 2003*

suitable space could have been instrumental in the decision of these schools to serve breakfast in the classroom, it is also conceivable that the surge in school breakfast participation that resulted from classroom feeding made these principals aware of the need for additional space.

Principals of control schools who responded that the availability of space was not a constraint in deciding where breakfast would be served were asked if they would respond differently should the rate of participation in school breakfast double or triple. Of those responding, 20 percent said that space would be constraining under those circumstances.

Cafeteria Operations

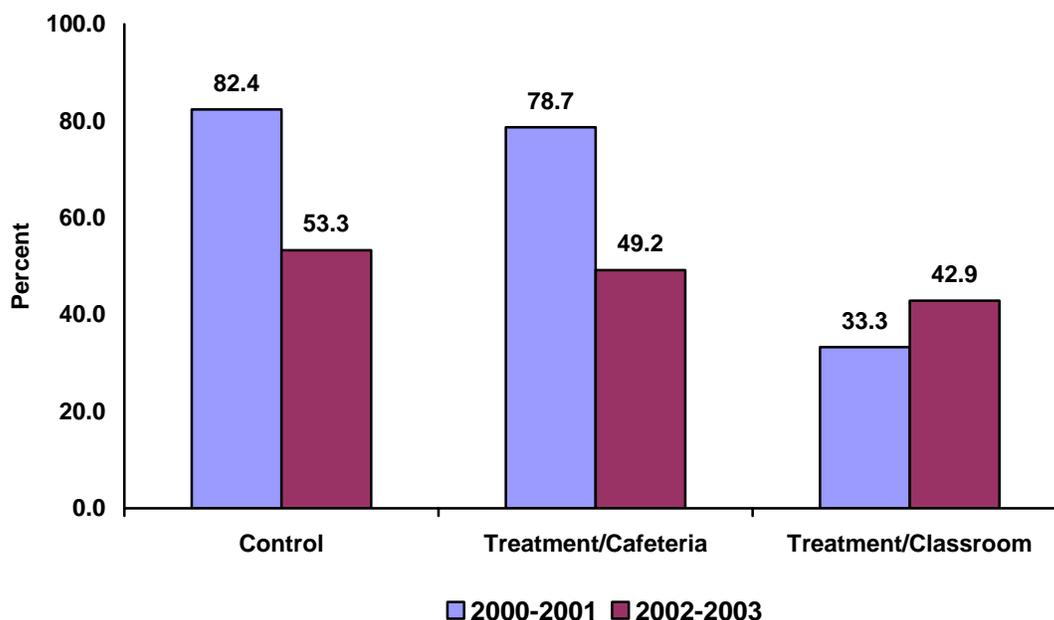
To participate in the School Breakfast Program, schools must meet specified operational requirements. Within these regulatory parameters, however, schools have substantial latitude in how they implement their programs. In this section, we compare the cafeteria operations of control and treatment schools on some of these discretionary features.

Offer Versus Serve

To qualify as a reimbursable meal, students must accept a specified number of menu items, with the number dependent on the menu planning system that is being used. To avoid requiring students to take food they do not want and probably will not eat, schools may allow students to refuse a limited number of foods offered and have the meal still qualify as reimbursable. The approach is called “offer versus serve” and is implemented in elementary schools at the discretion of the SFA.

In SY 2002-2003, about half (51 percent) of all (control and treatment) schools in the pilot were following the offer versus serve approach at breakfast (Exhibit A-37). This is down from 75 percent of all pilot schools two years earlier. Exhibit 3.3 shows the share of treatment and control schools using offer versus serve in the first and third year of the SBPP. In the first year that universal-free school breakfast was offered, the use of offer versus serve was lower among treatment schools serving breakfast in the classroom than among treatment schools serving breakfast in the cafeteria,

Exhibit 3.3**Share of Schools Using Offer Versus Serve, SY 2000-2001 and SY 2002-2003**



N = 153 for SY 2000-2001, 154 for SY 2002-2003

Source: *Implementation Study—Cafeteria Manager Interview, Spring 2001 and Spring 2003.*

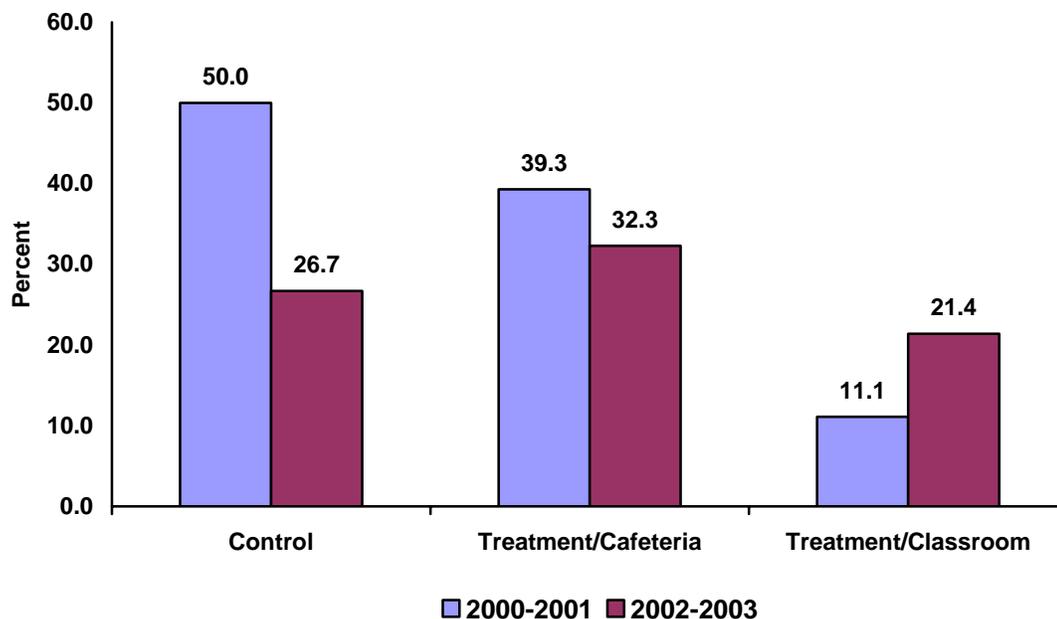
though the difference was not statistically significant. However, as use of offer versus serve has declined among all schools, particularly control schools, differences among school types have become much smaller. Most of the decline in use of offer versus serve over this period was due to its discontinued use in one of the larger school districts. The district had discontinued use of offer versus serve at lunch several years earlier. It was discontinued at breakfast due to the district's inability to meet the nutritional standards of Nutrient Standard Menu Planning when students were declining items.

Availability of À La Carte Items

Some schools also offer their students an opportunity to buy individual food items à la carte, either in addition to or instead of a reimbursable breakfast. Exhibit 3.4 presents the share of treatment and control schools offering à la carte in the first and third years of the evaluation. In SY 2000-2001, the first year of the pilot, 41 percent of all schools offered breakfast items à la carte. The share of treatment schools offering à la carte in the first year was significantly lower than the share of control schools (33 percent versus 50 percent), due primarily to the absence of à la carte offerings by treatment schools with classroom breakfast.

Results of the SY 2002-2003 survey indicate that the share of control schools offering à la carte had been cut nearly in half, falling from 50 percent to 27 percent, (Exhibit A-37). As a result, there was no longer a statistically significant difference between control and treatment schools in whether they offered à la carte. While the share of schools within each district offering à la carte at breakfast

Exhibit 3.4**Share of Schools Offering À La Carte, SY 2000-2001 and SY 2002-2003**



N = 153 for SY 2000-2001, 154 for SY 2002-2003

Source: *Implementation Study—Cafeteria Manager Interview, Spring 2001 and Spring 2003.*

varied greatly among the six districts, from a low of 3 percent to a high of 65 percent, in five of the six school districts the share fell over this period.

Of the schools offering à la carte in SY 2002-2003, most limited availability to the breakfast period though about one-third made their offerings available after breakfast as well. A majority of the schools offering à la carte offered milk (84 percent), juice (75 percent), and/or an entrée (64 percent). There were no significant differences between control and treatment schools, either in when à la carte was available or which foods were offered.

Other On-Campus Sources

In some schools, foods are offered for sale through other on-campus sources, such as school stores and vending machines. The share of schools where foods are available from these sources during breakfast service was small in the first year of the pilot and had become smaller still by the third year. There were no significant differences between control and treatment schools in either year. In SY 2002-2003, foods could be purchased from other sources in 10 percent of all schools in the pilot, compared to 14 percent in the first year (Exhibit A-38). Most of these schools were in one district, as in the first year of the pilot. In four of the six districts, there were no schools where food was available from other on-campus sources. Of the relatively few schools where food was available from other sources, the types of food most frequently available were juice (87 percent), candy/chips/cookies (53 percent), and soda (27 percent). None of the schools offered milk through these sources.

Accessibility of Breakfast

The median length of time allotted for breakfast service in SY 2002-2003 was 30 minutes in both control and treatment schools, the same as in SY 2000-2001 (Exhibit A-33). A comparison of responses to the two surveys indicates that two-thirds of the schools reported a different length of time allotted for breakfast service in the two survey years. While the share indicating a longer period of service (38 percent) exceeded the share indicating a shorter period (29 percent), the median remained unchanged (Exhibit A-34). Most schools do not treat breakfast as part of the school day. The most significant exception is among treatment schools serving breakfast in the classroom. Of these schools, 29 percent treated breakfast as part of the school day in SY 2002-2003, about the same share as in the first year of the pilot (Exhibit A-33). Again, there were no significant differences between control and treatment schools.

In schools where breakfast is not treated as part of the school day, cafeteria managers were asked for their opinion on how much initiative was required by students to eat a school breakfast. In the first year of the pilot, 26 percent of all cafeteria managers (59 percent in one district) reported that “moderate” to “significant” initiative was required in their schools. Most other cafeteria managers (69 percent) said that “little” or “no” initiative was required. No significant differences between control and treatment schools were observed in the earlier evaluation. In SY 2002-2003, the share of all cafeteria managers responding that “moderate” to “significant” initiative was required was only about half as large (14 percent) as in the first year (Exhibit A-33).

Breakfast Composition

Cafeteria managers were asked if there had been any changes in the composition of the breakfasts they served during the second and third years of the pilot and if there had been changes, to describe them and their impact.

Across all schools, only 14 percent of all respondents indicated that there had been a change in the composition of breakfast over this period, with no significant difference between control and treatment schools (Exhibit A-39). This could underestimate the extent of change for a couple of reasons. First, given the relatively high rate of turnover among cafeteria managers, some respondents might not have known if there had been a change in the composition of breakfast over the period. Second, slight product changes occur almost continuously in school foodservice. Given that such changes are commonplace, they might have been under-reported.

Of the relatively small share of cafeteria managers who indicated that there had been a change in the composition of breakfast in their schools, 32 percent said that it had been occasioned by the increased use of prepared foods resulting in a decline in preparation time. For many of these schools, the changes were occasioned by the increased use of pre-packaged foods. In other schools, the changes were prompted by a decision to improve the quality or variety of the foods offered. Half of those reporting a change in composition said that the change had the effect of increasing the variety of foods offered.

Impact of Implementing Universal-Free School Breakfast on School Operations

Having considered how universal-free school breakfast was implemented in the second and third years, we now turn to an assessment of how it affected school operations. We begin by examining

the impact on program participation. This is followed by an assessment of the implications of eating breakfast in the classroom and by the impact of universal-free school breakfast on program administration, staffing, cost and revenue, plate waste, and on the attitude of key stakeholders.

Analyses conducted after the first year of implementation found a substantial increase in breakfast participation in treatment schools. The question to be answered here is, did this impact continue throughout the three years of the pilot or was there a decline in participation rates once the novelty wore off? In the first year of the pilot, 18 schools permitted their students to eat their universal-free school breakfast in the classroom, resulting in sharply higher rates of participation in these schools. In this analysis, we will determine if any other schools were attracted to this approach in the second and third years of the pilot. In the first year of implementation, there was also some indication that the pilot (including implementation as well as evaluation activities) had increased the administrative workload and paperwork rather than reduce it, as had been hoped, and that it also added to foodservice labor requirements. Now that the requirements of project evaluation had largely been satisfied and cafeteria staffs had an opportunity to adapt to the increased number of students eating school breakfast, had these demands changed? And, to the extent school administrators observed a change in paperwork during the pilot, was it associated with implementation of universal-free school breakfast or with the evaluation that accompanied it? These and other impacts are examined in this section.

Program Participation

Nationally, participation in the SBP has always lagged far behind participation in the National School Lunch Program (NSLP). Some school districts do not participate in the SBP. However, the main reason for lower participation is that far fewer students who have access to the SBP choose to participate. While an estimated 4.7 billion NSLP lunches were served in FY 2003 in all schools (public and private) and in all grades (K through 12), only about 1.4 billion breakfasts were served. An average of 8.4 million students participated each day in the SBP in FY 2003 for a national SBP participation rate of 22 percent. Participation in the NSLP, in comparison, was 63 percent in FY 2003 (USDA, 2003).

Schools offering universal-free school breakfast experienced a sizable increase in participation during the initial year of the pilot (Exhibits 3.5 and 3.6). In treatment schools where breakfast was eaten in the cafeteria, the rate of participation (adjusted for enrollment) rose from 17 percent in the base year, SY 1999-2000, to 28 percent in SY 2000-2001. In treatment schools where breakfast was eaten in the classroom, the rate of participation rose even more sharply, climbing from 27 percent to 66 percent. Over the same period, the rate of participation in control schools was nearly constant, going from 20 percent in SY 1999-2000 to 21 percent in SY 2000-2001. Differences between control and treatment schools and between treatment classroom and treatment non-classroom were statistically significant.

Rates of participation in the SBP in the second and third years of the pilot were not much different from rates in the start-up year. Rates for both control and treatment schools rose slightly in the second year, while in the third year control schools remained at an average participation rate of 22 percent and the average rate for treatment schools declined by one percentage point to 38 percent. As noted earlier, the number of treatment schools serving breakfast in the classroom fell from 18 to 14 between the first and third years of the pilot.

Exhibit 3.5

Comparisons of the Rate of Participation in the School Breakfast Program, by School Type and District, SY 1999-2000 – SY 2002-2003¹

School Type/District	SY 1999-2000		SY 2000-2001		SY 2001-2002		SY 2002-2003	
	N	Percent	N	Percent	N	Percent	N	Percent
School Type								
Treatment	79	19	79	38*	79	39*	79	38*
Non-classroom	61	17	61	28**	63	29**	65	29
Classroom	18	27	18	66	16	64	14	71
Control	74	20	74	21	75	22	75	22
District								
A	16	21	16	34	17	34	17	32
B	24	21	24	27	24	31	24	29
C	10	25	10	32	10	34	10	35
D	34	9	34	12	34	16	34	16
E	59	24	59	31	59	31	59	31
F	10	33	10	47	10	49	10	49
All schools	153	19	153	29	154	30	154	30

¹ Participation rates have been adjusted for student enrollment.

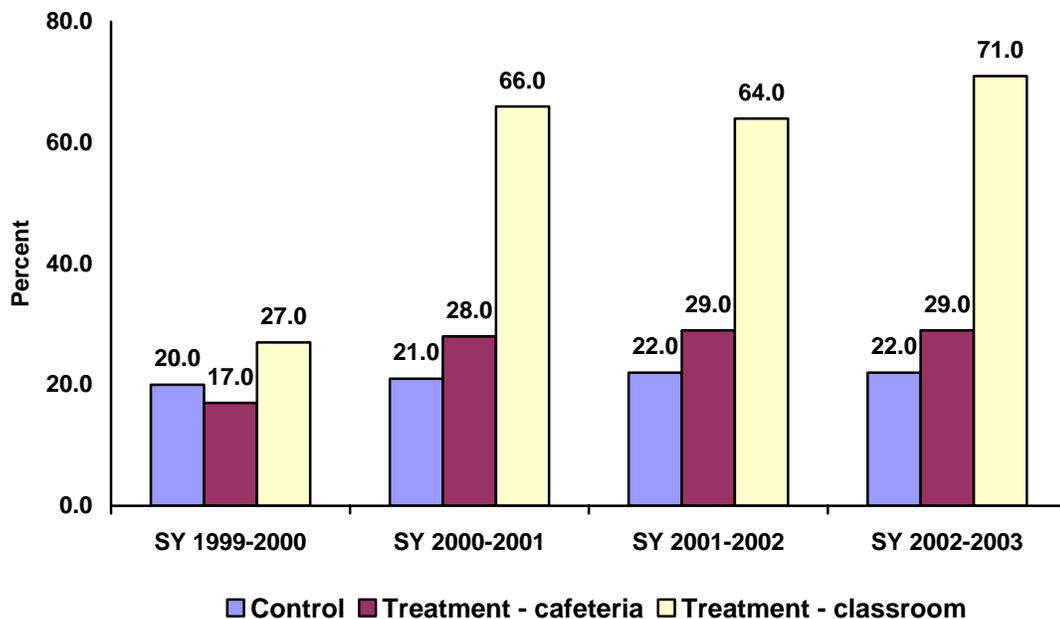
* Difference in proportions is statistically significant at the .05 level. Comparison is between control and treatment schools.

** Difference in proportions is statistically significant at the .01 level. Comparison is between classroom and non-classroom treatment schools.

Source: *Impact Study—School-Level Data, SY 1999-2000—SY 2002-2003*

Exhibit 3.6

Comparison of SBP Participation Rates, by School Type, SY 1999-2000 and SY 2002-2003



N for SY 1999-2000 and SY 2000-2001 = 153. N for SY 2001-2002 and SY 2002-2004 = 154.

Source: *Impact Study—School Level Data, SY 1999-2000—SY 2002-2003.*

The rate of participation in treatment schools remained significantly above the rate in control schools in both Year 2 and Year 3. In SY 2002-2003, all treatment schools experienced a rate of 38 percent compared to control schools' 22 percent. In SY 2000-2001, the first year of the pilot, the rate of participation was 38 percent in treatment schools and 21 percent in control schools. Participation among schools serving breakfast in the classroom continued to rise slowly over the period of study, increasing from 66 percent in the first year of the pilot to 71 percent the last year, though the differences between participation in these schools and in treatment schools not serving in the classroom was no longer statistically significant, due in large measure to the smaller sample size.

Eating Breakfast in the Classroom

Of the relatively few decisions that administrators had to make in implementing universal-free school breakfast, deciding where breakfast was to be eaten was potentially one of the most important. It was important for two reasons. First, as noted above, it affected the rate of participation in school breakfast. The rate in treatment schools where breakfast was eaten in the classroom was significantly higher than the rate in treatment schools where breakfast was eaten in the cafeteria. Although this outcome had been documented in other studies where universal-free school breakfast had been offered in the classroom (e.g., Murphy and Pagano, 2001), it was confirmed by the results from the first year of SBPP implementation.

Second, allowing students to eat breakfast in the classroom affected not just the cafeteria staff but the instructional and custodial staff as well. Teachers became involved in overseeing breakfast service in classrooms. Custodians were confronted with multiple points of refuse collection, rather than one, and the possibility of additional classroom clean up. As the number of stakeholders increased, so too did the opportunity for problems and conflicts. The attraction of higher participation rates was therefore set against the drawback of increasing the workload of teachers, custodians, and cafeteria workers. Perceptions of this tradeoff were markedly different among schools.

To the extent school administrators gave further attention to the issue in the second and third years of the pilot, they appear to have been conflicted by the attraction of achieving increased participation and the drawbacks of adding to the workload of the staff. The opposition of some teachers appears to have been particularly telling in the decisions of some principals.

To help determine the impact of eating breakfast in the classroom, beyond its impact on participation, SFA directors and cafeteria managers in schools where breakfast was eaten in the classroom were asked if they experienced any particular problems and, if so, what they were. Four of the six SFA directors said that these schools had encountered problems (Exhibit A-50). They included problems of insect infestations, spillage, refuse collection, meal accountability, teacher resistance, and the difficulty of procuring breakfast foods in forms more conducive to serving in the classroom. SFA directors were also asked for their perception of how teachers in these schools viewed serving breakfast in the classroom. Their responses suggest a range of views that make it difficult to generalize. Two SFA directors said that teacher attitude varied greatly, both among schools and among teachers within the same school. Another director characterized the reaction of teachers as "strong support" while still another described them as in "slight opposition". Two directors said they "didn't know".

Of the 14 schools serving breakfast in the classroom in the final pilot year, the cafeteria managers of nine of the schools said that they had experienced a variety of problems (Exhibit A-36). Among the

problems cited by these cafeteria managers were spillage, poor record keeping, teacher resistance, difficulties in delivering food to the classrooms, and increased plate waste.

Administrative Requirements

One objective of the evaluation that was expressly noted in the legislation authorizing the pilot project was to assess the impact of universal-free school breakfast on “the paperwork required to be completed by the schools” (Public Law 105-336, section 109). Lessening the administrative workload of the SBP in ways that do not undermine the attainment of other program goals is a continuing objective of FNS. Past FNS research has found that elimination of all or part of the application and meal counting and claiming processes can result in substantial labor savings (FNS, 1994).

It should be noted that the design of the pilot, as specified in the authorizing legislation, was not well suited for assessing the impact on paperwork. One of the most burdensome features of the existing programs is the need to collect and process applications for eligibility for free and reduced-price meals. Since school lunch was unaffected by the pilot, this information was still required and therefore collected throughout the period of study.

Of the treatment school principals interviewed during the first year of the SBPP in SY 2000-2001, 60 percent reported an increase in administrative reporting requirements while 28 percent said that meeting these requirements had required additional staff time. Since implementation of the universal-free school breakfast required little, if any, additional paperwork, it was suspected that the increased administrative workload was associated with the evaluation protocol rather than with implementation. Ten-person data collection teams had spent a full day in each school during Spring 2001 conducting interviews of students and parents and retrieving records. In addition, a liaison selected from the school staff assisted in scheduling evaluation interviews in the first and third years of the pilot and in collecting information from school records throughout the study. All of these activities were associated with the evaluation rather than with implementation of the program itself. There were no special administrative requirements associated with implementation of universal-free school breakfast.

This issue of administrative workload was revisited during the interviews conducted in SY 2002-2003. Five of the six SFA directors reported that offering universal-free school breakfast had no impact on paperwork or administrative requirements, either at the district level or in the schools (Exhibit A-52). The only exception noted by one SFA director occurred when records had to be retrieved from archives for purposes of obtaining baseline data for the evaluation, a task unrelated to implementation.

At the school level, cafeteria managers were asked if they had observed any change in paperwork or administrative reporting over the past two school years. Of the cafeteria managers interviewed, only 8 percent reported a change with no significant difference between the responses of cafeteria managers in control and treatment schools (Exhibit A-41).

To the extent offering universal-free school breakfast resulted in an increased administrative burden, treatment school principals were probably in the best position to observe it. School paperwork, including that associated with administering school food programs, is commonly managed by the “front office” under the supervision of the principal or the principal’s designee. Principals in

treatment schools were therefore asked if they thought the pilot had any effect on paperwork or administrative requirements and if it had increased, to estimate what share of the increase was associated with the evaluation and what share with implementation.

Of the principals interviewed, 71 percent felt that offering universal-free school breakfast had no effect on administrative requirements (Exhibit A-24). Of the remaining 29 percent, most believed that the pilot had resulted in increased administrative requirements and that more than half of the increased paperwork was associated with evaluation activities rather than implementation. Thus, while a majority of all respondents observed no change in administrative workload as a result of universal-free school breakfast, a minority (27 percent) felt that there had been an increase in workload, most of whom thought that at least a majority of the increase was associated with evaluation activities. The share of principals reporting an increased workload was higher among those schools serving breakfast in the cafeteria than among those with classroom breakfast in both years in which interviews were conducted (Exhibit 3.7). However, the difference in SY 2002-2003 was no longer statistically significant, as it had been in SY 2000-2001.

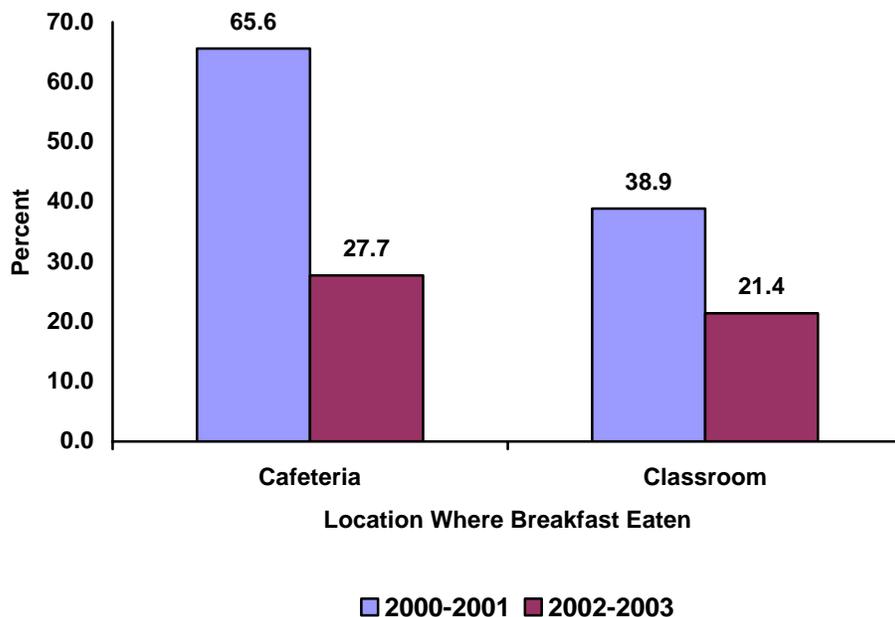
Satisfying the record-keeping requirements of the SBPP can be a demanding task for school foodservice. A daily count of all breakfasts qualifying for reimbursement is required and under the traditional SBP, the count has to be broken down by the number of meals qualifying as free, reduced-price, or full-price. In those systems where students move through a common checkpoint in the cafeteria, record-keeping can be relatively straightforward. However, in treatment schools where breakfast was served in the classroom, the responsibility for record-keeping was more dispersed and therefore more difficult to monitor and supervise. Further complicating record-keeping in at least two-thirds of these schools was the fact that teachers were assigned at least partial responsibility for a task that was new to them (Exhibit A-35).

Treatment school principals were asked if they thought that the SBPP had any effect on the accuracy or integrity of school breakfast record-keeping. While 87 percent of all treatment school principals said that offering universal-free school breakfast had not affected the accuracy of record-keeping, principals of schools serving breakfast in the classroom were more divided in their responses (Exhibit A-24). Of these principals, five of fourteen (36 percent) said that they thought it had affected accuracy. Of the five, three thought that the increased prominence of the program had resulted in improved accuracy, despite having more people involved. The other two principals felt otherwise, indicating that the added complexity of involving so many people in record-keeping had a negative effect on accuracy.

Staffing and Workload Impacts

One of the more widespread impacts observed in the initial year of the pilot was the increased use of foodservice labor in treatment schools. The increase in staff workload was directly associated with the increased number of breakfasts that were being served. To handle the increased number of students, many schools either increased the number of hours worked by existing staff or added additional staff, or some combination of the two. Findings from the first year study also indicated that the number of breakfasts increased proportionately more than did the number of staff hours, reflecting an improvement in labor efficiency when operating on a larger scale.

Exhibit 3.7**Share of Treatment Schools Reporting Increase in Administrative Reporting Requirements, SY 2000-2001 and SY 2002-2003**



N = 79 for each school year.

Source: *Implementation Study—Principal Interview, Spring 2001 and Spring 2003.*

It was anticipated that labor requirements in treatment schools would stabilize during the second and third years of the pilot, as the rate of participation plateaued. There was also the possibility that, with the experience of the first year behind them, some schools might have devised more labor-efficient practices, thereby reducing their labor requirements.

SFA directors, principals, and cafeteria managers were asked about staffing requirements in SY 2001-2002 and SY 2002-2003. Two of the six SFA directors felt that the workload of existing staff had been reduced over this period as a result of the increased use of pre-wrapped foods and improved efficiency (Exhibit A-47). Two other SFA directors identified particular schools, one in each district, that had added staff due to increased breakfast participation, while a third director reported an overall increase in staffing. The sixth SFA director reported no change in workload or staffing during this period.

When principals were asked about the trend in staffing for breakfast service in their schools in the second and third years of the pilot, most said there had been “no change” with no significant difference between the responses of control and treatment school principals (Exhibit A-16). A similar view was expressed by cafeteria managers (Exhibit A-40). When the principals of treatment schools were asked about the overall impact of the SBPP on staffing requirements over the entire three-year period, 71 percent said that it had “no effect” while 28 percent reported a “slight increase” (Exhibit A-20).

When treatment school principals were asked more pointedly about the impact of the SBPP on custodians and cafeteria workers, the staffing categories most directly affected, only about half responded that there had been “no effect” on these workers (Exhibit A-19). And, among those schools where breakfast had been eaten in the classroom, 70 percent or more said that both cafeteria workers and custodians had been affected by the SBPP. In the case of custodians, there was no consensus on whether the net impact had been positive or negative. At least as many principals judged the impact on custodians to have been positive (24 percent) as negative (22 percent). With regard to cafeteria workers, a substantially larger share perceived the impact to have been positive rather than negative (42 percent versus 10 percent).

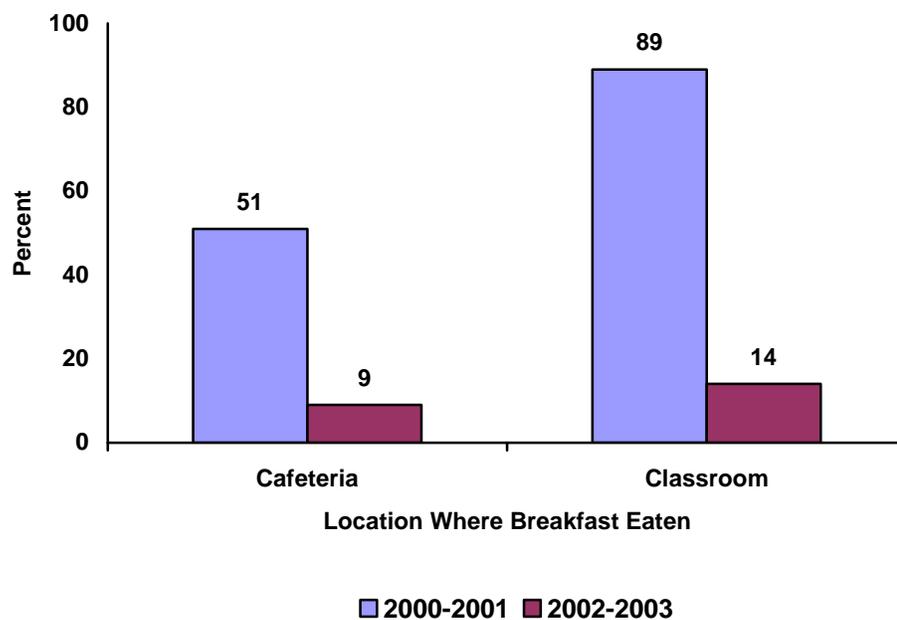
The share of cafeteria managers in treatment schools reporting a change in cafeteria staff workload dropped sharply between SY 2000-2001 and SY 2002-2003 (Exhibit 3.8). Differences by location of where breakfast was eaten were not significant in either year.

Impact on Costs and Revenues

As part of the evaluation conducted during the first year of the SBPP, estimates were made of food and labor costs and revenue from meal reimbursements and paid meals for each school taking part in the study. In brief, the results indicated that the higher rates of participation in the treatment schools made it possible for them to achieve substantial economies in their use of cafeteria labor. As a result, the average labor cost per breakfast in treatment schools was only 71 percent of the average cost in

Exhibit 3.8

Share of Treatment Schools Reporting Change in Cafeteria Staff Workload, SY 2000-2001 and SY 2002-2003



N = 79 for each school year.

Source: *Implementation Study—Cafeteria Manager Interview, Spring 2001 and Spring 2003.*

control schools. This advantage, combined with reimbursement at the highest rate for all breakfasts served in treatment schools, worked to the financial benefit of these schools. Total breakfast revenue was estimated to equal or exceed food and labor costs for 95 percent of all treatment schools compared to 80 percent of all control schools. While this was a partial analysis limited to the two principal components of meal cost, food and labor, it is suggestive of the financial advantage enjoyed by the treatment schools under terms of the study.⁴

Detailed cost and revenue data were not collected for the second and third years of the pilot. Instead, SFA directors and school principals were asked for their perceptions of the effect of universal-free school breakfast on costs and revenues over this period. SFA directors were asked about the impact during the second and third years of the pilot, relative to the first year. Since the growth in participation rates had substantially slowed by the second year in most schools, labor requirements for breakfast service should have leveled-off as well.

Three of the six directors reported their operations had incurred some additional costs associated with the SBPP in the second and/or third years of the pilot (Exhibit A-57). In one district, this resulted from the adoption of more expensive, pre-packaged foods. In another district, refrigerators were purchased and installed in classrooms where breakfast was served and eaten. The third district had added staff in a school that had converted to classroom service gradually, class-by-class, over the three-year period.

Of the four SFA directors who had observed the pilot from beginning to end, all agreed that the additional revenues associated with universal-free school breakfast exceeded any additional costs incurred during the second and third years of the pilot.

Most school principals in both control and treatment schools reported that there had been no change in expenditures related to school breakfast in either of the last two years of the pilot. In SY 2001-2002, 80 percent reported “no change” and in SY 2002-2003, 90 percent reported “no change” (Exhibits A-15 and A-17). While there was no significant difference between control and treatment schools, principals of treatment schools serving breakfast in the classroom were somewhat more likely to have reported an increase in expenditures. When viewed across the entire three-year period

⁴ A nationally representative study of the cost of producing school meals conducted on behalf of the Food and Nutrition Service in SY 1992-1993 found that the mean per meal cost of food was \$0.49 per breakfast while the mean per meal cost of labor was \$0.51 per breakfast (Glantz, et. al. 1994). The reimbursement rate for a free breakfast in SY 1992-1993 was \$0.95 per meal, \$0.05 less per meal than the combined cost of food and labor.

In comparison, the SBPP evaluation (McLaughlin et al., 2002) found that the mean per meal cost of food was about 14 percent higher than the earlier study (\$0.55 in treatment schools and \$0.56 in control schools) while the per meal labor costs were much lower (\$0.25 in treatment schools and \$0.35 in control schools). With a reimbursement of \$1.12 for a free breakfast in SY 2000-2001 (\$1.33 for severe need schools), reimbursements for treatment schools exceed the combined cost of food and labor by an estimated \$0.32 per meal, on average. It should be noted that the SBPP evaluation did not evaluate costs other than food and labor. These other costs were found in the SY 1992-1993 study to have added an additional 12 percent to the “reported” cost. Beyond this, the earlier study also identified “unreported” costs (costs that were not charged to the SFA budget) that averaged 17 percent of total reported cost. Adding these additional costs, assuming their relative size has not changed, narrows the financial advantage enjoyed by treatment schools taking part in the SBPP.

of the pilot, 91 percent of principals in treatment schools serving breakfast in locations other than the classroom said that the pilot had “no effect” on operating expenses (Exhibit A-21). In comparison, principals of treatment schools where breakfast was served in the classroom were evenly divided between a “slight increase” in expenses and “no effect.”

Plate Waste

As part of the first year evaluation, cafeteria managers were asked for their perceptions of any changes in the relative magnitude of plate waste during the first year of the pilot, compared to the previous year (McLaughlin et al., 2002). While a majority of all cafeteria managers said that there had been no change, the share of control school cafeteria managers indicating no change was significantly higher than the share of treatment school cafeteria managers (87 percent versus 67 percent (McLaughlin et al., 2002). For treatment schools with classroom breakfast, the share of cafeteria managers reporting increased plate waste was nearly twice as high as for non-classroom breakfast treatment schools (28 percent versus 15 percent). Thus, while plate waste was not considered a problem universally, to the extent it had increased it was far more likely to have occurred in treatment schools during the first year of the pilot.

In conducting interviews in the third year, cafeteria managers were asked if they had detected any difference in the amount of individual plate waste at breakfast over the previous three years. A majority (62 percent) responded that the amount of plate waste hadn’t changed over the period, with no significant difference between control and treatment schools (Exhibit A-43). Not surprisingly, given the relatively high turnover rate of cafeteria managers, 24 percent of the respondents indicated that they did not know if there had been a change. As in the first year, the share of cafeteria managers reporting increased plate waste is small but higher among treatment schools (10 percent versus 1 percent) and within that group, highest among classroom breakfast schools (14 percent versus 9 percent for non-classroom breakfast treatment schools).

All of the treatment schools that reported a decline in plate waste in SY 2002-2003 were non-classroom breakfast schools. The most frequently mentioned reason for the decline in plate waste was the improved acceptance of the menu by students, helped by the adoption of new menu items. The most frequently mentioned reason for increased plate waste, not surprisingly, was the reverse, i.e. students were being served food they did not like. Two cafeteria managers attributed the increased plate waste to the difficulty of planning for breakfasts served in the classroom.

Impact on Students and Teachers

Treatment school principals were asked to evaluate the overall impact of universal-free school breakfast on students and teachers. School principals are in a good position to judge the impact on these two important stakeholders, though many will not have had an opportunity to observe the impact at the same school over the entire period of study. A five-category scale ranging from “very positive” to “very negative” was used. All of the principals in treatment schools serving breakfast in the classroom characterized the impact on their students as “positive” (57 percent) or “very positive” (43 percent) (Exhibit A-18). The impact was nearly as favorable among principals in the other treatment schools with 51 percent reporting a “positive” impact and 37 percent “very positive.”

The impact of universal-free school breakfast on teachers, according to the principals, was less clear-cut, particularly among teachers in those schools where breakfast was eaten in the classroom. Of the

latter (n=14), 21 percent described universal-free school breakfast as having had a “negative” impact on their teachers. At the same time, more than three times as many principals in these schools described the impact on teachers as either “positive” (43 percent) or “very positive” (29 percent).

The principals’ perceptions of the impact of universal-free school breakfast on teachers in schools where breakfast was not eaten in the classroom was less dichotomous. While a majority of these principals viewed the impact on teachers as either “positive” (43 percent) or “very positive” (20 percent), most of the remaining principals (34 percent) said that it had “no effect” on teachers.

School Discipline

To assist in evaluating the impact of universal-free school breakfast on student behavior, record logs for the number of disciplinary incidents requiring a visit to the principal’s office were collected from each SBPP school over a 20-week period during the first year of the pilot. Earlier evaluations of schools in Maryland (Murphy and Pagano, 2001) and Boston (Murphy et al., 2000) concluded that students were better behaved following implementation of universal-free school breakfast. However, findings from the first year of the SBPP indicated that the average number of daily disciplinary visits, adjusted by enrollment, was somewhat higher in treatment schools (1.13 per 100 students) than in control schools (0.86 per 100 students), and that the difference was statistically significant. Analysis of these data also indicated that the impact was primarily due to a higher incidence of disciplinary actions occurring in the morning in treatment schools. These results suggested that rather than contributing to improved behavior, access to universal-free school breakfast might be having the opposite effect.

Analysis of disciplinary records collected in SY 2001-2002 and SY 2002-2003, the second and third years of the pilot, continued to show a higher average incidence among treatment schools than control schools, although the difference was not statistically significant. In the second year, there was a significant difference between control and treatment schools in the number of incidents in the afternoon, as opposed to the morning, as found in the first year. In the third year, there was no effect by time of day. These results are reported in greater detail in Chapter Five.

Given the unexpected results in the first year and the inconclusiveness of the second and third year results, school discipline was added to the list of topics addressed in the implementation interviews conducted in SY 2002-2003. School principals were asked several questions about the incidence and circumstances of disciplinary incidents in their schools. It should be emphasized that the findings reported below are based on the perceptions of school principals as opposed to the written records that served as the basis of the analysis described above and in Chapter Five.

Disciplinary Policies

Most schools (85 percent) have written policies on school discipline (Exhibit A-13). In some districts, the policy is developed at the district level for implementation among schools. In other districts, development of a policy on school discipline is left to each school. Administrators in four of the six districts reported that disciplinary guidelines were centrally developed.

Incidence of Disciplinary Actions

Across all schools, the median number of daily visits to the school office for disciplinary reasons per 100 students, as estimated by school principals, was 0.31 (Exhibit A-9). The incidence per day was somewhat higher in treatment schools than in control schools (0.33 versus 0.25). The daily number of

perceived incidents was highest (0.74) in those treatment schools serving breakfast in the classroom. While the difference between the principals' estimates of the mean number of visits in control and treatment schools was not significantly different; differences between classroom and non-classroom treatment school estimates were statistically significant at the .05 level.

When school principals (control and treatment) were asked how the rate of disciplinary action in their school compared with that of other elementary schools, 77 percent said that it was about the same, lower, or much lower in their school (Exhibit A-8). Only 14 percent indicated a higher rate in their school. There were no significant differences between control and treatment schools in these responses.

Searching for trends in the incidence of disciplinary problems over the period during which the SBPP had been implemented, the responding principals (control and treatment) were about equally divided between those who thought there had been a change (46 percent) and those who felt it had remained about the same (43 percent) (Exhibit A-13). Of those principals who thought that they had detected a change in the incidence of disciplinary problems over the period, 77 percent said they thought it had decreased while only 16 percent perceived an increase. Again, there was no significant difference in the responses of control and treatment school principals.

Characteristics of Disciplinary Incidents

The three most common reasons given by principals for taking disciplinary actions were disrespect towards teachers and staff (50 percent), fighting (46 percent), and aggressive behavior (29 percent) (Exhibit A-10). Most principals (95 percent) indicated that there were more disciplinary incidents during certain periods of the day. Of these, 49 percent reported a higher incidence during recess (Exhibit A-9). Principals' perceptions on the time of day most disciplinary incidents occurred are presented in Exhibit 3.9. Substantially more of the principals believed that there were more disciplinary incidents in the afternoon than in the morning (36 percent versus 3 percent), with no significant difference between control and treatment schools in this regard.

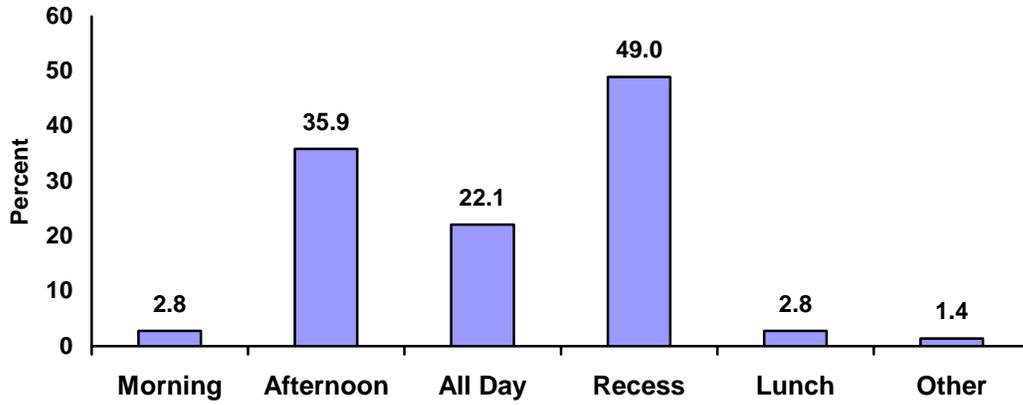
Principals' perceptions of where disciplinary incidents were most likely to occur are presented in Exhibit 3.10. Playgrounds were identified as the location where disciplinary incidents were most likely to occur (88 percent) (Exhibit A-12). School buses were a distant second (18 percent), with the frequency of mention varying greatly, depending on the geographic size of the district and its dependence on busing. In general, principals reported that disciplinary incidents occurred with greatest frequency when students were less closely supervised, such as on the playground or on school buses.

On the basis of these findings, we conclude that there is no direct link between the number of disciplinary visits to the principal's office and offering universal-free school breakfast. While the perceived number of visits was found to be higher among treatment schools serving breakfast in the classroom than in other treatment schools, all other evidence (location, time of day, and reasons for the incidents, as well as principals' perceptions of the trend in incidents) suggests that this is not associated with the availability of universal-free school breakfast.

Stakeholder Attitudes

Several stakeholder groups are affected, directly or indirectly, by the School Breakfast Program and by any changes that might be made in it. They include district and school administrators who are

Exhibit 3.9**Principals' Perceptions of the Time of Day of Most Disciplinary Visits, SY 2002-2003**

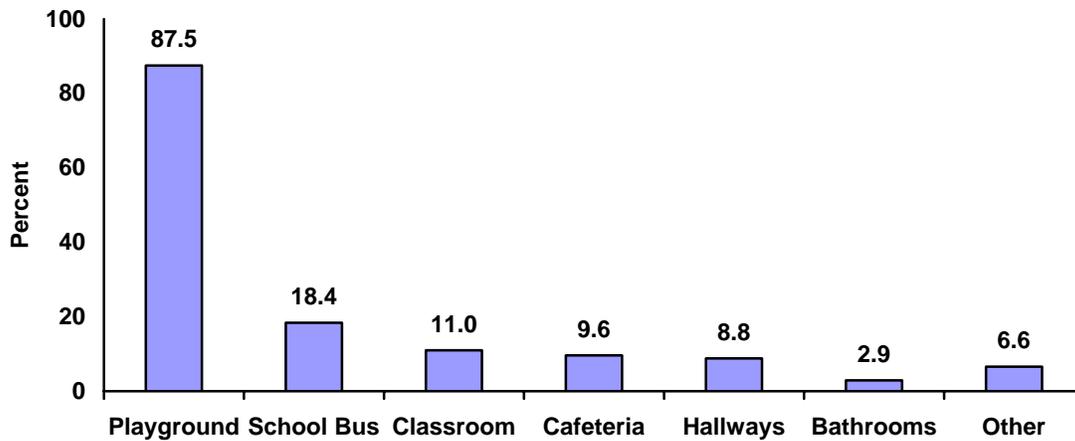


N = 145; 76 Treatment and 69 Control.

Note: Percentages sum to more than 100.0% due to multiple responses.

Source: *Implementation Study—Principal Interview, Spring 2003.*

Exhibit 3.10**Principal's Perceptions of Locations Where Disciplinary Incidents Are More Likely to Occur, SY 2002-2003**



N = 136; 69 Treatment and 67 Control

Note: Percentages sum to more than 100.0% due to multiple responses.

Source: *Implementation Study—Principal Interview, Spring 2003.*

responsible for integrating the feeding programs with the educational mission of their institutions, foodservice personnel at both district and school levels, teachers, custodians, parents, and, perhaps most important of all, the program's student customers. In the Spring 2001 data collection, each of these groups was surveyed. Principals and cafeteria managers in all participating schools, as well as a random sample of teachers, custodians, parents, and students were interviewed. In addition, student attitudes were explored during a series of 12 focus groups held with students.

First Year Results

The results of the 2001 interviews, presented in the report of the first year findings (McLaughlin et al., 2002), revealed a positive attitude toward the SBP in general and universal-free school breakfast in particular across all stakeholders. A majority of school principals characterized the attitude of administrators as "positive" or "extremely positive," with nearly identical findings for treatment schools (85 percent) and control schools (86 percent) (Exhibits A-34 and A-36 in McLaughlin et al., 2002). Foodservice staff was similarly supportive with 82 percent of all cafeteria managers describing staff attitude toward the SBP as "positive" or "very positive," again with no significant differences between control and treatment schools (Exhibit A-59 in the report cited above).

Student attitude toward universal-free school breakfast in its initial year was also positive. Nearly three times as many cafeteria managers in treatment schools as in control schools (60 percent versus 22 percent) believed that student attitudes had become more positive in the first year of implementation of the SBPP (Exhibits A-57 and A-62 in McLaughlin et al., 2002). This finding was corroborated in the student focus groups. Students in the focus groups were particularly enthusiastic about eating breakfast in the classroom. It had been hypothesized prior to the study that the SBP might be viewed by students as a program designed primarily for students from low-income families. However, findings from interviews of principals and teachers as well as conversations with students in the focus groups failed to reveal evidence of a stigma associated with participation in the SBP among these elementary school students.

Two stakeholder groups who could have been negatively affected by universal-free school breakfast are teachers and custodians. Both were potentially affected by the need to supervise additional students during breakfast service. For those schools serving breakfast in the classroom, teachers were required to play an expanded supervisory role. For custodians, the increased trash associated with higher program participation meant additional work, particularly if it had to be collected from individual classrooms rather than from a single location.

Despite these potentially negative implications, a strong majority of both stakeholder groups, teachers, and custodians, were described by school principals as having a positive attitude toward the program with no significant differences between control and treatment schools. The one feature of the SBPP over which opinion was divided was teacher attitude toward eating in the classroom. Though based on a small sample, teachers who had not had breakfast served in their classroom were generally opposed to this approach while teachers who had experienced classroom feeding were much more supportive.

As noted earlier, interviews conducted in the final year of the pilot were limited to district and school administrators, SFA directors, and cafeteria managers. Their perceptions of the attitude of key stakeholders are described below.

SFA Directors

Given their positions as head of the school district foodservice operation, SFA directors have a “big picture” view of foodservice in their district. This is qualified by the fact that only four of the six SFA directors had been in their positions throughout the three years of the pilot. As noted earlier, one director was new to the position within the past year while another had less than three months experience as director in the school district.

SFA directors were asked for their perceptions of the predominant attitude of key stakeholders toward the SBP, differentiating between control and treatment schools. They were asked to rate each stakeholder’s attitude on a five-point scale ranging from “extremely positive” to “extremely negative.” In the view of SFA directors, both students and foodservice staff were characterized as having a “positive” or “extremely positive” attitude toward school breakfast in both treatment and control schools (Exhibits A-59 and A-60). Most SFA directors viewed administrators, school board members, and parents as having a neutral to positive attitude toward the program, whether in control schools or treatment schools. Teachers and custodians were seen as having a more neutral attitude toward school breakfast. The attitudes of teachers, particularly those in treatment schools, were difficult to categorize and were seen by some SFA directors as ranging from extremely positive to extremely negative. Half of the SFA directors described the attitude of teachers in control schools as “neutral.”

Cafeteria Managers

School cafeteria managers were asked how their staffs viewed school breakfast and if they perceived any change in attitude over the three years of SBPP implementation. In SY 2002-2003, a strong majority of cafeteria managers reported either a “positive” or “very positive” attitude toward the SBP, with similar results for control schools (87 percent) and treatment schools (84 percent) (Exhibit A-44). Although they were in a distinct minority, cafeteria managers in two of the 79 treatment schools said that their staff was “negative” or “very negative toward the SBP.” Breakfast was served in the cafeteria in one school and in the classroom in the other.

A comparison of findings from the first and third year interviews shows very little change in attitude. Most notable was the more positive attitude of cafeteria managers in treatment schools serving breakfast in the cafeteria in the final year. The share of managers in these schools who described staff attitude as “very positive” rose from 33 percent in the first year to 54 percent in the third year.

When cafeteria managers were asked if they perceived any change in staff attitude toward school breakfast over the period of the study, a significantly higher share of those in treatment schools said that they had detected a change (28 percent versus 11 percent) (Exhibit A-45). The share of cafeteria managers detecting a change in staff attitude was especially high (43 percent) among managers in treatment schools where breakfast was eaten in the classroom. Overall, most of those cafeteria managers who perceived a change in attitude (87 percent), described the change as “more positive” or “much more positive.”

Cafeteria managers were also asked if they perceived any change in student attitude toward school breakfast over the period of the SBPP. A significantly higher share of cafeteria managers in control schools than in treatment schools (60 percent versus 33 percent) detected no change in attitude (Exhibit A-42), while a significantly higher share of all treatment school cafeteria managers reported that students’ attitudes had become “more positive” (43 percent versus 24 percent).

Principals

Principals of treatment schools were asked both for their own overall assessment of the impact of universal-free school breakfast and for their perception of changes in staff and student attitude toward school breakfast as a result of the SBPP. A strong majority of all treatment school principals said that the overall impact of universal-free school breakfast had been either “positive” (43 percent) or “very positive” (43 percent) (Exhibit A-22).

About half of all treatment school principals (52 percent) felt that staff attitude toward school breakfast had become more favorable during the period of the pilot (Exhibit A-23). Most remaining principals (42 percent) perceived no change in staff attitude. A majority of treatment school principals (60 percent) also perceived that student attitude toward school breakfast had become more favorable during the pilot, while the share of principals in schools where breakfast was eaten in the classroom reporting a more favorable student attitude was even higher (71 percent).

Treatment school principals were also asked to assess the impact of their school’s participation in the pilot on key stakeholders using a five-part ranking from very positive to very negative (Exhibit A-18). The results are summarized in Exhibit 3.11 below. Students were seen to have benefited most with 90 percent of the principals indicating that the impact was positive or very positive. In schools where breakfast was eaten in the classroom, every principal (100 percent) viewed the impact on students as positive or very positive. Nearly two-thirds (65 percent) of the principals judged the impact on teachers as positive or very positive while only 5 percent perceived a negative impact (nearly all in classroom breakfast schools). Cafeteria workers and custodians were less positively affected by the pilot, in the view of principals (Exhibit A-19). This was particularly evident in schools where breakfast was eaten in the classroom and 29 percent of the principals described the impact on cafeteria workers as negative or very negative and 43 percent had the same assessment of the impact on custodians. For treatment schools where breakfast was not eaten in the classroom, 6 percent of principals reported a negative impact on cafeteria workers and 17 percent reported a negative impact on custodians.

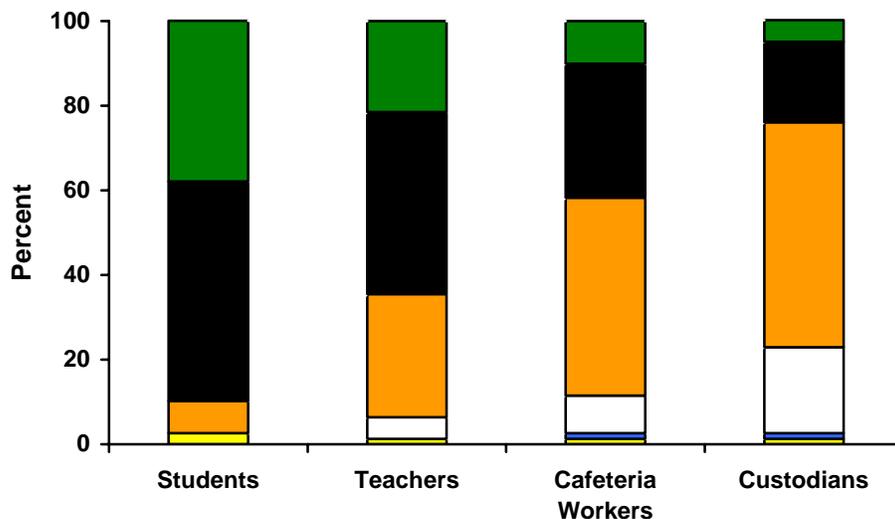
Post-SBPP Plans

At the time of the SY 2002-2003 interviews, the SBPP was nearing its June 30, 2003 termination, after which the treatment schools in the participating school districts would revert to their former status as participants in the SBP and to the standard schedule of meal reimbursement.

In the interviews conducted at the district level, respondents were asked if the participating treatment schools would be returning to the traditional school breakfast program and, if not, what changes were planned. Four districts reported that they planned to return to the traditional program. The SFA director in one of the districts indicated that the district was undecided as to whether it would make changes in the program. The remaining district reported that it planned to use Provision 2 authority to allow these schools serving free breakfast in the classroom under the pilot to continue doing so after the end of the SBPP, if they wanted.⁵

⁵ Under Provision 2 authority, meal reimbursements for a 3-year period are based on eligibility determinations made in a base period. In return for this simplified administrative procedure, Provision 2 schools are required to serve all meals at no charge. Provision 2 may be applied exclusively to meals served at breakfast or lunch, or both breakfast and lunch. In SY 1999-2000, an estimated 4.1 percent of all elementary schools were operating under Provision 2 authority (Daft, et al., 2002).

Exhibit 3.11**Treatment School Principals' Perceptions of the Impact of Universal-Free School Breakfast on Key Stakeholders, SY 2002-2003**



■ Don't know/other ■ Very negative □ Negative ■ No effect ■ Positive ■ Very positive

N = 79

Source: *Implementation Study—Principal Interview, Spring 2003.*

School principals and cafeteria managers in treatment schools were asked if they had any concerns about returning to the regular SBP when the pilot ended at the end of the school year. About two-thirds of both the principals and the cafeteria managers responded affirmatively (Exhibits A-27 and A-46). In schools where breakfast was eaten in the classroom, 93 percent of the cafeteria managers voiced concerns over returning to the traditional SBP. Among principals, the responses for classroom and non-classroom breakfast schools were nearly identical. The most prominent concerns among principals were that some students would no longer eat school breakfast (51 percent), in part because they could not afford it, and that participation in the SBP would fall (18 percent). The reasons cited with greatest frequency by cafeteria managers in those treatment schools expressing concern were an anticipated decrease in program participation (37 percent), a concern that some students would go hungry (28 percent), and the likelihood of student/parental confusion over the need to pay (20 percent).

Chapter Four

Impact Study Design and Methodology

This chapter focuses on the Impact Study design and methodology, originally described in detail in the report of findings from the first year of SBPP implementation (McLaughlin et al., 2002). The original design for the study was developed by Mathematica Policy Research, Inc., as part of a contract with FNS (Ponza et al., 1999). Here we summarize the basic features of the overall evaluation design: study objectives, research questions, sampling design, data collection methodology, and analytic approach. We also address the specific aspects of the study that were conducted in the final two years of the SBPP (SY 2001-2002 and SY 2002-2003).

Objectives and Research Questions

The primary objective of the Impact Study was to assess the effects of universal-free school breakfast on student outcomes. The Impact Study included a broad range of outcomes that may be immediately affected by school breakfast, such as cognitive functioning in the morning after breakfast, and more distal outcomes, such as performance on a standardized academic achievement test. Toward the end of the first year of implementation, an extensive set of these outcomes was gathered directly from students, including dietary intake at breakfast and over 24 hours, attitudes about school breakfast, cognitive functioning, and height and weight. Data were also collected from parents, teachers, and school records, and included information on breakfast consumption patterns, food security status, child health, student behavior, school breakfast participation, school attendance, tardiness, and academic achievement. Data were gathered at the school-level only for incidents of visits to the school nurse and disciplinary visits to the principal. In this report, we focus primarily on a more limited set of outcomes, gathered from school records in Years 2 and 3 of SBPP implementation, that measure further trends in school breakfast participation, academic achievement, and attendance, both at the student and school level. In addition, we report school-level findings on school nurse visits and disciplinary incidents.

The Impact Study addresses three categories of research questions listed below.

(1) Impacts of the **availability** of universal-free school breakfast on the overall sample

The overall impact of the **availability** of universal-free school breakfast in the treatment schools was addressed in the report of the first year of SBPP findings. The following research questions guided data collection with students, parents, and teachers conducted only in the first year. These questions focus on whether, when compared with students without access to universal-free school breakfast, treatment school students:

- Are more likely to consume breakfast,
- Are more likely to improve their dietary intake at breakfast and over 24 hours,
- Achieve higher scores on cognitive tests of attentiveness and memory,
- Exhibit better classroom behavior, and/or
- Enjoy better health and a higher sense of food security.

In addition, the first year report also looked at a series of research questions using data collected from student records, again comparing students with and without access to universal-free school breakfast. Specifically, they ask whether students with access to universal-free school breakfast:

- Have higher rates of participation in school breakfast,
- Demonstrate greater gains on standardized academic achievement tests,
- Attend school at higher rates and are tardy less often,
- Exhibit better health, as indicated by parent report and the number of visits to the school nurse's office, and/or
- Exhibit better behavior in school, as measured by the number of disciplinary incidents.

Student record data to analyze these questions continued to be collected in Years 2 and 3 of the SBPP, SY 2001-2002 and SY 2002-2003. This latter set of questions is thus analyzed further in this report.

In addition to cross-sectional analyses focused on separate comparisons of baseline to Year 2 and to Year 3 data, impacts are estimated within the context of a longitudinal growth curve analysis. This analysis can answer questions focusing on development and change in students over time, by taking full advantage of the multiple observation points over time that are a feature of this evaluation. A full description of the growth modeling procedure used to conduct these analyses is provided in Appendix C.

(2) Subgroup and district-level impacts of the **availability** of universal-free school breakfast

The experimental model used in this evaluation also provides valid estimates of variations in impacts across subgroups of students, thereby answering the question of whether there is a differential impact of universal-free school breakfast on two groups of students who differ only on a baseline characteristic, such as minority status or gender. In addition, district-level impacts are estimated in the event of a treatment by district interaction, i.e., if the effect of universal-free school breakfast varies significantly across school districts.

(3) Effects of **participation** in school breakfast and consumption of breakfast in general

Although the above research questions focus on the availability of universal-free school breakfast, this study also addresses a number of questions dealing with the effects of participating in school breakfast and eating breakfast in general. These questions focus on variations in the effects of participation in school breakfast both across and within school districts, and on the effects of eating any or a substantial breakfast on student outcomes. For this set of research questions, non-experimental methods were used to derive impact estimates. The results of these analyses are presented in Chapter Six. In addition, a summary of the experimental results of the SBPP impacts on students who actually participated is provided in Appendix F.

Sampling Design

As described earlier, the evaluation of the SBPP is based on an experimental design, with school treated as the experimental unit. The sample for the Impact Study is comprised of students in grades 2 through 6, in a total of 138 elementary school units, grouped into 69 matched pairs across the six

participating school districts.¹ Within each matched pair, one school unit was randomly assigned to the treatment group (universal-free school breakfast) and the other to the control group (SBP). Within each treatment and control school unit, a total of six classrooms were randomly selected, with at least one classroom per grade for grades 2 through 6. An initial sample of 48 students was selected within each school, allowing for sample loss due to refusal, mobility, and absenteeism, to reach a target sample of 30 students per school unit and a total student sample of 4,290 (2,190 treatment and 2,100 control). The sample for the SBPP study was derived by stratifying the students in the selected classrooms according to school meal eligibility status and prior participation in school breakfast, when this information was available. This procedure resulted in a stratified random sample of students from the six participating school districts. For further details on the sampling methodology used in this study, please refer to the report on the first year of SBPP findings (McLaughlin et al., 2002).

In Years 2 and 3 of the SBPP evaluation, we continued to gather data from the sample of schools and students. The student sample declined over the course of the evaluation, however, as students moved from the elementary schools in the sample to middle and junior high schools, or to other elementary schools. Students who changed elementary schools were kept in the sample if they moved from one treatment school to another or from one control school to another in the same district. They were dropped from the sample if they crossed from a treatment school to control (or vice versa), moved out of the school district, or graduated from elementary school.

Data Collection Measures and Methodology

The Impact Study is based on data collected directly from students, parents, and teachers, as well as from school records. Exhibit 4.1 summarizes the Impact Study data collection across the baseline and three years of the SBPP evaluation. As stated earlier, the report on first year findings (McLaughlin et al., 2002) described extensively the various measures used to collect these data. This volume of the report follows up with further findings based on information gathered from student records only, describing students' school breakfast participation, attendance, tardiness, academic achievement test scores, school nurse visits, and disciplinary incidents. Data on school breakfast participation, attendance, tardiness, and academic test scores were collected at both the student and school level. Data on school nurse visits and disciplinary incidents were collected at the school level only. These data were all collected in Year 2 (SY 2001-2002) and Year 3 (SY 2002-2003) of the pilot.

Exhibit 4.2 displays response rates across all students for a variety of data collection measures in Years 2 and 3 of the SBPP. Response rates presented for student-level measures (breakfast participation, attendance, and achievement test scores) were based on the number of eligible students in the study enrolled in SY 2001-2002 (n=3,221) and SY 2002-2003 (n=2,182). As Exhibit 4.2 indicates, these response rates ranged from 71 to 100 percent, depending upon the outcome and year

¹ The original sample consisted of 153 schools. Schools with different grade configurations, however (e.g., K-2, 3-5), were combined for sampling purposes. In addition, in three school districts, two treatment school units were paired with one control group. After the first year of SBPP, a newly constructed school in one district took some of the grades from a control school. Thus, the final sample for the study consists of 154 schools. One treatment school and its matched control could not be included in the Impact Study analysis. The final school sample was thus grouped into 138 school units, 69 treatment and 69 control.

in which data were collected.² Response rates for these outcomes (breakfast participation, attendance, and achievement test scores) at the school level were 100 percent. Response rates for the nurse and disciplinary logs (school-level outcomes) were based on the total number of schools in the sample times the number of weeks of data collection (n=20). Response rates for these outcomes were 92 to 93 percent across the two years.

Exhibit 4.1

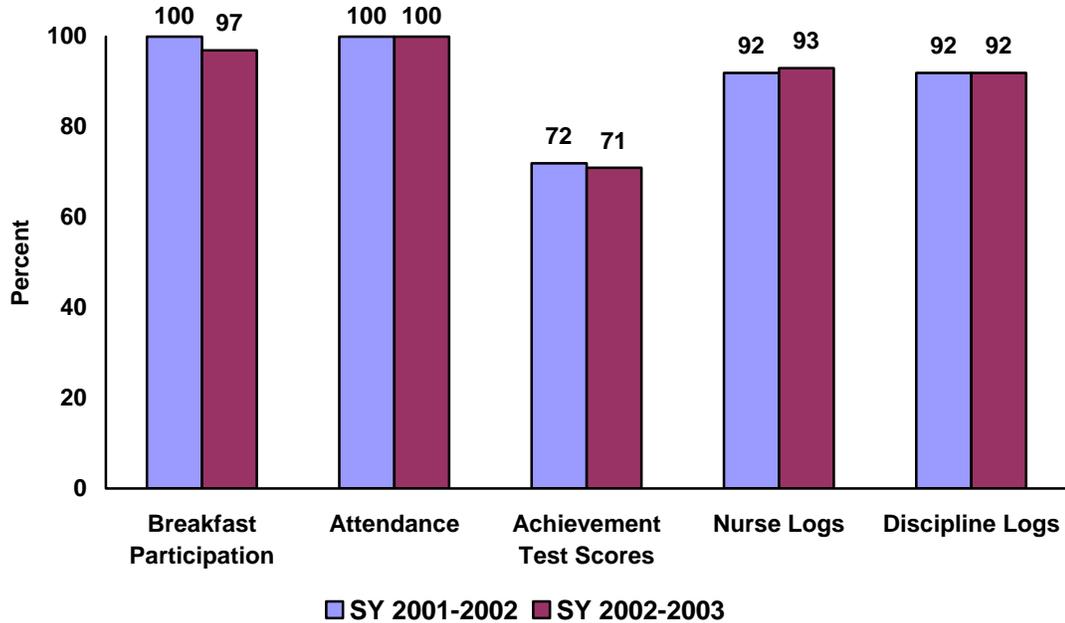
Summary of Impact Study Data Collection

Source	Outcomes	Baseline	Year 1	Year 2	Year 3
		SY 1999- 2000	SY 2000- 2001	SY 2001- 2002	SY 2002- 2003
Students	• Dietary intake at breakfast and over 24 hours		✓		
	• Source of breakfast		✓		
	• SBP participation		✓		
	• Attitudes about breakfast		✓		
	• Plate waste		✓		
	• Cognitive functioning		✓		
	• Height and weight		✓		
	• School breakfast participation		✓		
Parents	• Dietary intake at breakfast and over 24 hours (repeat assessment)		✓		
	• Student's dietary intake		✓		
	• Food security status		✓		
	• Student's usual breakfast patterns		✓		
	• Child health		✓		
	• Parent/guardian attitudes toward breakfast and school breakfast		✓		
	• Socioeconomic characteristics of household		✓		
Teachers	• School climate		✓		
	• Student behavior		✓		
School Records ³	• School breakfast participation	✓	✓	✓	✓
	• Attendance	✓	✓	✓	✓
	• Tardiness	✓	✓	✓	✓
	• Achievement test scores	✓	✓	✓	✓
	• School nurse visits		✓	✓	✓
	• Disciplinary incidents		✓	✓	✓

² Response rates for school attendance were based on whether attendance or tardiness data were available for study students. The response rates for student-level tardiness data, however, were far below those for student attendance (47 percent in SY 2001-2002 and 45 percent in SY 2002-2003). Tardiness data were not available at the student-level in two districts and at the school-level in four districts.

³ School records of attendance, tardiness, achievement test scores, and school breakfast participation were obtained for both sample students and the entire school. Disciplinary incidents and school nurse visits were obtained at the school level only.

Exhibit 4.2**Impact Study: Data Collection Response Rates Across All Districts**



Note: Response rates for school breakfast participation, attendance, and test scores are for the student sample. School-level response rates for school breakfast participation, attendance, and test scores were 100 percent. Response rates for nurse and disciplinary logs were based on the total number of schools in the sample times 20, the number of weeks of data collection. Sample sizes used in analyses may vary, however, due to unreliable or missing data.

N=3,221 for SY 2001-2002 student-level breakfast participation, attendance, and achievement test scores.

N=2,182 for SY 2002-2003 student-level breakfast participation, attendance, and achievement test scores.

N= 2,814 for the number of nurse visit logs and 2,801 for the number of disciplinary logs for SY 2001-2002.

N= 2,858 for the number of nurse visit logs and 2,838 for the number of disciplinary logs for SY 2002-2003.

Source: *Impact Study Data Collection, SY2001-2002 and SY2002-2003*

Analytic Approach

This section briefly reviews the Impact Study analytic approach, previously described in detail in the report of findings from the first year of SBPP implementation (McLaughlin et al., 2002). The discussion distinguishes between two types of research questions. One type explicitly addresses the impact of availability of universal-free school breakfast on the overall sample; the randomized experiment underlying the SBPP evaluation was designed to answer these questions with a high level of confidence. The second type of question addresses the effects of participation in school breakfast, or eating breakfast in general, not just the availability of universal-free school breakfast. The experimental design was not constructed to answer these questions. That is, because neither schools nor students were randomly assigned to various levels of participation in school breakfast or amounts of breakfast eaten, tests of differences cannot be conducted with the same degree of confidence.

Analytic Models to Estimate the Overall Impacts of the Availability of Universal-Free School Breakfast

The Impact Study focuses primarily on the effects of universal-free school breakfast on student outcomes. These impact analyses follow up on those conducted in the report covering the first year of implementation, by computing gain scores between the baseline year (SY 1999-2000) and Years 2 and 3 of implementation (SY 2001-2002 and SY 2002-2003, respectively). These analyses rest on the assumption that the treatment-control differences on the amounts of gain on a given outcome measure best indicates the impact of universal-free school breakfast. A full description of the methodology underlying these analyses can be found in Appendix C. This appendix also includes a discussion of statistical power in the study analyses.

Student outcomes were analyzed using a hierarchical mixed-model approach, providing for estimates of the overall as well as district-level impacts. A separate multivariate analysis was conducted for each outcome variable using a set of baseline covariates to increase the precision of the analytic estimates by adjusting for any initial differences between the treatment and control groups. The covariates used in the student-level models are:

- Age of student in months and years,
- School meal eligibility status (free and reduced-price versus paid),
- Gender, and
- Minority status (white versus non-white).

These same covariates were used in all of the student-level models. In addition, a baseline measure of the outcome (e.g., academic achievement test score) was included in the model. Missing data for any of the student-level demographic variables were imputed using the school-level mean. Missing data for baseline measures of outcomes (e.g., attendance) were not imputed given that the baseline value was used in estimating the gain score for each student. Consequently, the gain score analyses only included students with data at two time points.

Given that record data were also available at the school level, impact analyses were also conducted on school-level outcomes, namely, school breakfast participation, attendance and tardiness, academic achievement, school nurse visits, and disciplinary incidents. These school-level data were also analyzed to determine if there were impacts of universal-free school breakfast on the school as a whole.

Parallel to the approach to assessing overall impact using school-level means, variations in impacts for subgroups were assessed by examining the interaction between student-level characteristics and the treatment status of the school. Subgroup analysis was conducted on all four student-level covariates: school meal eligibility status, minority status, gender, and age. Age was defined here as “younger,” in grades 1 or 2, and “older,” grade 3 and above.

With the addition of two years of follow-up data, it was possible to conduct longitudinal growth curve analyses to examine change in student outcomes over time, taking advantage of all four years of data—baseline through the third year of implementation. These analyses are able to identify growth patterns in the data that are not readily apparent in the impact analyses comparing the change from baseline to each year of implementation. Longitudinal growth curves were plotted for student- and school-level outcomes, including participation, attendance, tardiness, and academic achievement test

scores. Based on the results of these plots, a decision was made to utilize hierarchical linear modeling techniques to analyze the growth curves of student- and school-level participation outcomes.

Analytic Approaches to Measuring Effects of Participation in School Breakfast and Consumption of Breakfast

As noted at the outset, the estimates described above measure the average impact of the *availability* of SBPP on all students. These analyses, however, do not address important questions, such as the effects of eating no breakfast or a substantive breakfast on student outcomes. Several different approaches were used to derive estimates for answering these questions. These analyses depend on assumptions that make the attribution of observed differences in outcomes somewhat less certain than the level of reliability associated with impacts derived directly from the experimental design.

The research questions addressed in these analyses are:

- What is the relationship between breakfast consumption and nutrition and academic outcomes for all students? Specifically, what are the outcomes for those who consume a robust or substantive breakfast and for those who skip breakfast?
- Do students who only eat breakfast at school have different nutrition outcomes than students who only eat breakfast at home or at home *and* school?
- Do treatment group students who eat breakfast in the classroom have different nutrition outcomes than treatment group students who eat breakfast in other locations (e.g., cafeteria, hallway) or from control group students who eat in the cafeteria?
- Do students from families below 130 percent of the federal poverty level have different nutrition outcomes than students in higher income families?
- Do students who are classified as food insecure differ in their household characteristics from students who are food secure?
- How does school breakfast participation change over the course of the SBPP? Do students with certain demographic characteristics follow a particular participation pattern?

A variety of analytic approaches were employed to deal with the research questions listed above that, because of the design, must be analyzed in a non-experimental framework. Specifically, these questions ask about the effects of eating no breakfast or a substantive breakfast, and variations in the effects of universal-free school breakfast by source (e.g., home, school), school location (e.g., classroom, cafeteria), as well as household income on a host of student outcomes. The results of these analyses, and the limitations of the nonexperimental analyses, are discussed further in Chapter Six and Appendix H. Because students were not randomly assigned to where they ate breakfast, the results will need to be interpreted with caution.

One set of analyses looks at the effect of breakfast consumption on student outcomes, independent of treatment status. That is, do students who eat a substantive breakfast have better outcomes compared to students who eat a less substantive breakfast? Alternatively, do students who eat any breakfast fare better than those who skip breakfast?

Another set of analyses looks at the effects of school breakfast location on students' nutrition outcomes. Of particular interest is whether or not students in treatment schools that eat breakfast in the classroom have better nutrition outcomes than students in treatment schools that eat breakfast elsewhere. Alternatively, do students who eat breakfast only at school have better nutrition outcomes than those eating at home only or those eating at home and school?

To look at the relationship between household characteristics and food security status, descriptive analyses were run for each level of food security on the Household Food Security Scale.

To address the last question regarding school breakfast participation over the course of the SBPP, data were analyzed to determine if there were any distinctive patterns, and, if so, how many students followed a particular pattern. To assess whether students with certain characteristics were associated with particular patterns, analyses of demographic variables, including minority status, gender, school meal eligibility status, and age were run for each pattern.

Chapter Five

Impact of the Availability of Universal-Free School Breakfast on Students in Years 2 and 3

This chapter presents results from the analyses conducted to assess the impact of the *availability* of universal-free school breakfast on student outcomes in Years 2 and 3 of the SBPP implementation. These analyses utilize the rigor of the experimental design in addressing the main question concerning program impact: Do students in elementary schools where universal-free school breakfasts are available do better across a number of outcomes than they would have in the absence of universal-free school breakfast?

This chapter begins with a summary of the key findings from the Year 1 report (McLaughlin et al., 2002), followed by a description of the sample of students in the Impact Study at baseline, before the SBPP was implemented. The discussion then moves to the presentation of findings on the student outcomes for Years 2 and 3. The main findings discussed in this chapter represent the average impact across all school districts. A summary of all the main impact findings discussed in this chapter is presented in Exhibits 5.9 to 5.12. If there is a significant variation among districts, this is also presented and the relative magnitude of treatment effects among districts is discussed. To aid the reader in interpreting the magnitude of results, effect sizes for outcomes are shown, which provide a standard comparison scale in all the exhibits.¹ Results that are not significant are not discussed in depth, but readers can find detailed tables of the combined and individual district results in Appendix D. Finally, the analysis of subgroup impacts is presented (see Appendix D for exhibits).²

Summary of Year 1 Impact Findings on the Availability of Universal-Free School Breakfast

Key findings from the Year 1 analyses are presented below by study objective.

Assess the effects of the availability of universal-free school breakfast on student participation.

- Students in schools where universal-free school breakfasts are available showed significant gains in participation in school breakfast compared with students in control

¹ An effect size expresses the impact in terms of standard deviation units, and by doing so allows you to more easily compare results from different scales (e.g., achievement tests).

² Given that a joint set of hypothesis tests are performed on the same outcome (i.e., by district and subgroup), it is important to note the increased risk of finding significant differences when they do not really exist (i.e., Type I errors). For example, with a statistical significance cutoff of .05, one estimate out of 20 is likely to be significant by chance alone. If 10 statistical tests are performed on the same set of data, each of which has a 1 in 20 chance of yielding a false positive result ($p = .05$) the probability of not committing a Type I error is only $(.95)^{10}$ or 60 percent. In light of this, this report focuses on consistent patterns of findings, while scattered significant results from several tests are treated as possibly due to chance.

schools with the regular breakfast program (16 versus 1 percentage point, respectively). This effect varied significantly from district to district, and was greater for paid students.

Assess the effects of the availability of universal-free school breakfast on student outcomes.

- Most students in both treatment and control schools ate something for breakfast and did so all five days of a typical school week. The likelihood of consuming breakfast on a given day was slightly higher among students in treatment schools when breakfast was defined as providing a minimum level of food energy and at least two foods (80 versus 76 percent for control students), representing a significant finding.³
- The availability of universal-free school breakfast was associated with a higher likelihood of eating more than one nutritionally substantive breakfast (7 percent for treatment versus 4 percent for control students), typically at home and at school, although few students had adopted this eating pattern. This finding was also significant.
- There was little effect of the availability of universal-free school breakfast on students' food or nutrient intake, either at breakfast or over 24 hours. The handful of significant differences in food and nutrient intake were generally in a positive direction but very small. The great majority of students overall consumed a usual diet that was adequate in food energy, vitamins, and minerals. On the other hand, few met recommendations for total fat, saturated fat, and sodium.
- There were no significant effects of the availability of universal-free school breakfast on measures of academic achievement (reading and math); cognitive or social/emotional functioning; attendance; tardiness; food insecurity; or children's health, including parent reports of health and visits to the school nurse.
- The availability of universal-free school breakfast resulted in treatment schools reporting significantly higher rates of disciplinary incidents overall than control schools, and these differences were due to incidents that took place in the morning.
- With respect to overweight and obesity, there was no evidence that the availability of universal-free school breakfast was related to excessive intakes of total food energy or to increased risk of overweight as measured by body mass index (BMI).

Further details of these results are presented in the report of the first year of evaluation findings (McLaughlin et al., 2002).

The findings for Years 2 and 3 for outcomes measured in all three years mirrored those of Year 1. That is, we did not find any consistent pattern of effects favoring the treatment group schools and students on any of the outcome variables reported on here. Furthermore, there was no consistent pattern of significant effects by subgroup or school district.

³ All references in this chapter to "significant" findings refer to statistically significant findings at the .05 level.

Description of Sample at Baseline

Sample Characteristics

Baseline data on sample children were gathered from both school records and parent interviews. Some key characteristics of the study sample are listed below.

- **Race/Ethnicity:** The student sample at baseline was predominantly White (64 percent), with an additional 17 percent Hispanic and 11 percent Black, fairly similar to national percentages. According to the U.S. Department of Education’s National Center for Educational Statistics (2001), the ethnic makeup of the national elementary and secondary student population was 62 percent White, 16 percent Hispanic, and 17 percent Black.
- **Gender:** The student sample at baseline was fairly evenly split in terms of gender—52 percent girls and 48 percent boys.
- **Age:** The average age of the students at baseline was a little under 10 years old (9.8 years). Slightly more than half the sample (54 percent) was in grades 2 and 3.
- **School Meal Eligibility Status:** A little more than half of the student sample (54 percent) across all schools at baseline were certified as eligible for free or reduced-price meals. This number was somewhat higher than the percent of the student population certified in these categories in the six participating school districts in the study (49 percent).
- **Parent’s Education Level:** Only 11 percent of the parents/guardians interviewed at baseline indicated that they did not graduate from high school. Almost a quarter (24 percent) had a college degree.
- **Household Income:** Only 18 percent of the parents/guardians interviewed at baseline indicated that their household income was less than \$20,000 annually. Nearly one third (30 percent) of the sampled parents reported household incomes of \$60,000 or more.
- **Family Structure:** One quarter of the students lived in a single parent family, as reported by parents at baseline.

Impacts on School Breakfast Participation

School breakfast participation plays a critical role in the evaluation of the SBPP. Increasing the historically low level of school breakfast participation is one of the key goals of the demonstration and serves as the pathway through which short- and long-term outcomes may be realized. In Chapter Three, changes in participation at the school level due to the implementation of the SBPP were reported for descriptive purposes. In this section, the impact of the SBPP on changes in participation at the student level, i.e., for those students in the Impact Study sample, as well as changes in participation at the school level, are analyzed.

Increased participation has been shown to be a result of the implementation of universal-free school breakfast programs across the country, although the magnitude of the increase has varied. In Minnesota's Fast Break to Learning Program, the universal-free schools saw a significant increase over control schools, with participation increasing in treatment schools from 39 to 56 percent (Peterson et al., 2003). Participation was highest (65 percent) among those students eligible for free meals. Other studies based on universal-free school breakfast programs serving breakfast in the classroom have reported increases in participation of about 45 to 65 percentage points (Murphy et al., 2001; Murphy and Pagano, 2001). These findings refer to programs that have served breakfast in the classroom in Baltimore and throughout Maryland.

Measures and Analytic Variables

For five of the six districts, the participation data came from the same electronic point-of-sale accountability system. The Student Nutrition Accountability Program (SNAP) tracks individual student participation in the SBP on a daily basis. The five districts using SNAP provided school-level and student-level participation electronically from the SNAP files for SY 2001-2002 and 2002-2003.⁴ Our analysis is based on these data. In these analyses, SBP participation is defined as the number of meals received divided by the number of days a school is in session, calculated in most cases across the entire school year.

Findings

Similar to the reported findings in Year 1, implementation of universal-free school breakfast lead to significant increases in participation over baseline in treatment schools in both Years 2 (Exhibit 5.1) and 3 (Exhibit 5.2).⁵ Overall, when compared to the baseline year, participation in the treatment schools increased by 19 percentage points (from 19 to 38 percent) in Year 2 and by 17 percentage points (from 19 to 36 percent) in Year 3. Students in the control schools slightly increased their participation over baseline by about 2 percentage points in Years 2 (from 19 to 21 percent) and 3 (from 19 to 21 percent). The overall net gain attributable to the implementation of universal-free school breakfast is thus 17 percentage points in Year 2 and 15 percentage points in Year 3, which are both significant at the .01 level. Over both years, each district also showed net increases relative to baseline participation in treatment school breakfast participation, ranging from about 11 percentage points in Years 2 and 3 for schools in District D to 30 percentage points in Year 2 for schools in District F, the district where students in treatment schools ate breakfast primarily in the classroom (see Exhibit D-2a and D-2b in Appendix D).

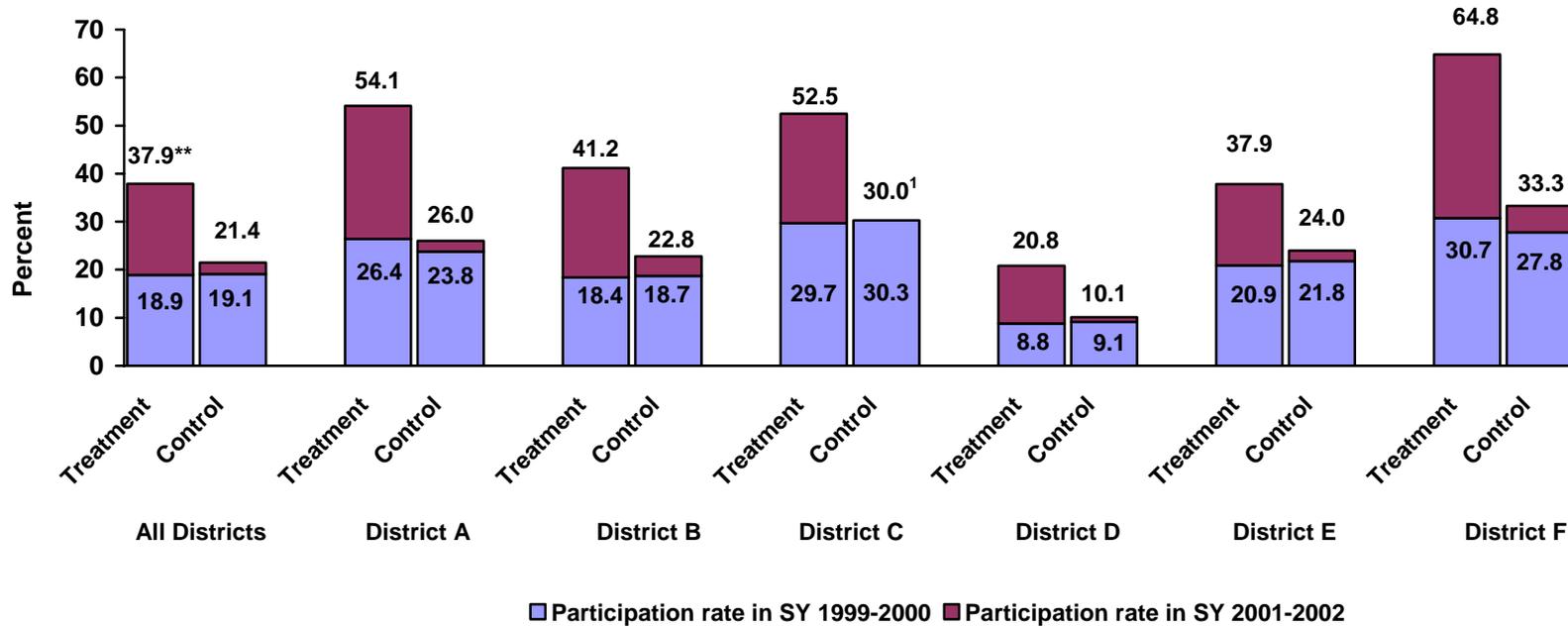
The first year of findings also showed significant increases in participation among sampled students relative to the baseline year. In Year 1, the overall net gain attributable to the implementation of universal-free school breakfast was 19 percentage points, significant at the .01 level. These gains were maintained over time, with a 21 percentage point net gain in Year 2 and a 19 percentage point net gain in Year 3 relative to baseline participation, both significant at the .01 level.

⁴ In the sixth district (District C), breakfasts are recorded on hardcopy forms that cover a two-week period. None of the control schools and only four of the treatment schools in this site could provide student-level data on participation. Thus, student-level analyses could not be conducted for this district.

⁵ School-level participation results presented here vary slightly from those presented in Chapter Three due to the use of the analytic models in the impact analyses.

Exhibit 5.1

School-Level School Breakfast Participation in SYs 1999-2000 and 2001-2002, Overall and by District



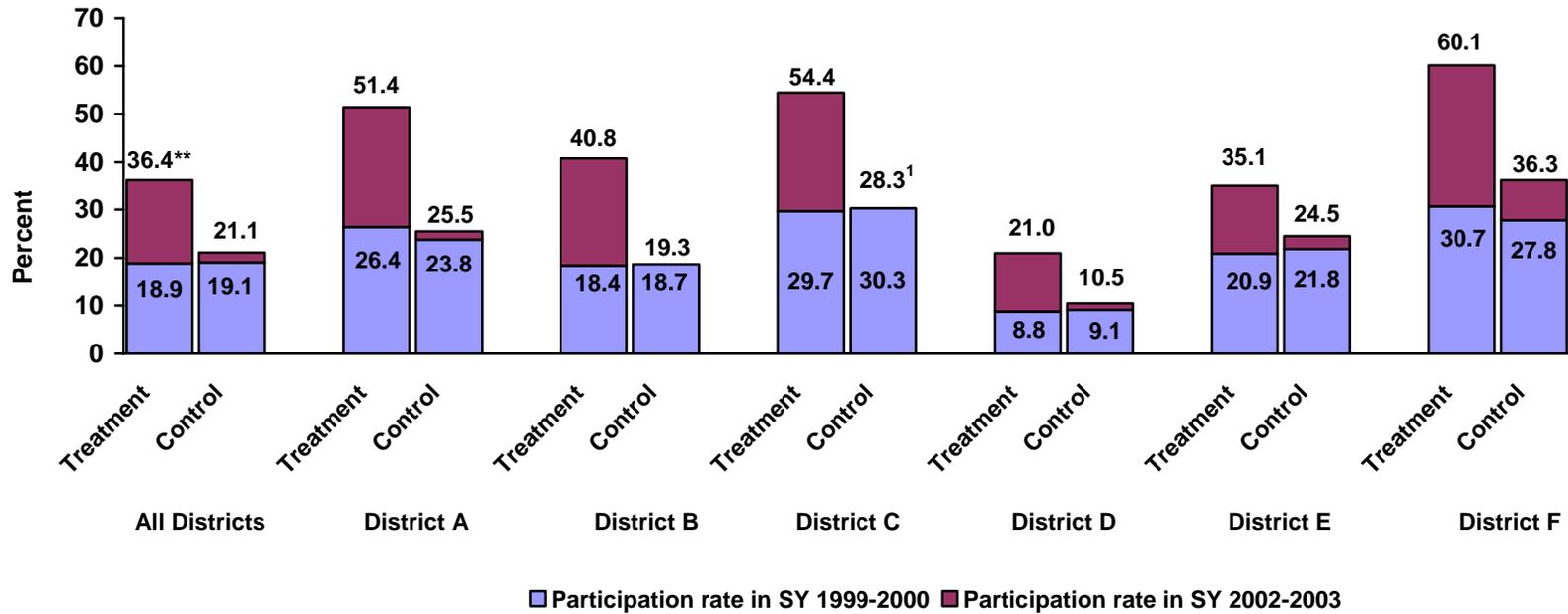
N=151 for all districts, 78 Treatment and 73 Control.

¹ Participation rate decreased from SY 1999-2000 (baseline) to SY 2001-2002 (Year 2).

** Difference in participation gain from SY 1999-2000 to SY 2001-2002 between treatment and control students is statistically significant at the .01 level.

Sources: *Impact Study—School-Level School Breakfast Participation Data, 1999-2000 and 2001-2002*

Exhibit 5.2
School-Level School Breakfast Participation in SYs 1999-2000 and 2002-2003, Overall and by District



N=151 for all districts, 78 for Treatment and 73 for Control.

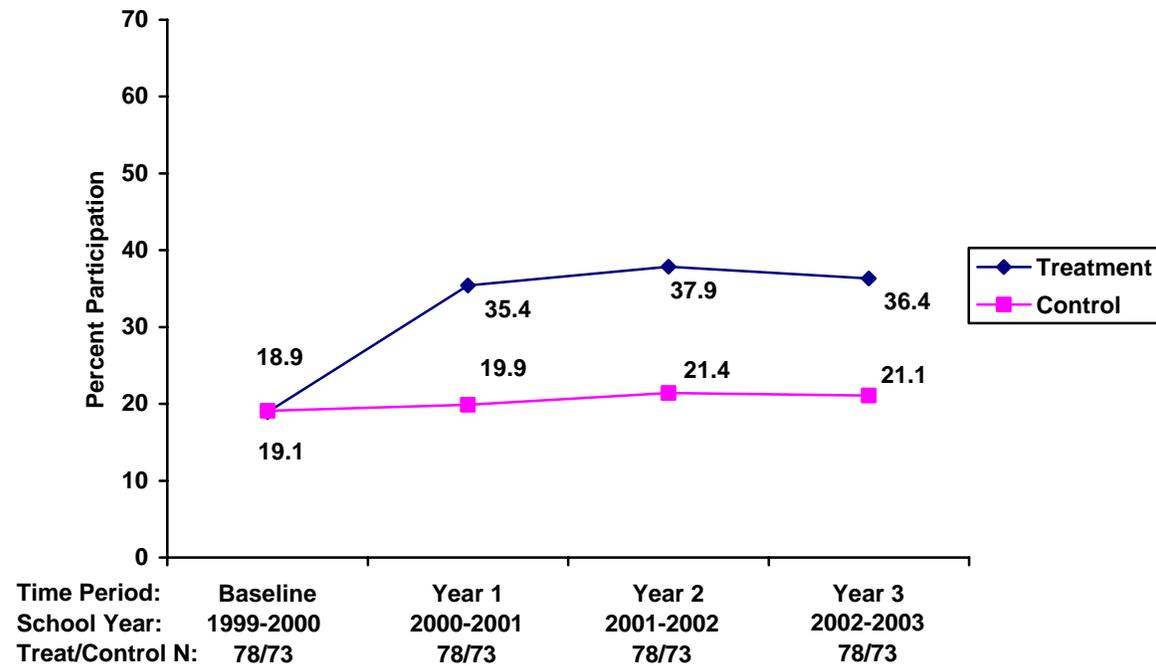
¹ Participation rate decreased from SY 1999-2000 (baseline) to SY 2002-2003 (Year 3).

** Difference in participation gain from SY 1999-2000 to SY 2002-2003 between treatment and control students is statistically significant at the .01 level.

Sources: *Impact Study—School-Level School Breakfast Participation Data, 1999-2000 and 2002-2003*

Exhibit 5.3

Plot of Treatment and Control Group School-Level School Breakfast Participation Over Time



N=151 for all districts, 78 for Treatment and 73 for Control.

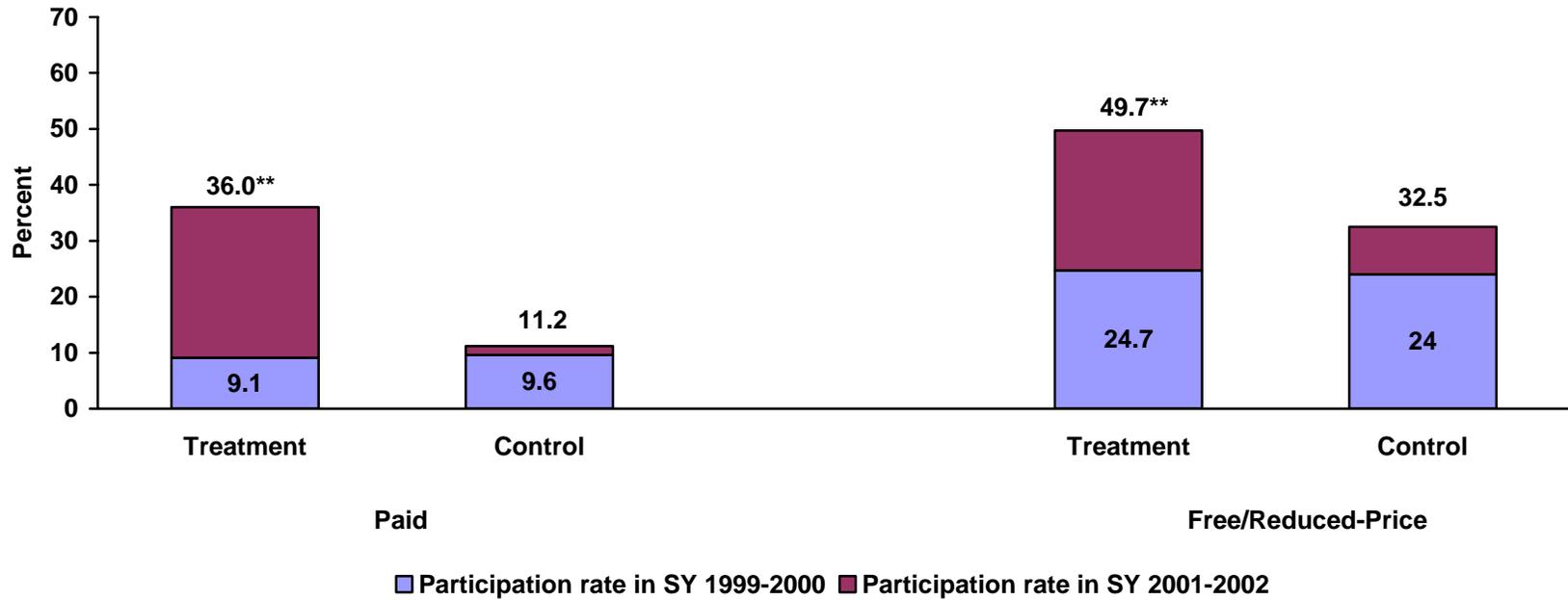
Sources: *Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003*

However, when looking at both school and student-level gains over time, we see that participation essentially remained flat for both treatment and control group schools during implementation Years 2 and 3, both overall and at the district level, indicating that participation did not show any further net increases over what was reached during Year 1 (see Exhibit 5.3). Appendix C contains a complete description of the longitudinal growth curve models used to analyze both student and school-level participation outcomes.

Significant differences also emerged in Year 2 when changes in participation relative to the baseline year are broken down by school meal eligibility status (Exhibit 5.4).⁶ Specifically, relative to baseline participation, paid students in the treatment schools show a significantly greater increase in participation (25 percentage points) compared to their control counterparts than free or reduced-price students (15 percentage points). In Year 3, paid treatment school students also showed a greater net increase in participation relative to the baseline year compared to free or reduced-price students (21 percentage points versus 14 percentage points). This difference, however, was not statistically significant at the .05 level.

⁶ Differences reported here and shown in Exhibit 5.4 are slightly different, as the statistical models used to calculate the impacts are made more precise by including demographic variables (e.g., minority status).

Exhibit 5.4
Overall Gains in School Breakfast Participation of Sampled Students from SY 1999-2000 to SY 2001-2002, by School Meal Eligibility Status¹



 N=2,459

¹ District C could not provide student-level data for this analysis.

** Difference between gains in participation for paid and free/reduced-price students is statistically significant at the .01 level.

 Sources: *Impact Study—Student-Level School Breakfast Participation Data, 1999-2000 and 2001-2002*

Impacts on Student Behavior—Disciplinary Incidents

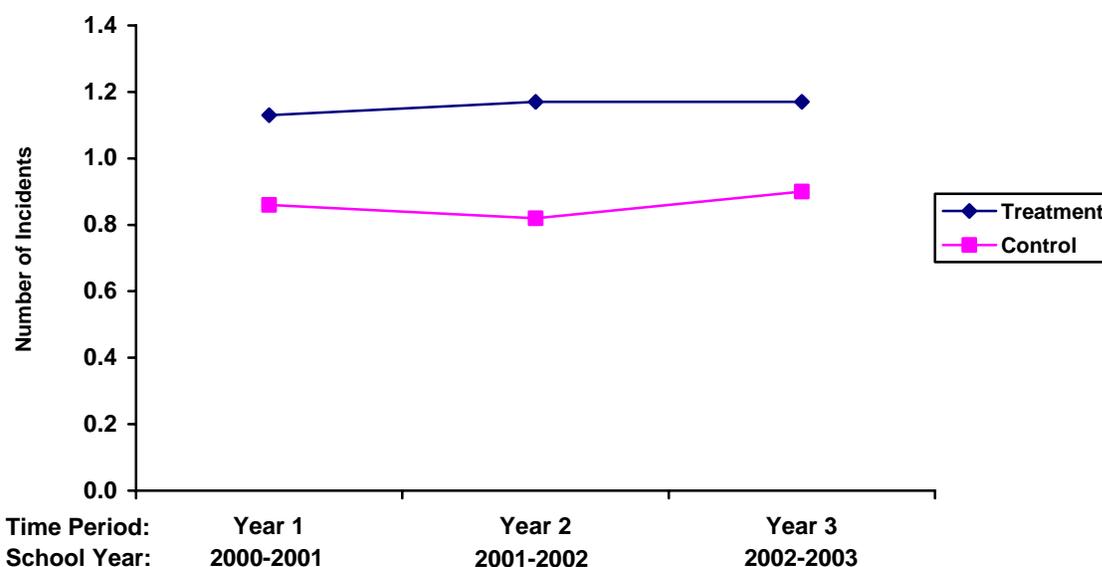
Universal-free school breakfast could also potentially have an effect on student behavior in school. Children who are adequately nourished and ready to learn might be expected to be cooperative, attentive, able to complete tasks, and exhibit more control over their impulses. A number of studies have looked at the effect of universal-free school breakfast on the incidence of disciplinary actions serious enough to warrant a visit to the principal or assistant principal. Student behavior is typically measured in these studies through the use of record logs of the number of disciplinary visits made to the principal's office during the day. Studies conducted by Murphy and his colleagues have found associations between regular participation in school breakfast programs and improved student behavior (see Murphy et al., 1998; Murphy et al., 2000; Murphy and Pagano, 2001). Peterson and her colleagues used a similar methodology in their evaluations of Minnesota's Fast Break to Learning School Breakfast Program (Peterson et al., 2001). These researchers report that after one year of Fast Break, the number of disciplinary infractions in study schools was higher when compared to a baseline year, although the difference was not statistically significant. The greatest number of these incidents took place in the classroom.

In this study, student behavior was based on the number of disciplinary incidents recorded as visits by students to the principal's office over the course of a day. Record logs for the number of disciplinary incidents were collected from each SBPP school over a 20-week period divided among Fall and Spring during both SY 2001-2002 and SY 2002-2003.⁷ The incidents represented repeated offenses or those of a more serious nature that required the principal's intervention. The principal's office provided totals of reported incidences by location (classroom, playground, hallway/cafeteria, or bus) and whether or not the incident took place in the morning or afternoon. The logs document the disciplinary incidents for all students in the school, and therefore the results are presented as school-level outcomes. The mean number of daily incidents per 100 students remained low across all schools in Years 2 and 3, indicating that behavioral problems requiring the principal's intervention were relatively rare in these elementary schools. The results for Year 1 indicated a statistically significant negative effect of universal-free school breakfast on disciplinary incidents, with treatment schools reporting a significantly higher average number of daily disciplinary incidents than controls (1.13 versus 0.86, $p < .05$) (McLaughlin et al., 2002). However, the differences between treatment and control schools were not statistically significant in the two subsequent years. Exhibit 5.5 displays the average number of daily incidents per 100 students for all treatment and control group schools over the three years of data collection.

When the incidents were broken down by time of day, the overall results indicated a significant impact in the morning in Year 1 (treatment school mean of 0.52, compared to control school mean of 0.39, $p < .05$). In Year 2, on the other hand, there was a significant impact in the afternoon (treatment school mean of 0.58, compared to control school mean of 0.40, $p < .05$). However, in Year 3, there was no effect by time of day. In terms of location of incident, the only significant finding was in Year 3, where treatment schools had a higher number of incidents in the playground (0.33) than control group schools (0.23), $p < .05$.

⁷ In Year 1 (SY 2000-2001), all logs were collected during a 20-week contiguous period from January through May.

Exhibit 5.5**School-Level Mean Number of Daily Disciplinary Incidents Over Time¹**



¹ Baseline data on disciplinary incidents were not available for SY 1999-2000. In SY 2000-2001, the data were collected for 20 weeks from January to May. In subsequent two school years, the data were collected for 10 weeks each in Fall and Spring, for a total of 20 weeks each year.

Sources: *Impact Study—Logs of Visits by Students to the School Office for Disciplinary Reasons, 2000-2001, 2001-2002, and 2002-2003*

Impacts on Academic Achievement

Of particular interest in the study is the hypothesized long-term effect of the SBPP on student academic achievement test scores. Given the increased scrutiny paid to student testing, previous research has focused on relationships between student participation in school breakfast and student performance on academic tests. While previous studies have suggested a link between school breakfast participation and an increase in standardized test scores (see Meyers et al., 1989; Wahlstrom et al., 1997), in general they have suffered from weak designs and inconsistent findings.

This study, on the other hand, allows for a rigorous test of the hypothesis of whether or not the availability of universal-free school breakfast leads to improvement in academic test scores when compared to schools offering the regular SBP. The experimental design represents a considerable improvement over previous research in ensuring a high level of internal validity.

Measures and Analytic Variables

The school districts selected for the SBPP posed several challenges to the evaluation of achievement gains associated with universal-free school breakfast. While all of the school districts administered norm-referenced standardized tests in at least three consecutive grade levels, they were not the same tests across all districts. In addition, as shown in Exhibit 5.6, they varied in terms of the grades in which the tests are administered, and with respect to the timing of administration (Fall versus Spring).

An additional complication is that with the advent of the No Child Left Behind Act of 2001 (Public Law 107-110),⁸ some school districts abandoned their norm-referenced testing program in Years 2 and 3, in order to comply with the testing requirements of the new legislation. (See Appendix B for details on changes in test administration during Years 2 and 3.)⁹

Exhibit 5.6

Standardized Achievement Tests Used in the SBPP¹

School District	Number of Schools	Standardized Test	Grade Levels Tested	Test Schedule
Boise	34	ITBS	3-6	Fall
		NWEA	2-6	Spring
Shelby	16	SAT-9/SAT-10	3-6	Spring
Harrison ²	10	CTBS	2-6	Spring
Phoenix	24	SAT-9	2-6	Spring
Santa Rosa	10	SAT-9	2-6	Spring
Wichita	59	MAT-7	3-6	Fall
		State	4-5	Spring
		Local	2,5	Spring

ITBS: Iowa Test of Basic Skills

SAT-9: Stanford Achievement Test, Ninth Edition

SAT-10: Stanford Achievement Test, Tenth Edition

CTBS: Comprehensive Test of Basic Skills, Terra Nova

MAT-7: Metropolitan Achievement Test, Seventh Edition

NWEA: Northwest Educational Association – Idaho State Assessment

State: Kansas State Assessment Test

Local: Local Benchmark Test

¹ A more detailed summary of achievement test score data collected for each district in SBPP Years 2 and 3 is presented in Appendix B.

² Harrison County began using the Mississippi Curriculum Test during the course of the study. It is a performance-based test that cannot be linked to the SAT-9, so it was not included in the analyses reported here.

In estimating impacts on achievement scores, we used traditional methods of combining data from different tests, grade levels, and/or timing of administration, based on equating or linking procedures.¹⁰ The goal of these procedures is to link the various tests to the scaled score metric of the most frequently employed test. Scale scores, or developmental scores, are scores that provide a common scale for different forms of a test or for different tests. Test linking is a method of converting scores on one test to the same scale as scores on a second test, when scores on the two tests are highly correlated and when the two tests cover the same general content domain (i.e. both are reading tests or both are math tests). While test linking may involve some error due to the differences in content across tests, these errors are minimized to the extent that within each district, the same standardized test is used. Moreover, the randomized design within each district ensures that any measurement errors are evenly distributed across both treatment and control schools. Thus, linking errors do not affect the comparisons between treatment and comparison schools within districts that are the basis of our impact estimates. Therefore, the analysis of achievement data is not adversely

⁸ The No Child Left Behind Act was signed into law in January 2002. Among the requirements of the Act, states were required to put in place annual, standards-based assessments in reading and math for grades 3 through 8 by SY 2005-2006. The Department of Education website offers more information at <http://www.ed.gov/policy/elsec/leg/esea02/index.html>.

⁹ The variations in tests and grades tested in each district affected the statistical power for the achievement analyses, as there were small samples sizes for some analyses (e.g., second grade reading scores).

¹⁰ See Kolen and Brennan, 1995; Linn, 1993; and Mislevy, 1992 for detailed discussions of these methods.

affected by linking errors. To obtain greater statistical power, estimates are aggregated across school districts, resulting in an estimate of the average within-district effect. While errors in linking different tests may reduce the precision of the estimate of the true impact somewhat, the weighted average across districts is still an unbiased estimate of impact.

The linking approach used involved picking one standardized test to serve as the "standard metric." All other tests were then linked to the scale score metric of the standard test. The SAT-9 used by three districts with a combined total of 50 schools was chosen as the standard test. Scores on the other tests, the CTBS, the ITBS, and the MAT-7, were then linked to the scale score metric of the SAT-9.¹¹

Similarly, linking procedures were employed to conduct pooled analyses of school-level effects on academic achievement. Each school in the study provided average national percentile rank scores by grade level for their respective test. These scores were subsequently converted to normal curve equivalent scores (NCEs). These are normalized scores with a mean of 50 and a standard deviation of 21.06, and are amenable to algebraic manipulation when averaging scores across groups.

Findings

Gains in academic achievement test scores were measured at both the student and school levels. At the student level, gain scores were measured on the same students as they moved from one grade to the next. For example, scores on students in third grade in 1999-2000 were compared to their fifth grade scores in 2001-2002. On the other hand, gains at the school level were measured on different cohorts of students at the same grade, two or three years apart (e.g., third graders in 1999-2000 versus third graders in 2001-2002). Findings for all analyses are presented in Appendix D.

Student Gain Scores

Gain scores were measured by grade for both reading and math. Overall, for student-level test scores, there were no significant differences favoring the treatment schools in either Year 2 or 3.¹² There was also no consistent set of results for any of the six school districts. We also conducted an analysis in which student-level test score results for each grade cohort were combined to form one estimate within each school. These analyses, which yielded an average scale score per school, did not show any significant differences between treatment and control school students on either math or reading in Years 2 or 3. Finally, the analyses measuring differences in impacts on test scores among free or reduced-price versus paid students did not display a consistent pattern of results either overall or

¹¹ This linking process was based on the assumption that the norm groups from the different tests are representative samples from the same population. The equipercentile method was used to link the two tests, whereby each possible score on the MAT-7 was assigned a SAT-9 scale score equivalent. The SAT-9 score equivalent to score X on the MAT-7 is the SAT-9 scale score with the same percentile rank (in the SAT-9 national norm group) as score X has in the MAT-7 norm group. That is, if score X on the MAT-7 has a percentile rank of 54 (in the MAT-7 national norm group) and a SAT-9 scale score of 450 corresponds to a percentile rank of 54 (in the SAT-9 national norm group), then score X on the MAT-7 was assigned a SAT-9 equivalent score of 450. Similar linking procedures were used to equate test scores on the ITBS and the CTBS to the SAT-9.

¹² On a measure of second to fourth grade math gain, control group students performed significantly better than treatment group students ($p < .05$).

across school districts. Impacts for other subgroups did not show any consistent pattern in terms of significant differences.¹³

In addition to looking at differences in gain scores in Years 2 and 3, we also examined patterns of growth in academic achievement test scores over time. Appendix E contains a series of plots of treatment versus control group student performance on both reading and math for each grade cohort. When looking at the growth trajectories for both groups across all six school districts, the patterns are strikingly similar. That is, both groups make approximately the same amount of progress over time regardless of test measure or grade cohort. However, when comparing these standardized scores to the scores for the national normative sample, the plots show that SBPP students in both the treatment and control groups outperform students nationally in both reading and math over time, by roughly 10 to 25 percentage points. (Differences range from 6 to 28 percentage points). This does not reflect any impacts of universal-free school breakfast, but rather the fact that study schools, on average, happen to perform above the national average in terms of student academic achievement.

School Gain Scores

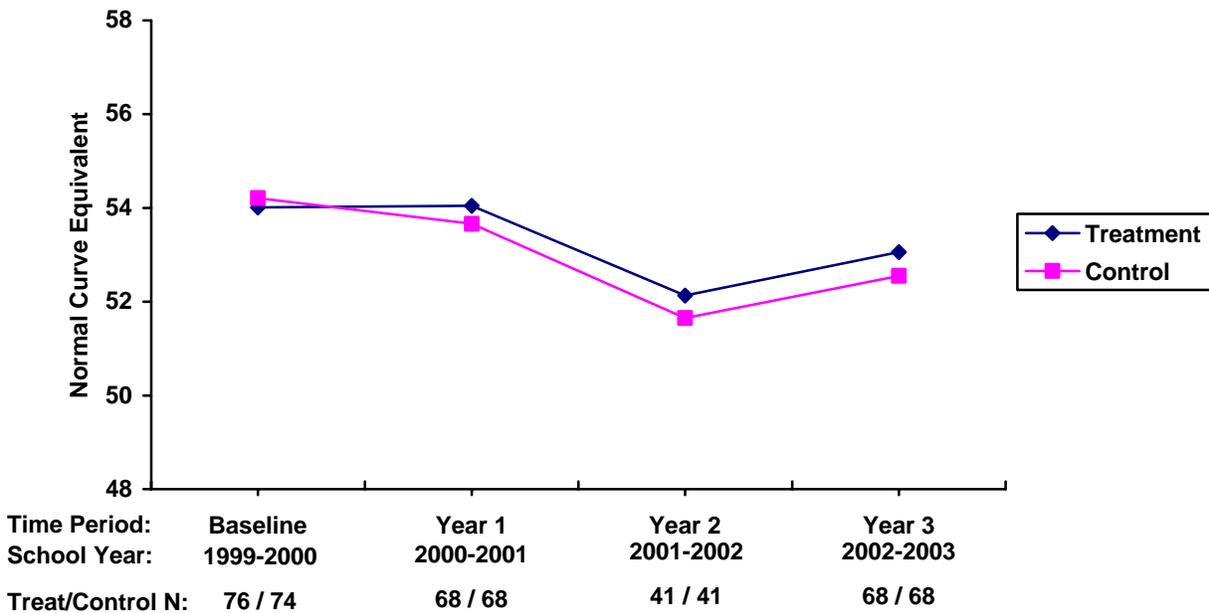
Gains at the school level, on the other hand, showed some scattered significant effects. Specifically, there were significant differences in gain scores favoring the treatment schools on sixth-grade math in Year 3 ($p < .05$) and second grade reading in Year 2 ($p < .05$). In addition, there were scattered significant effects at the district level, indicating that treatment effects varied across districts. However, in examining the district-level data, none of the school districts showed any discernible pattern of results at the school level. School-level results by grade were also aggregated within school to yield school-level average Normal Curve Equivalent (NCE) scores. On both math (Years 2 and 3) and reading (Year 2), there was significant variation in impacts across districts. These analyses, however, did not show any significant effects at the school district level, with the exception of math in Year 3, where there was an increase of 1.39 in treatment school NCE scores that was significantly different from a decline of -0.26 in control school NCE scores in District B ($p < .05$). Exhibits 5.7 and 5.8 show the average school-level NCE scores in reading and math across treatment and control schools in all six districts over the time of the study.

Impacts on Attendance and Tardiness

Children must consistently come to school and be on time for the instruction to begin to take full advantage of the learning opportunities provided by school. Providing free school breakfast might serve as an incentive for students to increase their attendance and cut down on their tardiness. Previous research and anecdotal evidence from ongoing universal-free school breakfast programs suggest that breakfast may offer these benefits. Increased attendance and decreased tardiness have been associated with free breakfast programs across several research reports and reviews (e.g., Meyers et al., 1989; Murphy et al., 2000; Briefel et al., 1999; Pollitt and Matthews, 1998; Food Research and Action Center, 2001). Positive changes in these two outcomes have not always

¹³ In terms of subgroup findings, we only found a scattering of effects. For example, there was a larger impact on female students in terms of a math score gain across all grades ($p < .05$). In addition, there was a larger impact for white students in terms of a math score gain from second to fifth grade ($p < .01$). Given the large number of non-significant results for all other subgroup tests, we must treat these findings with caution. In total, 56 subgroup analyses were conducted with only 2 statistically significant. By chance alone, we would expect to find three of these differences significant.

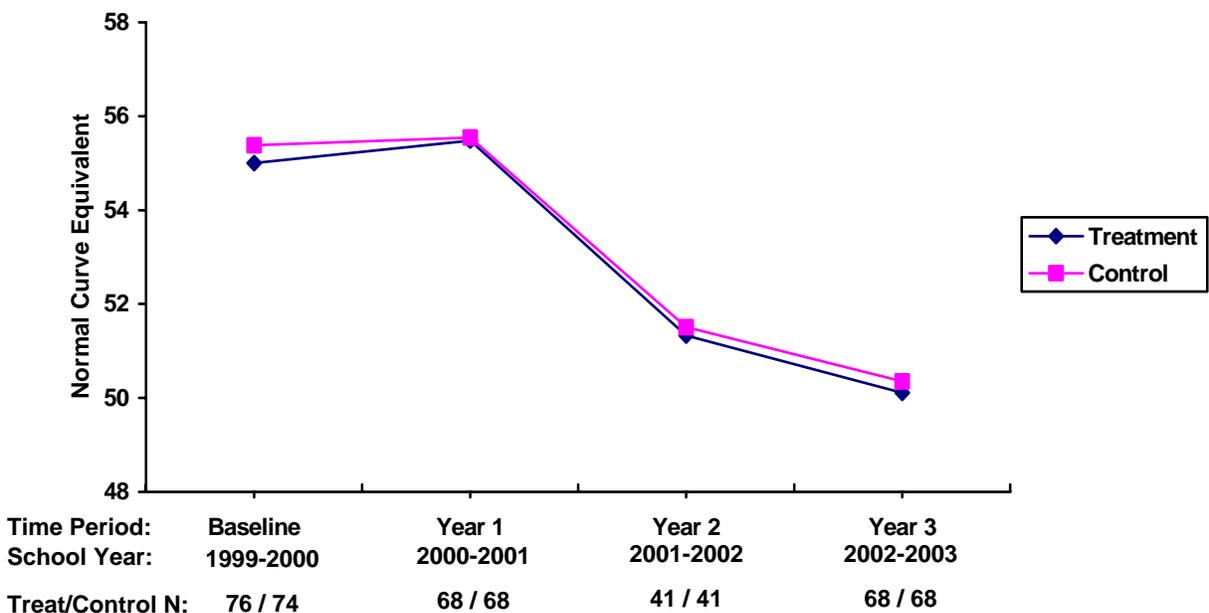
Exhibit 5.7**Average Normal Curve Equivalent Scores in Math for Treatment and Control Schools Over Time¹**



¹ Data were not available for District E in Year 2. Results did not greatly vary, however, when these analyses were conducted excluding District E from all years.

Sources: *Impact Study—School-Level Academic Achievement Test Scores, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.*

Exhibit 5.8**Average Normal Curve Equivalent Scores in Reading for Treatment and Control Schools Over Time¹**



¹ Data were not available for District E in Year 2. Results did not greatly vary, however, when these analyses were conducted excluding District E from all years.

Sources: *Impact Study—School-Level Academic Achievement Test Scores, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.*

emerged. In Minnesota's Fast Break to Learning Program, for example, universal-free school breakfast did not increase attendance for treatment versus control schools (Peterson et al., 2003). Given that average attendance rates in this state are already quite high (95 to 96 percent), there may not be much room for significant gains. In the most recent report for the Maryland Meals for Achievement Program, tardiness decreased while attendance showed no change (Murphy & Pagano, 2001). Thus, while some precedent exists for changes in attendance and tardiness as a result of providing free school breakfasts, no definitive pattern has been found across research studies.

Measures and Analytic Variables

Computerized attendance records at the district level were used for this analysis. Data were obtained at both the student and school levels for the second and third years of SBPP implementation (SYs 2001-2002 and 2002-2003), in addition to the baseline data previously collected.¹⁴ Attendance is defined as the number of days present at school divided by the total number of enrolled school days. The mean percentage of days present was compared for both treatment and control students and schools.

Tardiness is defined as the number of days the student was late as a percent of the number of enrolled school days. Data on tardiness were not consistently available at the student and school levels. In only two of the Districts (C and D), were data on tardiness available at both levels. District E could not provide data at either level. District B could not provide school-level data or student-level data at baseline (and thus no gains could be assessed over the years). While the other Districts (A and F) had student-level data available, District F data collection was inconsistent across schools. Given the inclusion of this measure in the legislatively mandated request for the evaluation, the analysis was conducted. The amount of missing information is important to consider, however, when interpreting the results.

Findings

For both Years 2 and 3, no effects of the availability of universal-free school breakfast were found on either attendance or tardiness for any of the main or subgroup analyses conducted. However, the rates of attendance were generally high and rates of tardiness were low across all schools, thus leaving little room for improvement on these outcomes. The amount of missing tardiness data should also be recognized when assessing the results.

In Year 3, although the overall treatment effect on attendance was not significant, there was a significant district-by-treatment interaction ($p < .05$; Exhibit D-26b). There were no significant treatment effects at the district level, however. The levels of attendance were quite high across all schools in the study. For students in the impact sample, attendance ranged from 95 to 96 percent across treatment and control schools. At the school level, overall attendance ranged from 91 to 96 percent.

In Year 3, although the overall treatment effect on tardiness was not significant, there was a significant district-by-treatment interaction at the student level ($p < .05$). However, there were no significant treatment effects for tardiness in any of the four districts included in the analysis. The

¹⁴ Data at the student level were only for students in the SBPP study sample, in contrast to school-level means for all students in the school.

mean number of student days tardy as a percent of enrolled school days ranged from 0 to 2.5 percent across treatment and control students. At the school level, tardiness ranged from 1.6 to 2.3 percent of days enrolled in the two districts reporting these data.

Impacts on Student Health—School Nurse Visits

Participation in school breakfast was also hypothesized to lead to improvements in student health. Eating school breakfast should make a difference in how students were feeling that day, and consistent participation might lead to improved nutrition and longer-term improvement in health status.

While the link between breakfast and health status has been established (Jacobson et al., 2001), very few of the studies of universal-free school breakfast programs report on health outcomes. One exception is a 1997 study of a pilot breakfast program in Minnesota by Dr. Kyla Wahlstrom and her colleagues, who questioned school staff, parents, and students about the benefits of universal-free school breakfast. Among the positive benefits reported were reductions in health and stress problems, including a decrease in the number of visits students made to the school nurse for headaches and stomachaches (Peterson et al., 2001). In the latest evaluation of the Maryland universal-free school breakfast program, there were slightly fewer reported visits to the school nurse associated with participation, but this was not significant (Murphy and Pagano, 2001).

Student health was measured by the number of visits made to the school nurse's office during the course of a day. Logs of school nurse visits were obtained from each SBPP school over a 20-week period divided among Fall and Spring during both SY 2001-2002 and SY 2002-2003.¹⁵ School nurses or health clinic staff provided totals of reported incidents for contagious illnesses, injuries, and minor and acute illnesses broken down by whether the visit came in the morning or afternoon. Visits to the nurse's office for medications were not included in the counts. It was not possible for schools to provide logs identifying individual students from the study sample. The logs were kept for all students visiting the nurse's office and the measure is thus a school-level rather than a student-level outcome. The mean number of daily visits recorded over a 20-week period was calculated for each district and averaged across all districts. The data were also analyzed by time of day of nurse visit, as it was expected that school breakfast might have more of an impact on morning than afternoon visits.

Findings

The school-level mean for the number of daily visits to the nurse's office or health clinic did not differ significantly between treatment and control schools in the first year of the SBPP (McLaughlin et al., 2002). In Year 2, there was a significantly higher average number of daily visits to the school nurse for students in control schools, 4.0 compared to 3.3 for students in treatment schools, $p < .05$. When analyzed by time of day in Year 2, there were more visits to the school nurse in the morning in control schools, 2.2 compared with 1.8 for students in treatment schools, $p < .01$. There were no significant differences for Year 3, overall or by time of day.

¹⁵ In Year 1 (SY 2000-2001), all logs were collected during a contiguous 20-week period from January through May.

Summary of Impact Findings in Years 2 and 3

Exhibits 5.9 through 5.12 summarize the Impact Study findings presented in this chapter. Detailed tables are presented in Appendix D.

Exhibit 5.9**Student-Level Outcome Gains, SY 1999-2000 (baseline) to 2001-2002 (Year 2) and SY 1999-2000 (baseline) to 2002-2003 (Year 3)**

Outcome	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools			Impact	Effect Size
	N	Pre	Gain	N	Pre	Gain		
School Breakfast Participation (Year 2)	1272	16.27 (0.68)	25.99	1187	16.19 (0.72)	4.78	20.41**	0.83
School Breakfast Participation (Year 3)	879	15.19 (0.82)	22.70	800	15.52 (0.86)	3.88	18.10**+	0.74
Math Achievement ¹ (Year 2)	762	604.61 (1.40)	40.33	759	601.41 (1.37)	43.02	-1.99	-0.06
Math Achievement ¹ (Year 3)	614	600.72 (1.52)	64.28	651	599.63 (1.46)	66.70	-1.77	-0.05
Reading Achievement ¹ (Year 2)	678	619.12 (1.77)	40.73	673	619.59 (1.78)	39.34	0.28	0.01
Reading Achievement ¹ (Year 3)	610	616.71 (1.90)	54.58	642	617.96 (1.80)	51.56	2.01	0.06
Attendance ² (Year 2)	1368	95.93 (0.12)	-0.20	1328	95.74 (0.11)	-0.19	0.13	0.03
Attendance ² (Year 3)	931	96.04 (0.12)	-0.31	896	95.64 (0.13)	-0.12	0.02+	0.01
Days Tardy as a Percent of School Days Enrolled (Year 2)	541	1.52 (0.13)	-0.26	535	1.80 (0.15)	-0.53	0.25	0.08
Days Tardy as a Percent of School Days Enrolled (Year 3)	327	1.68 (0.19)	-0.02	349	1.83 (0.19)	0.03	-0.06+	-0.02

¹ All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.

² Based on average percent of days student present.

Notes: Pre = pre-implementation or baseline year

Gain = second year of implementation—pre-implementation year

** Difference is statistically significant at the .01 level.

+ District-by-treatment interaction is statistically significant at the .05 level.

Source: *Impact Study—Student-Level School Breakfast Participation, Attendance and Academic Achievement Test Score Data, 1999-2000, 2001-2002, and 2002-2003.*

Exhibit 5.10**School-Level Outcome Gains, SY 1999-2000 (baseline) to 2001-2002 (Year 2) and SY 1999-2000 (baseline) to 2002-2003 (Year 3)**

Outcome	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools			Impact	Effect Size
	N	Pre	Gain	N	Pre	Gain		
School Breakfast Participation (Year 2)	69	18.93 (1.19)	18.93	69	19.11 (1.24)	2.29	16.63**	1.65
School Breakfast Participation (Year 3)	69	18.93 (1.19)	17.42	69	19.11 (1.24)	1.99	15.41**	1.53
Math Score ¹ (Year 2)	164 ²	53.55 (0.80)	-1.91	164 ²	53.33 (0.74)	-1.91	0.16+	0.02
Math Score ¹ (Year 3)	178 ²	53.56 (0.69)	-1.20	178 ²	53.27 (0.67)	-1.56	0.55+	0.06
Reading Score ¹ (Year 2)	164 ²	55.76 (0.94)	-4.98	164 ²	55.52 (0.87)	-4.37	-0.44+	-0.04
Reading Score ¹ (Year 3)	178 ²	55.08 (0.85)	-5.18	178 ²	55.06 (0.80)	-5.48	0.28	0.03
Average Daily Attendance (Year 2)	69	93.94 (0.43)	-0.16	69	94.06 (0.36)	-0.26	0.00	0.00
Average Daily Attendance (Year 3)	69	93.94 (0.43)	-0.74	69	94.06 (0.36)	-1.23	0.38	0.12
Days Tardy as a Percent of School Days Enrolled (Year 2)	20	1.89 (0.15)	-0.09	20	1.89 (0.23)	0.45	-0.29	-0.34
Days Tardy as a Percent of School Days Enrolled (Year 3)	10	1.67 (0.22)	-0.27	10	2.13 (0.44)	-0.19	-0.39	-0.36

¹ Based on normal curve equivalent scores.

² The N is the sum of all grades across schools in the six districts.

Notes: Pre = pre-implementation or baseline year

Gain = second year of implementation – pre-implementation year

+ District-by-treatment interaction is statistically significant at the .05 level.

Source: *Impact Study—School-Level School Breakfast Participation, Attendance and Academic Achievement Test Score Data, 1999-2000, 2001-2002, and 2002-2003.*

Exhibit 5.11**School-Level Disciplinary Incidents, SYs 2001-2002 (Year 2) and 2002-2003 (Year 3)**

Outcome	Unadjusted Means (Standard Errors)				Results of Impact Models	
	Treatment Schools		Control Schools		Impact	Effect Size
	N	Mean	N	Mean		
Overall						
Average Number of Daily Disciplinary Incidents ¹ (Year 2)	1438	0.57 (0.03)	1285	0.42 (0.02)	0.17	0.19
Average Number of Daily Disciplinary Incidents ¹ (Year 3)	1444	0.56 (0.03)	1329	0.41 (0.02)	0.17	0.20
By Time of Day						
Average Number of Morning Disciplinary Incidents ¹ (Year 2)	1438	0.57 (0.03)	1285	0.42 (0.02)	0.17	0.19
Average Number of Afternoon Disciplinary Incidents ¹ (Year 2)	1438	0.58 (0.03)	1285	0.40 (0.01)	0.19*	0.24
Average Number of Morning Disciplinary Incidents ¹ (Year 3)	1444	0.56 (0.03)	1329	0.41 (0.02)	0.17	0.20
Average Number of Afternoon Disciplinary Incidents ¹ (Year 3)	1444	0.62 (0.02)	1329	0.49 (0.02)	0.13	0.15
By Location²						
Average Number of Bus Incidents ¹ (Year 2)	1439	0.08 (0.01)	1283	0.08 (0.01)	0.00	0.01
Average Number of Classroom Incidents ¹ (Year 2)	1439	0.63 (0.03)	1285	0.40 (0.01)	0.24	0.24
Average Number of Hallway Incidents ^{1,2} (Year 2)	1439	0.13 (0.02)	1285	0.09 (0.01)	0.04	0.08
Average Number of Playground Incidents ¹ (Year 2)	1439	0.29 (0.02)	1285	0.22 (0.01)	0.09	0.17
Average Number of Incidents in Other Locations ¹ (Year 2)	1439	0.02 (0.00)	1285	0.03 (0.00)	-0.01	-0.08
Average Number of Bus Incidents ¹ (Year 3)	1444	0.07 (0.01)	1329	0.08 (0.01)	-0.01	-0.05
Average Number of Classroom Incidents ¹ (Year 3)	1444	0.62 (0.03)	1329	0.44 (0.02)	0.18	0.18
Average Number of Hallway Incidents ^{1,2} (Year 3)	1444	0.13 (0.01)	1329	0.10 (0.01)	0.03	0.07
Average Number of Playground Incidents ¹ (Year 3)	1444	0.33 (0.02)	1329	0.23 (0.01)	0.10*	0.19
Average Number of Incidents in Other Locations ¹ (Year 3)	1444	0.04 (0.01)	1329	0.04 (0.00)	-0.01	-0.04

¹ Logs of incidents represent the number of daily incidents per 100 students. Disciplinary incident logs were requested weekly from each study school for 20 weeks during the school year. The N represents the total number of weekly logs actually obtained from treatment and control schools during the data collection period.

² The logs for disciplinary incidents combines hallway and cafeteria. Principals were asked about hallway and cafeteria locations separately in the most recent interview, and the results are reported in Exhibit 3.11.

*Difference is statistically significant at the .05 level.

Source: *Impact Study—Logs of Visits by Students to the School Office for Disciplinary Reasons, 2001-2002, 2002-2003.*

Exhibit 5.12**School-Level Health Office/Nurse Visits, SYs 2001-2002 (Year 2) and 2002-2003 (Year 3)**

Outcome	Unadjusted Means (Standard Errors)				Results of Impact Models	
	Treatment Schools		Control Schools		Impact	Effect Size
	N	Mean	N	Mean		
Overall						
Average Number of Daily Health Office/Nurse Visits ¹ (Year 2)	1454	3.31 (0.05)	1320	4.02 (0.07)	-0.65*	-0.28
Average Number of Daily Health Office/Nurse Visits ¹ (Year 3)	1500	3.53 (0.06)	1358	3.78 (0.07)	-0.28	-0.18
By Time of Day						
Average Number of Morning Health Office/Nurse Visits ¹ (Year 2)	1454	1.80 (0.03)	1320	2.22 (0.05)	-0.43**	0.29
Average Number of Afternoon Health Office/Nurse Visits ¹ (Year 2)	1454	1.50 (0.03)	1320	1.80 (0.04)	-0.22	-0.16
Average Number of Morning Health Office/Nurse Visits ¹ (Year 3)	1461	1.85 (0.04)	1332	2.04 (0.04)	-0.19	-0.13
Average Number of Afternoon Health Office/Nurse Visits ¹ (Year 3)	1461	1.68 (0.04)	1332	1.69 (0.04)	-0.06	-0.04

¹ Logs of visits represent the number of daily visits per 100 students. Logs of health office/nurse visits were requested weekly from each study school for 20 weeks during the school year. The N represents the total number of weekly logs actually obtained from treatment and control schools during the data collection period.

*Difference is statistically significant at the .05 level.

**Difference is statistically significant at the .01 level.

Source: *Impact Study—Logs of Visits to the Health Office/School Nurse, 2001-2002, 2002-2003.*

Chapter Six

Results of Non-Experimental Analyses

The body of the report on the first year of findings (McLaughlin et al., 2002) focused on questions addressing the implementation of the SBPP and on the impact of the availability of universal-free school breakfast on student and school outcomes. Since the release of the report, policy makers and key stakeholders have requested additional data analyses that focus on various aspects of the SBPP and on student breakfast consumption in general. This chapter focuses on these supplementary analyses.

As discussed in Chapter One, we address six main questions in these analyses:

- What is the relationship between breakfast consumption and nutrition and academic outcomes for all students? Specifically, what are the outcomes for those who consume a robust or substantive breakfast and for those who skip breakfast?
- Do students who only eat breakfast at school have different nutrition outcomes than students who only eat breakfast at home or at home *and* school?
- Do treatment group students in schools where breakfast is eaten in the classroom have different nutrition outcomes than treatment group students in schools where breakfast is eaten in other locations (e.g., cafeteria, hallway) or from control group students where school breakfast is eaten in non-classroom locations?
- Do students from families below 130 percent of the federal poverty level have different nutrition outcomes than students in higher income families?
- Do students who are classified as food insecure differ in their household characteristics from students who are food secure?
- How does school breakfast participation change over the course of the SBPP? Do students with certain demographic characteristics follow a particular participation pattern?

Each section of this chapter will address the analysis associated with one of these questions. Exhibits summarizing the findings for these analyses are presented either in this chapter or in Appendix G. All exhibits are accompanied by means (or percentages) and standard errors. Adjusted differences and effect sizes (or odds ratios) are also provided in Appendix G. Statistically significant differences between groups are reported at the $p < .05$ level.

It is important to note that the supplementary analyses were performed outside the experimental framework of the study design. These analyses address questions that are more difficult to address given the original design of this study, and thus the results cannot be interpreted with the same degree of certainty. A particular concern for non-experimental comparisons is that they may be subject to selection bias. That is, the two groups being compared—those that skipped and did not skip breakfast, for example—may differ systematically in ways other than the fact that on a given day students did or did not eat breakfast. Observed differences in outcomes between the two groups would thus be a combination of the effects of skipping or not skipping breakfast and other pre-existing differences. Although we control for student background characteristics wherever possible in

these analyses, we cannot assume that groups are statistically comparable, as they are in the experimental impact analyses.¹ Appendix H presents the results of tests of selection bias conducted on the non-experimental analyses in this chapter. The results suggest that for two analyses, one comparing home and school breakfast eaters, and the other comparing classroom and non-classroom breakfast locations, selection bias is likely affecting the outcomes. For the other analyses included here, the results of the test are more reassuring, with selection bias less likely to influence student outcomes in these comparisons. Thus, while the analyses are helpful in further exploring some of the relationships within the SBPP data, caution is required in interpreting results from these non-experimental comparisons.

Before reporting the results of the supplementary analyses, we summarize a set of secondary analyses that were conducted for the first year report (McLaughlin et al., 2002). Like the supplementary analyses included in this report, these results were in response to questions that were important to ask of the data, but outside the main focus on SBPP implementation and on the impact of the availability of universal-free school breakfast on students.

Summary of the First Year Findings of Supplementary Analyses

Reported in Appendix F of McLaughlin et al. (2002), these analyses focused on:

- The impact of universal-free school breakfast on students who actually participated in the program (as opposed to those to whom it was made available);
- Impacts on students who increased their participation over the first year by two or more days a week;
- The effects of the availability of school breakfast in the classroom; and,
- The effects of breakfast consumption on cognitive functioning.

The results of the SBPP impacts on students who actually participated are summarized in Appendix F of this volume. The results of the other analyses are summarized by topic below.

Impacts on Students Who Increased Their School Breakfast Participation

A second set of analyses focused on whether students who increased their participation in school breakfast relative to the baseline year had better outcomes than those whose participation level remained the same. This analysis was conducted in a non-experimental framework, as the students were not randomly assigned to different levels of participation. The analysis focused on those students from both treatment and control group schools that increased their participation by 40 percent or more over the first year of implementation, the equivalent to an increase of two or more days per week. This group of students, referred to as “changers,” was compared with “non-changers” on measures of cognitive functioning, food insecurity, and measures of student health, behavior, and academic achievement, controlling for observable differences in their characteristics.

¹ The supplementary analyses were conducted within the same regression model used for the impact analyses, controlling for student age, gender, minority status, and school meal eligibility. The model is described in Appendix C of the first year report (McLaughlin et al., 2002).

- Statistically significant differences between changers and non-changers were in the negative direction, with poorer scores for changers on teacher ratings of hyperactivity and an index of an attention disorder, as well as their ability to focus and follow instructions.
- Changers also had lower gains in reading achievement.
- On the positive side, changers attended school more often and were tardy less often.
- Attitudes towards school breakfast were more positive for parents of changers than for non-changers.

These analyses were repeated with a sample restricted to students from low-income families. For this group of low-income students, no statistically significant differences were found between school breakfast changers and non-changers on any of the tested outcomes, except in the case of parent attitudes. Mirroring the results for the entire changer sample, parents of low-income changers were generally more favorable toward school breakfast. Note however, that it is unclear how to interpret these findings, as the selection into each group (“changer” or “non-changer”) was not experimentally controlled. Other uncontrolled characteristics of the sample or experiences could have determined these outcomes.

Effects of Classroom Breakfast

As mentioned above, the choice of the classroom as the location of school breakfast was a key decision in implementing the SBPP. Participation in those schools was higher than in their non-classroom counterparts. To determine if school breakfast participation translated into better school-level outcomes, the subsample of 18 schools where breakfast was eaten in the classroom was compared with their matched control schools on a number of measures. This too was a non-experimental analysis, as schools were not randomly assigned to classroom eating status. Despite an almost 40 percentage point difference in the level of school breakfast participation between schools where breakfast was eaten in the classroom and their matched controls, no significant differences were found on attendance, achievement test scores, teacher ratings of school climate and student behavior, disciplinary incidents, or visits to the school nurse.

Relationship Between Consumption of Breakfast and Cognitive Functioning

The results from the experimental impact analyses and analysis of impacts on school breakfast participants indicated no differences between treatment and control school students in terms of cognitive functioning. Since previous research in this field has pointed to effects of nutrition on cognitive functioning, further analyses were conducted to explore whether a relationship could be found in the study sample between children’s food energy and nutrient intake at breakfast (either at school or at home) and how well they performed on the battery of cognitive tests.

As a first step, correlations were run relating various indicators of nutrient intake and breakfast timing with scores on the cognitive measures. Little or no relationship was found between the amount of calories, protein, carbohydrate, or fat that students consumed and how well they performed. Moreover, in terms of timing, the results indicated a slight negative relationship. That is, the longer the interval between breakfast and testing, the better students did in terms of average trial and decision time on a test of stimulus discrimination.

The next step was to assess whether students who ate a more substantive breakfast (defined in several ways) performed better on the cognitive measures. Parallel to the results found in the previous analysis, consumption of breakfast was not positively related to student performance.

Analyses of Nutrition Outcomes for Substantive versus Non-Substantive Breakfast Eaters

We now turn to the current analyses. As noted in Chapter One, the literature shows that eating breakfast is positively related to children's intake of food energy and key vitamins and minerals over 24 hours. The first year findings from the SBPP indicated that the availability of universal-free school breakfast had a small but significant impact on the likelihood of consuming a *substantive* breakfast. In light of the widespread concern over the problem of childhood obesity, an important question is to what extent substantive breakfast consumption is positively related to children's dietary intake. In particular, do children who consume a substantive breakfast have higher mean intakes of vitamins, minerals, and dietary fiber than children eating a less substantial breakfast? Do they consume more food energy, fat, added sugar, or sodium over the course of the day?

This section presents results from a set of analyses examining the relationship between eating a substantive breakfast and students' nutrition outcomes. The outcomes assessed are limited to measures of dietary intake on a given day.² Because we do not know from a single 24-hour dietary recall whether students who consumed a substantive breakfast do this on a typical basis, it is not possible to examine outcomes beyond that day (such as usual dietary intake, weight status, or academic achievement). As expected, comparisons of the dietary intakes of substantive breakfast eaters and non-substantive breakfast eaters yield a number of statistically significant findings. We find that eating a substantive breakfast is related to higher levels of food energy, nutrient, and food group intake, both at breakfast and over 24 hours. On average, students eating a substantive breakfast consumed more than the RDA for food energy over a 24-hour period, regardless of how substantive breakfast eating was defined.

Measures and Analytic Variables

All measures were based on data collected in parent-assisted 24-hour dietary recall interviews using a standard multiple-pass approach.³ Breakfast eaters were defined on the basis of all foods and beverages reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods

² Results of analyses conducted to assess the relationship between breakfast consumption and cognitive functioning are reported in McLaughlin et al., 2002 (Appendix F, pp. F-24–F-26) and briefly summarized in Appendix F of this report.

³ The data on intake at breakfast were derived from a dietary recall interview with the student at school. Measures of intake for the full day were based on the combination of data from the breakfast recall with data from a parent-assisted dietary recall interview covering the rest of the 24-hour period. A detailed description of the dietary data collection methodology used in the SBPP Impact Study can be found in McLaughlin et al., 2002 (Chapter Five, pp. 80-81 and 88).

consumed up to 10:30 a.m. that were reported as being part of breakfast on the “target day”.⁴ For some students, this included more than one breakfast eating occasion or source of breakfast food (e.g., home and school). Four definitions of breakfast consumption were used:

- **Definition 1:** Consumption of any food or beverage (except water)
- **Definition 2:** Consumption of breakfast containing food from at least two of five main food groups⁵ and greater than 10 percent of the RDA for food energy
- **Definition 3:** Consumption of food from at least two of five main food groups and greater than 15 percent of the RDA for food energy
- **Definition 4:** Consumption of food from at least three main food groups and greater than 25 percent of the RDA for food energy

Definition 1 identifies students who consumed *any* breakfast, i.e., they broke the overnight fast with something other than water during the breakfast period. This definition was not used in our analyses of substantive breakfast consumption. Definitions 2, 3, and 4 represent alternative measures of substantive breakfast consumption. Modeled after work done by Devaney and Stuart (1998), Definitions 2 and 3 were used in the SBPP to assess the impact of universal-free school breakfast on the likelihood of students’ consuming a substantive breakfast (McLaughlin et al., 2002). Definition 4 approximates the current minimum requirement for food energy (25% of the RDA) in reimbursable breakfasts offered through the SBP.

Definition 2 and Definition 3 substantive breakfast eaters and non-substantive breakfast eaters were compared on the following measures of breakfast consumption and dietary intake:

- Consumption of more than one breakfast
- Food energy and nutrient intake at breakfast and over 24 hours
- Food group intake at breakfast and over 24 hours
- Contribution of breakfast to food energy and nutrient intake over 24 hours

A more limited set of analyses compared the food energy intakes of substantive and non-substantive breakfast eaters, based on Definition 4 above.

The University of Minnesota’s Nutrition Data System for Research (NDS-R) was used to analyze the food energy and nutrient content of all foods and beverages reported in the 24-hour recalls. Vitamin

⁴ The term “target day” refers to the particular school day the breakfast portion of the dietary recall was conducted with students. About 67 percent of students completed the dietary recall interview with their parents for the target day; another 14 percent completed the recall for a later 24-hour period (“late recall”). The data used in analyses presented here are for the day the child and parent completed the full 24-hour recall, target day or late (n=3,347).

⁵ The five food groups are (1) milk and milk products, (2) meat and meat equivalents, (3) grain products, (4) fruits and fruit juices, and (5) vegetables and vegetable juices. These food groups are based on the required SBP meal components for food-based menu planning (7 CFR Ch. II, Sec. 220.8), but we separate the juice/fruit/vegetable component into two groups.

and mineral intakes were assessed as percentages of the latest available Recommended Dietary Allowances (RDAs)⁶ (Institute of Medicine (IOM), 2001, 2000b, 1998, and 1997; National Research Council (NRC), 1989a). The macronutrients total fat, saturated fat, carbohydrate, and protein were calculated as a percentage of total food energy, while sodium, cholesterol, and dietary fiber were measured in units representing the absolute amount of the dietary component. Fiber intake was also measured as a percentage of the American Health Foundation's recommendation for children of "age-plus-five" grams per day (Williams, 1995).

Food group servings were derived from the USDA Food Guide Pyramid servings database after linking foods and ingredients coded in the NDS-R database to USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes of Individuals (CSFII). Food group intake was measured as the number of servings of each of the five major food groups of the USDA Food Guide Pyramid, as well as the 22 subgroups (USDA/ARS, 2000). Intakes of discretionary fat, in grams, and teaspoons of added sugars were also measured.⁷

Sample Characteristics

Exhibit 6.1 shows the percentages of sample students who were identified as having consumed a substantive breakfast on the target day. More than three quarters of the students (78 percent) had a substantive breakfast based on Definition 2. Using the slightly higher food energy criterion of Definition 3, about three fifths of the students (61 percent) were defined as substantive breakfast eaters. When breakfast is defined according to the most stringent criteria (Definition 4), less than one fifth (18 percent) of students consumed substantive breakfasts. Looking across the six districts that participated in the SBPP (Exhibit G-1), some variation existed in the rate of substantive breakfast consumption. For example, the largest proportion of Definition 3 breakfast eaters was found in District F (66 percent), whereas District A had a somewhat smaller share (56 percent).

In terms of demographic characteristics, substantive and non-substantive breakfast eaters were similar with regard to household size, household income, and family structure (Exhibits G-2a and G-2b). Significant differences between the two groups of students were found for student's school meal eligibility status, minority status, gender, age, and parent's education. Substantive breakfast eaters, regardless of how breakfast was defined, were more likely than non-substantive breakfast eaters to be male and younger. More Definition 4 substantive breakfast eaters were eligible for free or reduced-price school meals and non-white, and their parents had lower levels of education than their non-substantive controls.

⁶ The RDA is an average intake level sufficient to meet the nutrient requirements of nearly all (97 to 98 percent) healthy individuals in a particular age and gender group. In the case of calcium, where scientific evidence was not sufficient for determining a new RDA, two variables were constructed: (1) calcium as a percentage of the 1989 RDA and (2) calcium as a percentage of the DRI-based Adequate Intake (AI) value. The AI is a recommended intake value based on observed or experimentally determined estimates of nutrient intake by groups of healthy people that are assumed to be adequate (IOM, 2000a).

⁷ Discretionary fat includes all "excess" fat from the five major food groups beyond amounts that would be consumed if only the lowest fat forms were eaten, as well as fats added to foods in preparation or at the table (e.g., butter, oil, cream cheese). Added sugars include all forms of sugar used as ingredients in processed and prepared foods (e.g., cakes, soft drinks, jam, ice cream) and sugars added to foods at the table (USDA/ARS, 2000).

Exhibit 6.1**Percent of Students Who Consumed a Substantive Breakfast on a Typical School Day, by Breakfast Definition**

Breakfast Definition¹	N	Percent	SE
Food from at least two main food groups ² and >10% RDA for food energy (Definition 2)	2627	78.49%	(0.71)
Food from at least two main food groups ² and >15% RDA for food energy (Definition 3)	2052	61.31	(0.84)
Food from at least three main food groups ² and > 25% of RDA for food energy (Definition 4)	591	17.66	(0.66)

RDA = Recommended Dietary Allowance

¹All three definitions of breakfast include all food and beverages, excluding water, reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that the student/parent reported as being part of breakfast.

²The five main food groups are milk and milk products, meat and meat alternates, grain products, fruit and fruit juices, and vegetables and vegetable juices.

Differences were not tested for statistical significance.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Findings

The comparison of target day dietary intakes of substantive and non-substantive breakfast eaters indicates a wide range of statistically significant differences. Findings are generally similar for students categorized as substantive breakfast eaters based on Definition 2 or Definition 3. To simplify presentation of results, exhibits provided in this section show findings only for Definition 2. Results of all analyses for Definition 3 substantive breakfast eaters are found in Appendix G and are summarized below.

Consumption of More than One Breakfast

The majority of substantive breakfast eaters (approximately 80 percent) consumed a single Definition 2 or Definition 3 breakfast, either from home or at school. Not surprisingly, however, substantive breakfast eaters were significantly more likely to have consumed two or more breakfasts on a given day than non-substantive breakfast eaters (18 percent versus 2 percent for Definition 2, 22 percent versus 3.5 percent for Definition 3; $p < .05$ for both comparisons). A student was identified as consuming more than one breakfast if breakfast food came from school and at least one other source (e.g., home or other).

A further look at the Definition 2 substantive breakfast eaters with more than one breakfast finds that almost four fifths consumed their substantive breakfast from school. Of these students, 54 percent ate a non-substantive second breakfast from home, such as a glass of juice or milk, a plain waffle, or a Danish pastry. The remaining 46 percent of students ate two substantive breakfasts, one from school and one from home. For example, one student had a large glass of milk and a banana at home, followed by a school breakfast consisting of juice, cereal, milk, and a toaster pastry. Another had pancakes with butter and honey, milk, and juice at home, and a bagel with cream cheese and milk at school. Findings for Definition 3 eaters were comparable.

Food and Nutrient Intake at Breakfast

Mean intakes of food energy and nutrients at breakfast are provided in Exhibits 6.2 and G-3. Substantive breakfast eaters consumed close to two and one-half times as much food energy at breakfast as non-substantive eaters (24 and 27 percent of the RDA for food energy for Definitions 2 and 3, respectively, compared with 9 and 11 percent for the non-substantive group). Their breakfasts also included substantially more protein, vitamins, and minerals (as a percent of RDA); more cholesterol, sodium, and dietary fiber; and higher levels of total fat and saturated fat (as a percent of total food energy).

Substantive breakfast eaters consumed significantly more servings from each of the five main Food Guide Pyramid food groups than non-substantive breakfast eaters (Exhibit G-4). Differences for grain products were close to one serving, and approximately one half to three quarters of a serving for fruits and dairy products, for both Definition 2 and Definition 3 substantive/nonsubstantive comparisons. Substantive breakfast eaters also consumed two to three times more discretionary fat and added sugar at breakfast.

While there are no specific standards for food energy, nutrients, or food group intake at individual meals, nutrition standards for the SBP specify that schools serve breakfasts that meet at least one fourth of the RDA for food energy, protein, and key vitamins and minerals. Breakfasts are also expected to conform to the *Dietary Guidelines* for total fat and saturated fat. Overall, the majority of the students in the SBPP sample consumed breakfasts that met these "standards" on a typical school day, except for food energy and dietary fiber. Exhibit 6.3 provides a comparison of the share of Definition 2 substantive breakfast eaters and non-substantive breakfast eaters whose one-day breakfast intakes met these levels.⁸ Substantive breakfast eaters were significantly more likely to meet the 25-percent-of-recommendation benchmark for food energy, protein, fiber, and all vitamins and minerals assessed. On the other hand, they were less likely than students with non-substantive breakfasts to meet the cutoffs for cholesterol and sodium, or to have breakfasts with less than 10 percent of food energy from saturated fat.

Food and Nutrient Intake Over 24 Hours

Exhibit 6.4 compares the 24-hour food energy and nutrient intakes of Definition 2 substantive and non-substantive breakfast eaters. (Results for Definition 3 breakfast eaters are shown in Exhibit G-6.) Substantive breakfast eaters consumed significantly more food energy over a 24-hour period than non-substantive breakfast eaters (104 and 108 percent of the RDA for Definition 2 and 3 substantive eaters versus 90 percent of the RDA for the non-substantive breakfast eaters). Similar to the results for breakfast, they also consumed more protein, vitamins, and minerals (as a percent of RDA), and more cholesterol, sodium, and dietary fiber over 24 hours. Differences for 24-hour intakes of total fat and saturated fat (as a percent of total food energy), however, were in the opposite direction (i.e., less for substantive eaters).

⁸ This analysis was also conducted within the context of the SBPP experimental model, comparing the proportions of treatment and control school students whose breakfast on a given school day met the 25-percent-of-daily-recommendation cutoffs. Results are tabulated in Exhibit G-5. Students in the treatment group were significantly more likely to consume a breakfast containing at least 25 percent of the RDA for protein, vitamin B12, riboflavin, calcium, iron, phosphorous, and zinc; and more likely to meet the cholesterol recommendation of one fourth of the daily maximum of 300 mg.

Exhibit 6.2
Mean Food Energy and Nutrient Intake at Breakfast: Substantive vs. Non-Substantive Breakfast Eaters¹

Dietary Component	Definition 2			
	Substantive		Non-substantive	
	Mean	SE	Mean	SE
Food energy (as % 1989 RDA)	23.76*	(0.23)	9.42	(0.33)
Protein (as % 1989 RDA)	49.75*	(0.56)	15.21	(0.53)
Percent of Food Energy from:				
Total fat	24.29*	(0.23)	22.42	(0.60)
Saturated fat	9.71*	(0.10)	8.60	(0.29)
Carbohydrate	64.91*	(0.27)	69.07	(0.78)
Protein	12.57*	(0.08)	10.62	(0.27)
Vitamins (as percent of RDA)²				
Vitamin A	70.78*	(1.03)	24.72	(1.23)
Vitamin C	97.77*	(2.26)	34.12	(2.50)
Vitamin B ₆	90.87*	(1.50)	28.09	(1.34)
Vitamin B ₁₂	115.56*	(2.13)	28.34	(1.72)
Niacin	68.39*	(1.06)	24.28	(1.06)
Thiamin	89.54*	(1.12)	32.11	(1.26)
Riboflavin	127.09*	(1.54)	41.12	(1.60)
Folate	58.78*	(0.83)	20.52	(0.81)
Minerals (as percent of RDA)²				
Calcium	43.27*	(0.52)	12.41	(0.56)
Calcium (as percent of AI)	41.10*	(0.49)	11.85	(0.54)
Iron	73.59*	(1.19)	25.06	(1.08)
Magnesium	37.26*	(0.50)	12.35	(0.49)
Phosphorous	44.30*	(0.65)	14.07	(0.65)
Zinc	60.00*	(1.06)	18.24	(0.84)
Other Dietary Components				
Cholesterol (mg)	55.35*	(2.15)	15.22	(1.86)
Sodium (mg)	631.90*	(8.59)	230.60	(9.83)
Fiber (gm)	2.92*	(0.05)	1.17	(0.05)
Fiber (as percent of age-plus-5 gm)	20.59*	(0.34)	8.22	(0.36)
Number of Students³	2627		720	

RDA = Recommended Dietary Allowance

¹ Substantive breakfast eaters consumed a Definition 2 breakfast on a typical school day.

² Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

³ Includes students who skipped breakfast.

*Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Exhibit 6.3
Percent of Students Whose Breakfast Intake on a Typical School Day Met Standard: Substantive vs. Non-Substantive Breakfast Eaters¹

Standard/Dietary Component	Definition 2				All Students	
	Substantive		Non-Substantive		Percent	SE
	Percent	SE	Percent	SE		
At least 25 percent of RDA²:						
Food Energy	35.06%*	(0.93)	4.86%	(0.80)	28.56%	(0.78)
Protein	84.43*	(0.71)	17.50	(1.42)	70.03	(0.79)
Vitamin A	82.22*	(0.75)	37.08	(1.80)	72.51	(0.77)
Vitamin C	69.20*	(0.90)	32.50	(1.75)	61.31	(0.84)
Vitamin B ₆	82.64*	(0.74)	38.19	(1.81)	73.08	(0.77)
Vitamin B ₁₂	87.29*	(0.65)	33.89	(1.77)	75.80	(0.74)
Niacin	83.10*	(0.73)	37.78	(1.81)	73.35	(0.76)
Thiamin	96.88*	(0.34)	50.83	(1.86)	86.97	(0.58)
Riboflavin	97.60*	(0.30)	54.58	(1.86)	88.35	(0.55)
Folate	81.42*	(0.76)	35.28	(1.78)	71.50	(0.78)
Calcium	75.03*	(0.84)	16.25	(1.38)	62.38	(0.84)
Iron	85.57*	(0.69)	37.22	(1.80)	75.17	(0.75)
Magnesium	64.22*	(0.94)	10.14	(1.13)	52.58	(0.86)
Phosphorous	68.29*	(0.91)	16.67	(1.39)	57.19	(0.86)
Zinc	72.40*	(0.87)	25.28	(1.62)	62.26	(0.84)
Percent of Food Energy:						
30% or less from total fat	73.01	(0.87)	72.68	(1.80)	72.95	(0.78)
Less than 10% from saturated fat	59.12*	(0.96)	65.53	(1.92)	60.33	(0.86)
Other						
No more than 75 mg cholesterol	86.26*	(0.67)	96.81	(0.66)	88.53	(0.55)
No more than 600 mg sodium	61.32*	(0.95)	92.64	(0.97)	68.06	(0.81)
At least 25% Age plus 5 gm dietary fiber	26.53*	(0.86)	6.25	(0.90)	22.17	(0.72)
Number of Students³	2627		720		3347	

RDA=Recommended Dietary Allowance

¹ Substantive breakfast eaters consumed a Definition 2 breakfast on a typical school day.

² The RDAs, except for calcium, were based on Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, the 1989 RDA was used.

³ Includes students who skipped breakfast.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001.*

Exhibit 6.4

Mean Food Energy and Nutrient Intake Over 24 Hours: Substantive vs. Non-Substantive Breakfast Eaters¹

Dietary Component	Definition 2			
	Substantive		Non-substantive	
	Mean	SE	Mean	SE
Food energy (as % 1989 RDA)	104.22*	(0.57)	89.64	(1.06)
Protein (as % 1989 RDA)	254.62*	(1.83)	208.10	(3.22)
Percent of Food Energy from:				
Total fat	31.57*	(0.13)	32.78	(0.25)
Saturated fat	11.74*	(0.06)	12.20	(0.13)
Carbohydrate	55.35*	(0.15)	54.47	(0.30)
Protein	14.52*	(0.07)	14.16	(0.14)
Vitamins (as percent of RDA)²				
Vitamin A	176.36*	(1.90)	121.76	(3.22)
Vitamin C	272.23*	(4.31)	201.03	(6.85)
Vitamin B ₆	234.62*	(2.37)	166.46	(3.48)
Vitamin B ₁₂	325.44*	(4.48)	226.47	(6.15)
Niacin	220.12*	(1.90)	170.93	(3.11)
Thiamin	257.73*	(2.06)	194.69	(3.37)
Riboflavin	331.45*	(2.62)	235.16	(4.04)
Folate	159.02*	(1.46)	116.27	(2.11)
Minerals (as percent of RDA)²				
Calcium	142.94*	(1.24)	105.65	(2.08)
Calcium (as percent of AI)	135.74*	(1.19)	100.47	(2.03)
Iron	192.58*	(1.76)	140.98	(2.34)
Magnesium	141.31*	(1.25)	113.23	(2.10)
Phosphorous	169.35*	(1.89)	134.56	(3.23)
Zinc	181.91*	(1.74)	137.64	(2.60)
Other Dietary Components				
Cholesterol (mg)	217.31*	(3.07)	175.13	(4.51)
Sodium (mg)	3344.52*	(24.13)	2951.49	(43.94)
Fiber (gm)	14.55*	(0.12)	12.70	(0.23)
Fiber (as percent of age-plus-5 gm)	102.81*	(0.88)	88.94	(1.61)
Number of Students³	2627		720	

RDA = Recommended Dietary Allowance

¹ Substantive breakfast eaters consumed a Definition 2 breakfast on a typical school day.

² Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

³ Includes students who skipped breakfast.

*Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Except for food energy, mean intakes of both substantive and non-substantive breakfast eaters met or exceeded the RDA benchmarks for all of the dietary components assessed. Additionally, both groups consumed fat, saturated fat, and sodium, on average, in amounts that exceed daily recommendations. Thus, the findings of most interest appear to be mean food energy intakes above the RDA among substantive breakfast eaters, and mean food energy and dietary fiber intakes among non-substantive breakfast eaters that fall short of daily recommended levels.

As shown in Exhibit 6.5, Definition 2 substantive breakfast eaters consumed significantly more servings of grain products (including whole grains), fruits, and dairy products (primarily milk) over 24 hours compared with non-substantive breakfast eaters. The differences were approximately one to one and one-half servings of grains, three quarters of a serving of milk, and one half of a serving of fruit for both Definition 2 and Definition 3 comparisons (Exhibit G-7). Relative to the recommended number of Food Guide Pyramid servings per day for the age/gender groups of children in the SBPP sample, substantive breakfast eaters were closer to meeting these goals (Kennedy et al., 1995; Bowman et al., 1998). On the other hand, substantive breakfast eaters consumed even more discretionary fat and added sugars over the full day than their non-substantive comparison group—both groups had 24-hour intakes in excess of recommended maximums for these dietary components.

Not surprisingly, breakfast made a more important contribution to 24-hour dietary intake for substantive breakfast eaters than for non-substantive breakfast eaters. The difference was statistically significant for food energy and all of the dietary components measured (Exhibit G-8). On average, for students who consumed a substantive breakfast, breakfast contributed from two to three times as much toward total daily food energy and nutrient intake as it did for their non-substantive breakfast controls. For example, breakfast contributed about one fourth of the RDA for food energy for Definition 2 and Definition 3 substantive breakfast eaters compared with only 10 to 12 percent for non-substantive eaters.

Definition 4 Substantive Breakfast Eaters. Exhibit 6.6 shows that students who consumed a Definition 4 substantive breakfast had significantly greater mean 24-hour food energy intakes (as a percent of RDA)—almost 25 percent higher—than those who did not. As expected, the contribution of food energy from breakfast was also greater for Definition 4 substantive eaters than non-substantive breakfast eaters. These results suggest that students who consume a Definition 4 substantive breakfast (minimum of 500 to 625 calories depending on age/gender) may be over-consuming food energy and at risk for overweight.

As of the end of the first year of the SBPP, there were no significant differences in body mass index (BMI) percentile or the proportions of students who were overweight or at risk for overweight based on their consumption of a Definition 4 breakfast (Exhibit G-9). It should be noted, however, that a student's weight status is more likely to be associated with long term patterns of food consumption rather than the single school day on which substantive breakfast eaters were identified for this analysis.

Exhibit 6.5
Mean Food Group Intake Over 24 Hours: Substantive vs. Non-Substantive Breakfast Eaters¹

Food Group	Definition 2			
	Substantive		Non-substantive	
	Mean	SE	Mean	SE
	Number of Servings²			
Grain Products	7.8*	(0.06)	6.7	(0.12)
Whole grains	1.2*	(0.03)	0.8	(0.04)
Non-whole grains	6.6*	(0.06)	5.9	(0.11)
Vegetables	2.1	(0.03)	2.2	(0.07)
Dark green vegetables	0.1	(0.01)	0.1	(0.01)
Deep yellow vegetables	0.1	(0.01)	0.1	(0.01)
White potatoes	0.9	(0.03)	1.0	(0.05)
Other starchy vegetables	0.1	(0.01)	0.1	(0.02)
Tomatoes	0.4	(0.01)	0.4	(0.02)
Cooked dry beans and peas	0.1	(0.01)	0.1	(0.02)
Other vegetables	0.5	(0.01)	0.5	(0.02)
Fruits	1.8*	(0.03)	1.3	(0.06)
Citrus fruits, melons, and berries	0.8*	(0.02)	0.5	(0.04)
Other fruits	1.0*	(0.02)	0.8	(0.04)
Dairy Products	2.8*	(0.03)	2.0	(0.05)
Milk	2.2*	(0.02)	1.4	(0.04)
Yogurt	0.1*	(0.00)	0.0	(0.01)
Cheese	0.6	(0.01)	0.6	(0.02)
Meat and Meat Substitutes	1.4*	(0.02)	1.3	(0.04)
Red meat (beef, pork, veal, lamb, game)	0.6	(0.01)	0.6	(0.03)
Organ meats	0.0	(0.00)	0.0	(0.00)
Frankfurters, sausage, luncheon meats	0.2	(0.01)	0.2	(0.01)
Poultry (chicken, turkey, other)	0.3	(0.01)	0.3	(0.02)
Fish and shellfish	0.1	(0.01)	0.1	(0.01)
Eggs	0.1*	(0.00)	0.0	(0.01)
Soybean products (tofu, meat analogues)	0.0	(0.00)	0.0	(0.00)
Nuts and seeds	0.1	(0.00)	0.1	(0.01)
Other				
Discretionary fat (gm)	60.9*	(0.50)	55.8	(0.92)
Added sugars (tsp)	24.5*	(0.25)	23.1	(0.50)
Number of Students³	2627		720	

¹ Substantive breakfast eaters consumed a Definition 2 breakfast on a typical school day.

² Based mainly on the serving size definitions for the Food Guide Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

³ Includes students who skipped breakfast.

Note: Means have been rounded. Differences of 0.0 represent less than 0.05 of a serving.

*Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Exhibit 6.6**Food Energy Intake Over 24 Hours: Substantive vs. Non-Substantive Breakfast Eaters¹**

	Definition 4			
	Substantive		Non-substantive	
	Value	SE	Value	SE
Mean food energy (as % 1989 RDA)	119.99*	(1.27)	97.03	(0.53)
Percent contribution of breakfast to 24-hour food energy intake	31.38*	(0.36)	18.11	(0.17)
Number of Students²	591		2756	

RDA = Recommended Dietary Allowance

¹ Substantive breakfast eaters consumed food from at least three major food groups and more than 25 percent of the RDA for food energy on a typical school day.

² Includes students who skipped breakfast.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Analyses of Outcomes for Breakfast Skippers versus Breakfast Non-Skippers

Regular breakfast consumption is generally considered important for children's nutrition, behavior, health, and school performance. McLaughlin and colleagues (2002) reviewed the evidence for this association in the first year report on the SBPP. Briefly, the research on the effects of breakfast consumption and cognitive functioning, behavior, and academic achievement has had mixed results. Breakfast skipping has been associated with poorer diets among schoolchildren, although most studies looked only at group mean nutrient intakes. Estimates of the prevalence of breakfast skipping among school-age children vary widely, in part due to the various ways of defining breakfast consumption. A recent study of the diets of school children found that breakfast skipping increases with age and is especially prevalent among female adolescents (Gleason and Sutor, 2001).

The analyses presented below explore relationships between skipping breakfast and a range of student outcomes assessed in the SBPP Impact Study. Breakfast skippers and breakfast non-skippers were contrasted on measures of dietary intake and cognitive functioning on a given day, as well as usual dietary intake, weight status, academic achievement, and other outcomes that might be related to a usual pattern of breakfast skipping. Findings for the nutrition outcomes are discussed in the context of prior research on breakfast skipping among school-age children.⁹ The findings from this study suggest that children who skip breakfast consume less total food energy, vitamins, minerals, and other dietary components over a 24-hour period, on average, than non-skippers. However, comparisons based on usual 24-hour intake do not provide strong support for the notion that children who typically

⁹ We reviewed the reports from several recent national studies of the dietary intake of schoolchildren, as well as older studies and those more limited in geographic scope. None of the more recent studies reported conducting analyses to examine the overall dietary adequacy of children who skip breakfast, including the School Nutrition Dietary Assessment Study-I (Devaney, Gordon, and Burghardt, 1995), the 1994-96 Continuing Survey of Food Intakes of Individuals (Gleason and Sutor, 2001), and the National Health and Examination Survey (<http://www.cdc.gov/nchs/nhanes.htm>). The one exception was the analysis of 1994-96 CSFII data reported by Basiotis, Lino and Anand (1999), which is discussed later in this section.

skip breakfast are less likely to meet their daily nutrient requirements than those who eat breakfast. Skipping breakfast was not related to cognitive functioning, behavior, risk of overweight, food security, attendance, or gains in academic achievement.

Measures and Analytic Variables

Data sources for the analyses described below were collected as part of the SBPP Impact Study. They include the 24-hour dietary recall (and second recalls for a subsample of students), tests of cognitive functioning, teacher ratings, a parent interview, height and weight measurements, and school records. Breakfast skippers were defined two ways, using two different data sources, depending on the type of outcome we were analyzing:

1. For “target day” nutrition outcomes and cognitive outcomes (e.g., percent of the RDA for food energy over 24-hours, tests of verbal fluency), children who consumed less than 2.5 percent of the RDA for food energy during the breakfast period were considered breakfast skippers.¹⁰ The target day for nutrition outcomes was defined as the day the child completed the full 24-hour dietary recall interview, including late recalls. For the cognitive outcomes, the target day was limited to the day the child was tested, since breakfast consumption is hypothesized to have an immediate effect on cognitive functioning.
2. For usual dietary intake, weight status, academic achievement, and other long-term outcomes, children whose parents reported on the Parent Survey that the sample child consumed breakfast 0, 1, or 2 days a week were considered “usual skippers.” A similar method of identifying children who skip breakfast was recently reported by Gross and colleagues (2004).

In addition to the target day measures of dietary intake analyzed for substantive breakfast eaters¹¹, the following additional variables were contrasted between breakfast skippers and breakfast non-skippers:

- Usual dietary intake:
 - Percent of students whose usual 24-hour intake met dietary standards and recommendations
 - Means and distributions of usual intake for food energy, protein, and calcium

¹⁰ The majority of breakfast skippers reported consuming nothing other than water for breakfast. The cutoff of 2.5 percent of the RDA for food energy (45 to 63 calories, depending on age/gender) was chosen after reviewing the foods and amounts reported eaten at the lowest end of distribution for food energy. It approximates the level of intake that distinguishes children who ate only a bite or sip of something (i.e., a nutritionally insignificant breakfast) from those who ate or drank a more substantial serving (e.g., ½ cup juice, ½ granola bar, 1 slice toast, 1 pancake).

¹¹ This set of analyses does not compare outcomes for breakfast (e.g., consumption of more than one breakfast, percent of RDA for food energy at breakfast), because results are essentially zeros for the breakfast skipper group.

- Cognitive functioning
 - Stimulus Discrimination: number of trials completed, average decision time, and average trial time
 - Digit Span (WISC-III) scaled scores
 - Verbal Fluency: Animals, Things to Eat, and total scores
- Classroom behavior and psychosocial functioning
 - Pediatric Symptom Checklist: Total score and percent of students psychosocially impaired
 - Conners' Teacher Rating Scale: Opposition and ADHD indices, and cognitive problems/inattention and hyperactivity scores
 - Children's Behavior Questionnaire, Effortful Control Scale: ability to focus and ability to follow instructions subscales
- Child health and food security status
 - Weight status: body mass index (BMI) percentile for age, percent at risk of overweight and overweight
 - Health status: percent reported in good health
 - Food security: percent of food secure households, child and household food insecurity scale scores
- Gains in other student outcomes during first year of SBPP
 - School breakfast participation: breakfasts taken as a percent of school days
 - Attendance: days present as a percent of school days enrolled
 - Tardiness: days late as a percent of school days enrolled
 - Math and reading achievement: as measured by Stanford-9 scale scores¹²

Descriptions of these outcome measures can be found in McLaughlin et al., 2002.

In order to compare the nutrient adequacy of students' diets, data from second dietary recalls were used to adjust for day-to-day variability and estimate usual intake.¹³ The methods developed by Nusser and colleagues (1996) were employed, both to estimate the distribution of students' usual 24-hour nutrient intake and the proportion of students whose usual intake was above or below dietary reference standard values and national dietary recommendations. The procedure was carried out using the Software for Intake Distribution Estimation (C-SIDE).¹⁴

Usual intake distributions and the percentile values of the distribution were calculated for food energy and protein (as a percent of RDA), and 13 micronutrients.¹⁵ Where possible, the proportion of students whose usual intake equaled or exceeded the Estimated Average Requirement (EAR) was

¹² All student test scores were converted to a common metric using an equipercentile linking approach. See McLaughlin et al. (2002) for further details.

¹³ A second 24-hour recall was collected for a random subsample of 12 percent of the students overall.

¹⁴ Version 1.0, developed by Iowa State University, 1996.

¹⁵ It was not possible to estimate the distribution of usual *food* intake using C-SIDE because the distribution of food intake tends to be highly skewed with a large proportion of zero values.

estimated to assess adequacy of nutrient intake.¹⁶ To assess dietary adequacy for groups, the Institute of Medicine (IOM) recommends assessing the prevalence of *inadequate* nutrient intakes (Institute of Medicine, 2000a) by comparing usual intakes with the EAR. Since EARs for food energy, protein, and calcium were not available at the time of these analyses, average requirements were estimated for purposes of group comparison as 80 percent of 1989 RDA. To assess the percentages of students whose macronutrient intake was consistent with dietary recommendations, usual intake was compared with quantitative recommendations from the 2000 *Dietary Guidelines for Americans* (USDA and USDHHS, 2000) and the National Research Council's (NRC) *Diet and Health* report (1989b), as well as the "age-plus-five" grams recommendation for fiber.¹⁷

Sample Characteristics

Based on the definitions above, we identified samples of 122 and 177 breakfast skippers for the target day nutrition and cognitive outcomes analyses, respectively; the parent data yielded a maximum sample of 172 usual skippers.¹⁸ Usual breakfast skippers represented 5 percent of the sample overall (Exhibit G-10). Breakfast skipping was somewhat less prevalent in District E and District D than the other four districts (approximately 4 percent versus 7 to 8 percent of students in Districts A, B, C, and F).

In terms of demographic characteristics, usual breakfast skippers and breakfast non-skippers were remarkably similar (Exhibit G-11). The only significant difference was with respect to ethnicity: breakfast skippers were more likely to be non-white compared to non-skippers (46 percent versus 37 percent of students). This difference was accounted for in the statistical comparisons of outcomes discussed below.

Findings

Results of the analyses comparing breakfast skippers with non-skippers are summarized below. More of the significant results were found among the groups defined by their breakfast skipping behavior on the target day than those identified as usual skippers based on parent report. Significant results were found mainly for comparisons of students' 24-hour nutrition outcomes, and also for changes in school breakfast participation over the first year of the SBPP.

Food and Nutrient Intake Over 24 Hours

Exhibit 6.7 below provides a comparison of the 24-hour food energy and nutrient intakes of breakfast skippers and non-skippers on the target day. Breakfast skippers consumed significantly less food energy over a 24-hour period, on average, than breakfast non-skippers (79 percent versus 102 percent of the RDA). They also consumed significantly less protein, total carbohydrate, vitamins, minerals, cholesterol, sodium, and dietary fiber. At the same time, target day breakfast skippers consumed more total fat and saturated fat as a percent of total food energy.

¹⁶ The EAR is the usual intake level estimated to meet the requirement of half the healthy individuals in a particular age/gender group (Institute of Medicine, 2000a).

¹⁷ Estimates of usual intake and values for the specific reference standards and dietary recommendations used in this analysis were discussed in McLaughlin et al., 2002 (Appendix E).

¹⁸ Sample sizes for some outcomes are slightly smaller due to missing data.

Exhibit 6.7

Mean Food Energy and Nutrient Intake Over 24 Hours: Breakfast Skippers vs. Breakfast Non-Skippers¹

Dietary Component	Breakfast Skippers		Breakfast Non-Skippers	
	Mean	SE	Mean	SE
Food energy (as % 1989 RDA)	79.00*	(2.27)	101.92	(0.52)
Protein (as % 1989 RDA)	193.03*	(7.85)	246.56	(1.65)
Percent of Food Energy from:				
Total fat	34.28*	(0.68)	31.74	(0.11)
Saturated fat	12.43*	(0.33)	11.81	(0.06)
Carbohydrate	51.97*	(0.81)	55.28	(0.14)
Protein	14.96	(0.39)	14.43	(0.06)
Vitamins (as percent of RDA)²				
Vitamin A	95.77*	(6.56)	167.22	(1.72)
Vitamin C	144.58*	(10.51)	261.16	(3.82)
Vitamin B ₆	131.36*	(7.12)	223.31	(2.10)
Vitamin B ₁₂	176.88*	(10.75)	308.96	(3.92)
Niacin	143.74*	(7.97)	212.03	(1.69)
Thiamin	157.34*	(6.56)	247.46	(1.85)
Riboflavin	186.12*	(7.49)	315.45	(2.37)
Folate	90.04*	(4.45)	152.09	(1.29)
Minerals (as percent of RDA)²				
Calcium	89.50*	(4.79)	136.64	(1.12)
Calcium (as percent of AI)	84.02*	(4.52)	129.82	(1.08)
Iron	121.50*	(5.41)	183.75	(1.54)
Magnesium	88.65*	(3.70)	137.03	(1.12)
Phosphorous	103.10*	(5.44)	164.09	(1.70)
Zinc	107.64*	(4.50)	174.84	(1.54)
Other Dietary Components				
Cholesterol (mg)	186.80*	(13.29)	209.05	(2.66)
Sodium (mg)	2877.37*	(130.01)	3274.45	(21.56)
Fiber (gm)	10.68*	(0.43)	14.28	(0.11)
Fiber (as percent of age-plus-5 gm)	72.59*	(2.90)	100.86	(0.79)
Number of Students	122		3225	

RDA = Recommended Dietary Allowance

¹ Breakfast skippers include students who reported consuming little (less than 2.5 percent of the RDA for food energy) or nothing between 5:00 a.m. and 45 minutes after the start of school on a typical school day.

² Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

*Difference between breakfast skippers and breakfast non-skippers is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Breakfast skippers had mean intakes of dietary components that did not meet the RDA benchmarks (for food energy, vitamin A, calcium and magnesium); they also consumed less dietary fiber than the age-plus-5 gram recommendation. Non-skippers met the RDA benchmarks and age-plus-5 recommendation.

With regard to Food Guide Pyramid food groups (Exhibit 6.8), target day breakfast skippers consumed significantly fewer servings of grain products, fruits, and dairy products (milk in particular) than breakfast non-skippers. The differences ranged from an average of one-half to one and a half servings. The skippers also consumed less discretionary fat and added sugar (about five and a half fewer teaspoons), but not enough less to differ with respect to meeting daily-recommended maximums. Consumption of vegetables and meat/meat substitutes was similar among breakfast skippers and non-skippers, with the exception of poultry. Breakfast skippers and non-breakfast skippers were equally likely to consume poultry (primarily chicken), although skippers ate larger amounts, on average (means of 1.14 versus 0.84 servings for non-skippers) and at the higher end of the distribution (75th percentile and above).

These findings are roughly consistent with past studies that found that children who skipped breakfast had lower mean daily food energy and nutrient intakes than those who ate breakfast and, thus, did not make up the differences in dietary intake at other meals.¹⁹ In our analysis, target day breakfast skippers consumed more total fat and saturated fat (as a percent of food energy) over 24-hours than non-skippers. Findings from the few previous studies that examined dietary fat have been mixed (Morgan, Zabik, and Stampley, 1986; Nicklas et al., 1993).

None of the past studies compared breakfast skippers and non-skippers on intakes of Food Guide Pyramid food groups, although Basiotis, Lino and Anand (1999) analyzed the relationship between eating breakfast and overall diet quality based on the Healthy Eating Index (HEI). Using data from the 1994-96 CSFII, they demonstrated that children in both low- and higher income households who consumed breakfast had higher overall HEI scores than children who did not consume breakfast. For all children, consuming breakfast was associated with higher grain, fruit, milk, and variety scores (based on the Food Guide Pyramid food groups and serving recommendations). Our analysis of 24-hour food group intake is consistent with the findings of this study.

Usual 24-Hour Dietary Intake

Although usual breakfast skippers and non-skippers differed substantially in terms of their mean intakes of food energy, nutrients, and Food Guide Pyramid servings on the target day, these findings do not address the question of whether children who typically skip breakfast are less likely to meet their daily nutrition requirements than those who eat breakfast. Thus, analyses were conducted to compare the groups on usual 24-hour intake, using the latest dietary reference standards and methodology for assessing dietary adequacy.

¹⁹ These studies include the Nationwide Food Consumption Survey (Morgan, Zabik, and Stampley, 1986), the National Evaluation of School Nutrition Programs (Devaney, Fraker, and Morgan, 1987), and the Bogalusa Heart Study (Nicklas, et al., 1993).

Exhibit 6.8

Mean Food Group Intake Over 24 Hours: Breakfast Skippers vs. Breakfast Non-Skippers¹

Food Group	Breakfast Skippers		Breakfast Non-Skippers	
	Mean	SE	Mean	SE
	Number of Servings²			
Grain Products	6.0*	(0.28)	7.6	(0.06)
Whole grains	0.6*	(0.08)	1.1	(0.02)
Non-whole grains	5.4*	(0.28)	6.5	(0.06)
Vegetables	1.8	(0.13)	2.2	(0.03)
Dark green vegetables	0.1	(0.02)	0.1	(0.01)
Deep yellow vegetables	0.1	(0.04)	0.1	(0.01)
White potatoes	0.7	(0.09)	0.9	(0.02)
Other starchy vegetables	0.1	(0.03)	0.1	(0.01)
Tomatoes	0.3	(0.04)	0.4	(0.01)
Cooked dry beans and peas	0.1	(0.03)	0.1	(0.01)
Other vegetables	0.4	(0.06)	0.5	(0.01)
Fruits	1.1*	(0.11)	1.7	(0.03)
Citrus fruits, melons, and berries	0.5*	(0.07)	0.7	(0.02)
Other fruits	0.6*	(0.07)	1.0	(0.02)
Dairy Products	1.6*	(0.11)	2.7	(0.03)
Milk	1.0*	(0.09)	2.0	(0.02)
Yogurt	0.0	(0.01)	0.1	(0.00)
Cheese	0.6	(0.06)	0.6	(0.01)
Meat and Meat Substitutes	1.4	(0.11)	1.4	(0.02)
Red meat (beef, pork, veal, lamb, game)	0.5	(0.07)	0.6	(0.01)
Organ meats	0.0	(0.00)	0.0	(0.00)
Frankfurters, sausage, luncheon meats	0.3	(0.04)	0.2	(0.01)
Poultry (chicken, turkey, other)	0.4*	(0.09)	0.3	(0.01)
Fish and shellfish	0.0	(0.02)	0.1	(0.01)
Eggs	0.1	(0.02)	0.1	(0.00)
Soybean products (tofu, meat analogues)	0.0	(0.00)	0.0	(0.00)
Nuts and seeds	0.1	(0.01)	0.1	(0.00)
Other				
Discretionary fat (gm)	51.7*	(2.10)	60.1	(0.45)
Added sugars (tsp)	19.0*	(1.06)	24.4	(0.23)
Number of Students	122		3225	

¹ Breakfast skippers include students who reported consuming little (less than 2.5 percent of the RDA for food energy) or nothing between 5:00 a.m. and 45 minutes after the start of school on a typical school day.

² Based mainly on the serving size definitions for the Food Guide Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

Note: Means have been rounded. Differences of 0.0 represent less than 0.05 of a serving.

*Difference between breakfast skippers and breakfast non-skippers is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Exhibit 6.9 shows results of the comparison of breakfast skippers and breakfast non-skippers whose usual 24-hour intake met the standards for dietary adequacy (based primarily on EARs). In both groups, all (or virtually all) students had adequate 24-hour intakes of protein and ten micronutrients. For the three remaining micronutrients assessed—vitamin A, folate, and phosphorous—usual breakfast skippers were significantly less likely to have adequate intakes than non-skippers. Between 20 and 24 percent of breakfast skippers had inadequate usual intakes for these nutrients, compared with 1 to 6 percent of non-skippers.

Findings for total food energy are interesting. Despite estimates of the percent of students with food energy intakes above 80 percent of the 1989 RDA of 76 percent for breakfast skippers and 96 percent for non-skippers, statistical significance was not achieved. This is due in large part to the greater dispersion of usual food energy values among skippers relative to non-skippers (Exhibit 6.10) compared with the distributions for the other nutrients examined.

When means and the distributions of usual intake for food energy, protein, and calcium (as a percent of Adequate Intake) were compared, usual breakfast skippers were found to consume less of all three than breakfast non-skippers (Exhibit 6.10). The differences for both food energy and calcium were significant at the mean, median, and lower end (5th, 10th, and 25th percentiles) of the distribution; usual calcium intake was also lower at the 75th percentile. The difference for protein, which was consumed at very high levels relative to the RDA across the entire distribution of usual protein intake, was significant at the mean and median.

There were no statistically significant differences between breakfast skippers and non-skippers in the share of students whose usual 24-hour intake met recommendations for total fat, saturated fat, carbohydrate, cholesterol, sodium or dietary fiber (Exhibit G-12).

Cognitive Functioning

Somewhat surprisingly, on all of the measures of cognitive functioning, students who skipped breakfast performed similarly to those who ate breakfast on the day of testing (Exhibit G-13). This is consistent with a well-known review of prior research (Pollitt and Mathews, 1998) that contends the negative effect of skipping breakfast on cognitive functioning is likely to be more pronounced in nutritionally at-risk children. Findings from the dietary intake analyses above suggest that, since the majority of children were meeting nutrient requirements over 24 hours (three quarters to almost all, depending on the nutrient), few were likely to be undernourished.²⁰

Behavioral, Psychosocial, and Health Outcomes

A series of analyses was conducted contrasting usual breakfast skippers with non-skippers on classroom behavior, psychosocial and general health, weight status, and food security, as shown in Exhibit 6.11. The two groups of students were similar across the entire set of outcomes, with the exception of mean BMI percentile. Breakfast skippers had significantly higher BMI percentiles than non-skippers (68th percentile versus 63rd percentile), although they were not more likely to be classified as overweight or at risk of overweight using CDC criteria.

²⁰ In addition, findings reported by McLaughlin et al. (2002) indicated that only 2 percent of the SBPP sample was “underweight”, based on a BMI at or below the 5th percentile for age and gender.

Exhibit 6.9

Percent of Students Whose Usual 24-Hour Food Energy and Nutrient Intakes Met Standard for Dietary Adequacy: Breakfast Skippers vs. Breakfast Non-Skippers^{1,2}

Dietary Component	Breakfast Skippers		Breakfast Non-Skippers	
	Percent	SE	Percent	SE
Food energy	76.23	(10.28)	95.51	(3.46)
Protein	100.00	(0.00)	100.00	(0.00)
Vitamins				
Vitamin A	75.69*	(5.98)	99.25	(1.22)
Vitamin C	100.00	(0.00)	99.33	(1.34)
Vitamin B ₆	97.94	(5.01)	99.93	(0.15)
Vitamin B ₁₂	98.19	(3.12)	100.00	(0.00)
Niacin	100.00	(0.00)	100.00	(0.00)
Thiamin	100.00	(0.00)	100.00	(0.00)
Riboflavin	99.40	(0.68)	100.00	(0.00)
Folate	79.84*	(9.35)	98.90	(1.75*)
Minerals				
Calcium	82.84	(7.38)	95.65	(2.31)
Iron	99.42	(2.01)	100.00	(0.00)
Magnesium	77.28	(8.04)	94.12	(3.11)
Phosphorous	77.36*	(5.95)	94.32	(2.99*)
Zinc	91.51	(8.64)	99.21	(1.19)
Number of Students	169		3143	

¹ For vitamins and minerals, except calcium, the Estimated Average Requirements (EARs) based on DRIs are used as standards. There is no EAR for total food energy, protein, or calcium. For energy, protein, and calcium, 80 percent of the 1989 RDA was used as an approximation of the estimated average requirements.

² Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days a week.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

*Difference between breakfast skippers and breakfast non-skippers is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Exhibit 6.10**24-Hour Usual Intake Distributions for Food Energy, Protein, and Calcium: Breakfast Skippers vs. Breakfast Non-Skippers¹**

Dietary Component	Breakfast Skippers		Breakfast Non-Skippers	
	Value	SE	Value	SE
Food Energy (as percent of RDA)				
Mean	96*	(1.72)	102	(0.25)
Percentile:				
5th	63*	(6.75)	80	(2.23)
10th	69*	(5.76)	85	(1.81)
25th	80*	(3.86)	92	(1.06)
50th	94*	(2.46)	101	(0.50)
75th	110	(4.80)	111	(1.24)
90th	125	(8.76)	120	(2.42)
95th	135	(11.60)	126	(3.23)
Protein (as percent of RDA)				
Mean	225*	(3.25)	246	(0.88)
Percentile:				
5 th	160	(25.10)	173	(5.74)
10 th	173	(20.80)	187	(4.74)
25 th	195	(12.90)	212	(2.91)
50 th	222*	(6.66)	242	(1.49)
75 th	252	(15.20)	276	(3.65)
90 th	281	(28.20)	310	(7.30)
95 th	299	(37.10)	333	(9.92)
Calcium (as percent of AI)				
Mean	111*	(2.82)	129	(0.54)
Percentile:				
5th	57*	(8.92)	84	(3.79)
10th	67*	(7.82)	92	(3.16)
25th	85*	(5.49)	108	(1.97)
50th	107*	(3.78)	127	(0.99)
75th	133*	(7.16)	148	(2.46)
90th	160	(13.00)	169	(4.83)
95th	177	(17.20)	183	(6.51)
Number of Students	169		3143	

RDA = Recommended Dietary Allowance

AI = Adequate Intake

¹ Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days a week.

Exhibit reads: "Percentile: 95 percent of breakfast skippers (i.e., students at the 5th percentile) have a usual food energy intake of at least 63 percent of the RDA. Similarly, 90 percent of breakfast skippers (i.e., students at the 10th percentile) have a usual food energy intake of at least 69 percent of the RDA."

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

* Difference between breakfast skippers and breakfast non-skippers is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Exhibit 6.11**Behavioral, Psychosocial, and Health Outcomes: Breakfast Skippers vs. Breakfast Non-Skippers¹**

Outcome	Breakfast Skippers		Breakfast Non-Skippers	
	Value	SE	Value	SE
Conners' Teachers Rating Scale²				
Opposition index	52.31	(0.87)	51.37	(0.18)
Cognitive problems/inattention score	53.84	(0.94)	52.42	(0.20)
Hyperactivity	51.73	(0.78)	51.72	(0.18)
ADHD index	52.38	(0.93)	52.17	(0.19)
Effortful Control³				
Ability to focus	5.03	(0.11)	5.15	(0.03)
Ability to follow instructions	5.20	(0.11)	5.36	(0.03)
Pediatric Symptom Checklist				
Total score ²	10.21	(0.39)	9.86	(0.09)
Percent students reported to have psychosocial impairment	20.93	(3.11)	19.00	(0.69)
Weight Status				
BMI percentile	68.17*	(2.05)	63.15	(0.51)
Percent students at risk of overweight	36.26	(3.69)	32.13	(0.82)
Percent students overweight	20.47	(3.09)	16.40	(0.65)
Child Health Status				
Percent students reported to be in excellent health	54.22	(3.88)	56.58	(0.87)
Food Security				
Percent of food secure households	76.47	(3.26)	77.33	(0.74)
Child food insecurity scale score ⁴	1.24	(0.17)	1.03	(0.03)
Household food insecurity scale score ⁴	1.23	(0.15)	1.06	(0.03)
Number of Students	172		3249	

ADHD = Attention Deficit/Hyperactivity Disorder

BMI = Body Mass Index

¹ Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days a week.² Higher scores indicate tendency to exhibit problem behavior/impairment.³ Scored on 7-point Likert scale. Higher scores indicate better effortful control.⁴ Scale is from 0 to 10, from food secure (score of 0) to food insecure with hunger (score of 10).

*Difference between breakfast skippers and breakfast non-skippers is statistically significant at the .05 level.

Source: Impact Study—Parent Survey, Child Behavioral Measures and Height and Weight Measurements, Spring 2001

Other Student Outcomes

Students who usually skipped breakfast had smaller gains in school breakfast participation over the school year than those who ate breakfast regularly (Exhibit 6.12). The changes in attendance and tardiness, and gains in academic achievement, did not differ between the two groups of students.

These findings indicate little systematic relationship between students' non-nutrition outcomes and breakfast skipping, as defined in our study. We must caution the reader, however, on the limitations of defining breakfast skippers based on parent report. For example, parents are not usually able to observe whether or not their child ate breakfast at school.

Analyses of Nutrition Outcomes by Source of Breakfast: Home versus School

There was interest in examining nutrition outcomes for students who obtain their breakfasts from different sources—in particular, from home food supplies versus the USDA school breakfast (or other school food venues). Research focusing specifically on the effects of participation in the SBP has shown that students consuming school breakfasts have higher intakes of food energy, protein, several vitamins and minerals, and dietary fiber at breakfast than nonparticipants (Devaney et al., 1995; Devaney and Fraker, 1989; Gleason and Sutor, 2001). SBP participants may also have higher breakfast intakes of sodium and saturated fat and lower intakes of carbohydrates, especially added sugars (Devaney et al., 1995; Gleason and Sutor, 2001). Some, but not all, of these differences persist over 24 hours.

Analyses were performed with the SBPP sample to compare nutrition outcomes between children who ate breakfast exclusively from home versus exclusively from school. In addition, the analyses included a third group of students—those who ate breakfast from home and school on the same day.

The results presented here are based only on target day outcomes and do not include estimates of the proportion of students with usual 24-hour intakes that meet dietary standards. The data available for estimating usual intake include students who ate breakfast from one source on the first day and a different source on the second day. Therefore, the results could not be viewed as usual 24-hour intakes of children who *usually* eat breakfast from a particular source (home or school).²¹

²¹ Analyses were conducted in an attempt to identify “usual home” and “usual school” breakfast eaters. Regression models were developed to predict the likelihood that a child ate breakfast only from home, only from school, from both home and school, or neither. These models were tested on children with two days of 24-hour recall data to determine whether or not the probability that a child consumed breakfast from home (or from school) on one day was significantly related to whether or not they ate any breakfast from home (or school) and the amount of food energy from that source consumed on another day. Although we could identify a reasonable proportion of children as 80 percent likely to consume breakfast only from home on a typical school day, none of the children met that criterion for breakfast from school. Thus, it was not possible to identify a subgroup that had an 80 percent chance or more of eating breakfast from school (exclusively) on a given day.

We repeated the analyses to see if we could predict the likelihood of children eating breakfast from school, even if they also consumed food from other sources. We found that only 6 percent (n=246) of the children were likely to consume any breakfast from school four out of five days (80 percent predicted likelihood). When this criterion was relaxed to 75 percent, we estimated that 19 percent (n=812), or less than one child out of five, were likely to consume any school breakfast on a typical school day.

Exhibit 6.12**Gains in Student Level Outcomes: Breakfast Skippers vs. Breakfast Non-Skippers¹**

Outcome	Breakfast Skippers			Breakfast Non-Skippers		
	Pre	Gain	SE	Pre	Gain	SE
School breakfast participation (as a percent of school days)	15.33	7.54*	(2.06)	15.43	15.27	(0.56)
Attendance ²	95.70	-0.28	(0.29)	95.97	-0.09	(0.07)
Days tardy (as a percent of school days enrolled) ³	1.59	0.79	(0.48)	1.69	0.52	(0.09)
Math achievement ⁴	622.27	23.29	(2.93)	633.87	22.36	(0.69)
Reading achievement ⁴	633.03	19.47	(3.36)	649.09	17.03	(0.88)
Number of Students	170	170		3203	3203	

¹ Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days in a school week.

² Based on average percent of days present.

³ Data were not available for Districts B and E.

⁴ All test scores have been converted to Stanford-9 scale scores, using the equipercentile equating method.

Notes: Pre = pre-implementation or baseline year of SBPP

Gain = change from pre-implementation (baseline) year to first year of SBPP implementation.

*Difference between breakfast skippers and breakfast non-skippers is statistically significant at the .05 level.

Source: *Impact Study—Parent Survey, Spring 2001, and Student-Level School Breakfast Participation Data, Attendance Data, Academic Achievement Test Scores, 1999-2000 and 2000-2001.*

The findings indicate that students who ate breakfast exclusively from school were more likely to consume a substantive breakfast (Definition 2) than students who ate breakfast exclusively from home.²² At the same time, students who ate breakfast only from school had lower mean food energy, nutrient, and food group intakes than either of the other two groups, both at breakfast and over 24 hours. School breakfasts contributed as much or more than home breakfasts to mean 24-hour intakes of several vitamins and minerals. Note that the results of comparisons based on consuming breakfast exclusively from home versus school should be viewed cautiously. Our tests for selection bias suggest that the estimates for these analyses should not be regarded as unbiased.

Measures and Analytic Variables

All measures were constructed from data collected in the 24-hour dietary recall interviews. The sample of students was divided into the three groups of interest, based on where breakfast foods²³ were obtained:

1. Home breakfast only;
2. School breakfast only; and
3. School breakfast and home breakfast.

Because it was possible that the source of breakfast differed on the target day and the day of a late recall, a student could be classified in a different group for breakfast and full day outcomes. Thus, the comparisons discussed below include only those students for whom we have a full 24-hour recall (target day or late). In these analyses, students who skipped breakfast or ate breakfast from a source (or sources) other than home or school were excluded.²⁴

The following target day measures of breakfast consumption and dietary intake were analyzed for the three groups of students:

- Consumption of a substantive breakfast
- Food energy and nutrient intake at breakfast and over 24 hours
- Food group intake at breakfast and over 24 hours
- Contribution of breakfast to food energy and nutrient intake over 24 hours

Findings

The results of analyses comparing target day nutrition outcomes for children who ate breakfast from home, school, or both are summarized below. The three groups differed significantly with regard to

²² More students who ate breakfast exclusively from school met the food component-based criterion for Definition 2 than the home breakfast eaters. Mean food energy intake at breakfast, however, was lower for the Definition 2 school breakfast group (19 percent of RDA compared with 23 percent of RDA for the Definition 2 home eaters).

²³ As described earlier in this chapter, “breakfast” included all foods and beverages consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that were reported as being part of breakfast on the target day.

²⁴ The resulting sample was a total of 3,055 students (60 percent had home breakfast only, 25 percent had school breakfast only, and 15 percent had a home and a school breakfast).

almost all of the nutrients and dietary components assessed. Differences in food group intake were fewer but followed the same general pattern of lower intakes, on average, among students who consumed breakfast only from school.

Consumption of a Substantive Breakfast

Students who ate breakfast exclusively from school were significantly more likely to consume a Definition 2 (but not Definition 3) substantive breakfast than students who had breakfast only from home (85 percent versus 75 percent; Exhibit G-14). The great majority of students eating breakfast from both home and school consumed a Definition 2 or Definition 3 substantive breakfast (97 and 91 percent, respectively). As expected, these students were significantly more likely to consume a substantive breakfast than students eating breakfast from either source alone.

Food and Nutrient Intake at Breakfast

Exhibit 6.13 shows that mean intakes of food energy and most nutrients at breakfast were higher among students who ate breakfast exclusively from home versus exclusively from school (but lower than students eating breakfast from both sources). Exceptions for which differences were not observed include total fat, carbohydrate, and calcium and phosphorous (as a percent of RDA).

Differences in food group intake at breakfast were statistically significant across the three groups for grain products, fruits, and dairy products, as well as discretionary fat and added sugars (Exhibit 6.14). Except for fruits, students who ate breakfast exclusively from home ate more servings from these Food Guide Pyramid groups than those that had breakfast only from school. The differences, however, were relatively small (less than one-half serving, on average). With regard to added sugars, the average difference was approximately one and one-half teaspoons. Home breakfast eaters were somewhat more likely to consume sweetened beverages and cake, candy, or cookies, and to add sugar, jelly, or syrup to their breakfast foods than school breakfast eaters. Students who ate breakfast exclusively from home were less likely to eat cereal, but when they did, they ate a larger portion (26 versus 15 grams, on average) with almost twice the added sugar content as cereals eaten from school.

Consistent with findings for food energy/nutrients, students who ate breakfast from both home and school consumed about one additional serving of grains, and one-half serving more of fruits and dairy than other students; they also had the highest breakfast intakes of discretionary fat and added sugars.

Food and Nutrient Intake Over 24 Hours

Findings for 24-hour intakes of food energy and nutrients by source of breakfast tended to mirror the differences observed at breakfast (Exhibit 6.15). Students who ate breakfast exclusively from home consumed significantly more food energy and more of most vitamins and minerals (as a percent of RDA) over 24 hours than those who ate breakfast exclusively from school. They also consumed slightly but significantly more saturated fat (as a percent of food energy) and cholesterol. In spite of these differences, both groups had mean intakes of food energy, protein, vitamins, and minerals that approximate or exceed the RDA. Neither group met the *Dietary Guidelines* recommendations for total fat or saturated fat intake, nor the NRC-recommended maximum for daily sodium intake of 2,400 mg per day.

Exhibit 6.13
Mean Food Energy and Nutrient Intake at Breakfast, by Source of Breakfast

Dietary Component	Home Only		School Only		Home and School		Significant Differences
	Mean	SE	Mean	SE	Mean	SE	
Food energy (as % 1989 RDA)	20.31	(0.28)	17.04	(0.27)	30.39	(0.61)	a,b,c
Protein (as % 1989 RDA)	41.23	(0.68)	36.66	(0.71)	62.39	(1.54)	a,b,c
Percent of Food Energy from:							
Total fat	23.52	(0.30)	23.35	(0.41)	23.81	(0.48)	
Saturated fat	9.76	(0.14)	8.41	(0.16)	9.36	(0.21)	a,c
Carbohydrate	66.44	(0.38)	65.31	(0.47)	65.72	(0.55)	
Protein	12.07	(0.12)	12.84	(0.16)	12.19	(0.19)	a
Vitamins (as percent of RDA)¹							
Vitamin A	61.72	(1.23)	52.32	(1.35)	87.74	(2.76)	a,b,c
Vitamin C	84.62	(2.76)	70.90	(2.41)	113.71	(5.26)	a,b,c
Vitamin B ₆	80.40	(1.82)	62.12	(1.77)	108.63	(3.91)	a,b,c
Vitamin B ₁₂	102.09	(2.67)	75.92	(2.45)	132.56	(5.21)	a,b,c
Niacin	62.00	(1.32)	46.74	(1.19)	79.28	(2.64)	a,b,c
Thiamin	79.20	(1.40)	63.05	(1.31)	107.08	(2.94)	a,b,c
Riboflavin	110.59	(1.92)	89.89	(1.78)	156.98	(4.25)	a,b,c
Folate	53.64	(1.05)	39.02	(0.88)	68.91	(2.13)	a,b,c
Minerals (as percent of RDA)¹							
Calcium	35.52	(0.63)	32.95	(0.66)	55.84	(1.48)	b,c
Calcium (as percent of AI)	33.70	(0.60)	31.34	(0.64)	53.17	(1.41)	b,c
Iron	68.23	(1.53)	48.81	(1.16)	82.35	(2.87)	a,b,c
Magnesium	31.79	(0.62)	26.44	(0.53)	47.65	(1.31)	a,b,c
Phosphorous	35.97	(0.72)	34.15	(0.90)	57.88	(1.91)	b,c
Zinc	53.42	(1.33)	41.50	(1.07)	70.73	(2.72)	a,b,c
Other Dietary Components							
Cholesterol (mg)	53.30	(2.74)	26.42	(2.19)	56.14	(4.23)	a,c
Sodium (mg)	553.66	(10.84)	450.78	(10.19)	731.97	(20.48)	a,b,c
Fiber (gm)	2.65	(0.06)	1.94	(0.05)	3.58	(0.11)	a,b,c
Fiber (as percent of age-plus-5 gm)	18.62	(0.43)	13.63	(0.35)	25.39	(0.80)	a,b,c
Number of Students²	1835		768		452		

RDA = Recommended Dietary Allowance

¹ Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

² Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

a Difference between Home Only and School Only is statistically significant at the .05 level.

b Difference between Home Only and Home and School is statistically significant at the .05 level.

c Difference between School Only and Home and School is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Exhibit 6.14
Mean Food Group Intake at Breakfast, by Source of Breakfast

Food Group	Home Only		School Only		Home and School		Significant Differences
	Mean	SE	Mean	SE	Mean	SE	
	Number of Servings¹						
Grain Products	1.8	(0.03)	1.5	(0.03)	2.5	(0.07)	a,b,c
Whole grains	0.5	(0.02)	0.4	(0.02)	0.7	(0.04)	a,b,c
Non-whole grains	1.2	(0.03)	1.1	(0.03)	1.8	(0.07)	b,c
Vegetables	0.0	(0.01)	0.0	(0.00)	0.0	(0.01)	
Dark green vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Deep yellow vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
White potatoes	0.0	(0.00)	0.0	(0.00)	0.0	(0.01)	
Other starchy vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Tomatoes	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Cooked dry beans and peas	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Other vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Fruits	0.4	(0.02)	0.5	(0.01)	0.9	(0.04)	a,b,c
Citrus fruits, melons, and berries	0.3	(0.01)	0.2	(0.01)	0.4	(0.03)	b,c
Other fruits	0.2	(0.01)	0.3	(0.01)	0.5	(0.03)	a,b,c
Dairy Products	0.8	(0.02)	0.7	(0.02)	1.2	(0.04)	a,b,c
Milk	0.7	(0.02)	0.7	(0.01)	1.2	(0.04)	a,b,c
Yogurt	0.0	(0.00)	0.0	(0.00)	0.0	(0.01)	b,c
Cheese	0.0	(0.00)	0.0	(0.00)	0.0	(0.01)	
Meat and Meat Substitutes	0.1	(0.01)	0.1	(0.01)	0.1	(0.01)	
Red meat (beef, pork, veal, lamb, game)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Organ meats	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Frankfurters, sausage, luncheon meats	0.0	(0.00)	0.0	(0.01)	0.0	(0.00)	a
Poultry (chicken, turkey, other)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Fish and shellfish	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Eggs	0.1	(0.00)	0.0	(0.00)	0.0	(0.01)	a
Soybean products (tofu, meat analogues)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Nuts and seeds	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	a,c
Other							
Discretionary fat (gm)	9.3	(0.22)	7.2	(0.22)	13.8	(0.45)	a,b,c
Added sugars (tsp)	5.3	(0.12)	3.9	(0.11)	7.3	(0.25)	a,b,c
Number of Students²	1835		768		452		

¹ Based mainly on the serving size definitions for the Food Guide Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

² Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

Note: Means have been rounded. Differences of 0.0 represent less than 0.05 of a serving.

a Difference between Home Only and School Only is statistically significant at the .05 level.

b Difference between Home Only and Home and School is statistically significant at the .05 level.

c Difference between School Only and Home and School is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Exhibit 6.15
Mean Food Energy and Nutrient Intake Over 24 Hours, by Source of Breakfast

Dietary Component	Home Only		School Only		Home and School		Significant Differences
	Mean	SE	Mean	SE	Mean	SE	
Food energy (as % 1989 RDA)	101.35	(0.69)	96.83	(0.97)	110.22	(1.44)	a,b,c
Protein (as % 1989 RDA)	242.70	(2.21)	241.64	(3.09)	266.09	(4.68)	b,c
Percent of Food Energy from:							
Total fat	31.73	(0.15)	32.03	(0.23)	30.82	(0.28)	b,c
Saturated fat	11.96	(0.08)	11.61	(0.11)	11.39	(0.13)	a,b
Carbohydrate	55.45	(0.18)	54.43	(0.28)	56.34	(0.35)	a,c
Protein	14.34	(0.08)	14.83	(0.13)	14.28	(0.15)	a,c
Vitamins (as percent of RDA)¹							
Vitamin A	166.92	(2.31)	154.12	(3.13)	194.13	(4.95)	a,b,c
Vitamin C	260.80	(5.18)	237.32	(6.61)	293.02	(10.77)	a,b,c
Vitamin B ₆	221.89	(2.72)	205.53	(3.93)	257.41	(6.46)	a,b,c
Vitamin B ₁₂	312.11	(5.90)	284.06	(6.08)	335.24	(8.64)	a,c
Niacin	212.91	(2.24)	197.37	(3.18)	232.53	(5.01)	a,b,c
Thiamin	245.22	(2.40)	230.44	(3.50)	279.83	(5.50)	a,b,c
Riboflavin	312.94	(3.08)	292.27	(4.36)	362.87	(7.13)	a,b,c
Folate	152.19	(1.66)	139.60	(2.37)	172.33	(4.11)	a,b,c
Minerals (as percent of RDA)¹							
Calcium	134.05	(1.49)	130.55	(2.06)	155.80	(3.22)	b,c
Calcium (as percent of AI)	127.27	(1.43)	124.07	(2.00)	148.16	(3.07)	b,c
Iron	185.96	(2.18)	167.64	(2.35)	203.07	(4.40)	a,b,c
Magnesium	136.49	(1.47)	127.59	(2.11)	151.31	(3.12)	a,b,c
Phosphorous	160.82	(2.19)	157.74	(3.36)	183.08	(4.83)	b,c
Zinc	174.54	(2.09)	163.31	(2.57)	194.41	(4.66)	a,b,c
Other Dietary Components							
Cholesterol (mg)	213.10	(3.69)	191.15	(4.78)	215.66	(6.81)	a,c
Sodium (mg)	3260.34	(29.23)	3206.06	(41.66)	3364.26	(54.51)	
Fiber (gm)	14.39	(0.15)	13.29	(0.20)	15.17	(0.32)	a,c
Fiber (as percent of age-plus-5 gm)	101.32	(1.04)	93.87	(1.47)	107.77	(2.33)	a,b,c
Number of Students²	1835		768		452		

RDA = Recommended Dietary Allowance

¹ Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

² Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

a Difference between Home Only and School Only is statistically significant at the .05 level.

b Difference between Home Only and Home and School is statistically significant at the .05 level.

c Difference between School Only and Home and School is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Interestingly, total fat as a percent of food energy was significantly lower among students eating breakfast from both home and school than either source alone. Students who consumed breakfast from both home and school consumed significantly more food energy (110 percent of RDA) and most other dietary components than students eating breakfast from only one source.

Analyses of food group intake over 24 hours find that students who ate breakfast exclusively from home consumed significantly more servings of grain products (whole grains), some types of fruits, and milk, as well as higher amounts of discretionary fat and added sugars than students eating breakfast only from school (Exhibit 6.16). The differences were relatively small in magnitude (one-tenth to less than one-half serving for food groups), although the disparity for added sugars increased to a mean of about two and one-half teaspoons. Students who ate breakfast from both home and school had higher 24-hour intakes of the grain, fruit, and dairy Food Guide Pyramid groups than those with only one source of breakfast. A notable finding is that 24-hour discretionary fat and added sugar intakes did not differ significantly between students who ate breakfast only from home compared with those who ate at both home and school.

Finally, the analysis of the percent contribution of breakfast to intake over 24 hours shows that breakfasts exclusively from home are somewhat more important to total daily intake of food energy, macronutrients, and some (but not all) vitamins and minerals than breakfasts exclusively from school. Results are shown in Exhibit G-15. Exceptions for which the source of breakfast does not seem to play a role include vitamin A, calcium, magnesium, and phosphorous. In addition, the contribution of vitamin C from school breakfasts is greater than for breakfasts from home (33 percent versus 29 percent, respectively).

Analyses of Nutrition Outcomes by Availability of Breakfast at School

In the SBPP, all students had access to a school breakfast program. It was expected that students in schools where universal-free school breakfast was available (treatment schools) would be more likely to eat breakfast than students with access to the regular SBP (control schools). It was also hypothesized that rates of breakfast consumption (and school breakfast participation, in particular) would be higher among students offered the opportunity to eat breakfast in the classroom, free of charge and as part of the school day. As noted in Chapter Three, during the initial year of the SBPP, 18 of the 79 treatment schools implemented this approach and had significantly higher school breakfast participation rates compared with their matched control schools. Results of additional non-experimental analyses, however, found that the effects of classroom breakfast on participation did not translate into differential gains in attendance or academic achievement (McLaughlin et al, 2002; Appendix F).

This section presents results of analyses focused on the relationship between the school breakfast setting (classroom versus non-classroom) and students' nutrition outcomes. The outcomes assessed include measures of breakfast consumption and dietary intake on a given day, and usual dietary intake. It is important to recognize that comparisons were based on the *availability* of school breakfast in the student's school, not on their consumption of breakfast in the classroom or elsewhere.²⁵ The controllable policy variable of interest is whether breakfast is offered in a particular location—not whether a child eats breakfast in a location.

²⁵ Non-classroom school breakfast settings were primarily the school cafeterias, although in a small share of schools, students were served or ate breakfast in multi-purpose rooms, gymnasiums, kitchens, and even hallways.

Exhibit 6.16
Mean Food Group Intake Over 24 Hours, by Source of Breakfast

Food Group	Home Only		School Only		Home and School		Significant Differences
	Mean	SE	Mean	SE	Mean	SE	
	Number of Servings¹						
Grain Products	7.6	(0.08)	7.2	(0.11)	8.3	(0.15)	a,b,c
Whole grains	1.2	(0.03)	0.9	(0.04)	1.3	(0.07)	a,c
Non-whole grains	6.4	(0.08)	6.3	(0.11)	7.0	(0.15)	b,c
Vegetables	2.2	(0.04)	2.1	(0.06)	2.1	(0.08)	
Dark green vegetables	0.1	(0.01)	0.1	(0.01)	0.1	(0.02)	
Deep yellow vegetables	0.1	(0.01)	0.1	(0.01)	0.1	(0.02)	
White potatoes	0.9	(0.03)	0.9	(0.05)	0.8	(0.06)	
Other starchy vegetables	0.1	(0.01)	0.2	(0.02)	0.1	(0.02)	
Tomatoes	0.4	(0.01)	0.4	(0.02)	0.4	(0.02)	
Cooked dry beans and peas	0.1	(0.01)	0.1	(0.02)	0.1	(0.02)	
Other vegetables	0.5	(0.02)	0.5	(0.02)	0.5	(0.03)	
Fruits	1.7	(0.04)	1.7	(0.05)	2.2	(0.09)	b,c
Citrus fruits, melons, and berries	0.7	(0.03)	0.6	(0.03)	0.9	(0.05)	a,c
Other fruits	0.9	(0.03)	1.1	(0.04)	1.3	(0.07)	a,b,c
Dairy Products	2.7	(0.04)	2.5	(0.05)	3.1	(0.07)	a,b,c
Milk	2.0	(0.03)	1.9	(0.04)	2.4	(0.06)	a,b,c
Yogurt	0.1	(0.00)	0.0	(0.01)	0.1	(0.01)	b,c
Cheese	0.6	(0.02)	0.6	(0.03)	0.6	(0.03)	
Meat and Meat Substitutes	1.4	(0.02)	1.4	(0.04)	1.4	(0.04)	
Red meat (beef, pork, veal, lamb, game)	0.6	(0.02)	0.6	(0.03)	0.5	(0.03)	
Organ meats	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Frankfurters, sausage, luncheon meats	0.2	(0.01)	0.3	(0.02)	0.2	(0.02)	
Poultry (chicken, turkey, other)	0.3	(0.01)	0.4	(0.02)	0.4	(0.03)	
Fish and shellfish	0.1	(0.01)	0.1	(0.02)	0.1	(0.01)	
Eggs	0.1	(0.01)	0.1	(0.01)	0.1	(0.01)	a
Soybean products (tofu, meat analogues)	0.0	(0.00)	0.0	(0.00)	0.0	(0.01)	
Nuts and seeds	0.1	(0.00)	0.1	(0.01)	0.1	(0.01)	a
Other							
Discretionary fat (gm)	60.1	(0.60)	57.0	(0.86)	63.0	(1.20)	a,c
Added sugars (tsp)	24.8	(0.31)	22.3	(0.44)	25.6	(0.66)	a,c
Number of Students²	1835		768		452		

¹ Based on the serving size definitions for the Food Guide Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

² Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

Note: Means have been rounded. Differences of 0.0 represent less than 0.05 of a serving.

a Difference between Home Only and School Only is statistically significant at the .05 level.

b Difference between Home Only and Home and School is statistically significant at the .05 level.

c Difference between School Only and Home and School is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

The analyses suggest that the availability of school breakfast in the classroom is related to eating a substantive breakfast, and the consumption of more than one breakfast (usually from school and home). Students in treatment classroom schools were also found to have higher breakfast intakes of food energy and some macronutrients, yet their intakes of vitamins and minerals were lower than other students, both at breakfast and over 24 hours. Again, these findings are based on a non-experimental analysis, and our assessment of selection bias suggests that they not be viewed as unbiased.

Measures and Analytic Variables

Data sources for the analyses described here include the parent-assisted 24-hour dietary recall (plus second recalls for a subsample of students) and, to determine breakfast setting, interviews with cafeteria managers conducted as part of the SBPP Implementation Study. All students in the sample were categorized as:

1. Universal-free school breakfast available in the classroom (treatment classroom, 18 schools);
2. Universal-free school breakfast available in the cafeteria (treatment non-classroom, 61 schools); or
3. Universal-free/classroom school breakfast not available (control non-classroom, 73 schools).

The three groups of students were then compared on the full battery of measures of breakfast consumption, target day food and nutrient intake, and usual dietary intake:

- Consumption of a substantive breakfast
- Consumption of more than one breakfast
- Food energy and nutrient intake at breakfast and over 24 hours
- Food group intake at breakfast and over 24 hours
- Contribution of breakfast to food energy and nutrient intake over 24 hours
- Percent of students whose usual 24-hour intake met dietary standards and recommendations
- Means and distributions of usual intake for food energy, protein, and calcium

All “target day” analyses were based on data for the day the child completed the full 24-hour dietary recall interview (target day or late).²⁶ Measures of usual intake and nutrition standards used for all analyses were the same as those described previously in this chapter.

Findings

Nutrition outcomes were compared for the three groups of students characterized by the availability of breakfast at school. Results are discussed in the sections that follow. Differences in breakfast consumption patterns were significant, but students’ food and nutrient intakes were not clearly related to the location of breakfast availability at school.

²⁶ The total sample for this analysis was 3,347 students (13 percent in treatment classroom schools, 38 percent in treatment non-classroom schools, and 49 percent in control non-classroom schools).

Breakfast Consumption

Exhibits 6.17 and 6.18 illustrate the relationships between the availability of breakfast at school and the prevalence of breakfast consumption, for three definitions of breakfast. Students in treatment schools with classroom breakfast were significantly more likely to eat a substantive breakfast (both Definition 2 and Definition 3) on a given day than students in non-classroom control (regular SBP) schools. They were also more likely to eat a Definition 3 breakfast than their counterparts in treatment non-classroom schools.

With respect to the consumption of more than one breakfast, a significantly larger share of students in schools with classroom breakfast ate two or more breakfasts (substantive or not) than either group with non-classroom breakfast.

Food and Nutrient Intake at Breakfast

Results for food energy and nutrient intake at breakfast are mixed. For example, students in schools with classroom breakfast had significantly higher breakfast intakes of food energy, total fat (as a percent of food energy), and sodium, yet they consumed less of certain vitamins and minerals (e.g., vitamin B-6, folate, zinc) than one or both of the non-classroom groups (Exhibit G-16).

Students in schools with classroom breakfast ate significantly more servings of grain products (primarily *non*-whole grains) at breakfast than those in either of the non-classroom groups (Exhibit G-17).²⁷ The mean difference of about one-half serving was statistically significant. None of the other differences in Food Guide Pyramid food group intake at breakfast were nutritionally important (mean differences of one-tenth serving or less).

Food and Nutrient Intake Over 24 Hours

As shown in Exhibit 6.19, no relationship was found between the school breakfast setting and students' 24-hour intake of food energy or macronutrients (e.g., protein, fat, cholesterol, sodium, etc.). Students in treatment schools with classroom breakfast consumed significantly less of most vitamins and minerals (relative to the RDA) than students in either non-classroom group. The implications of this result are unclear, however, since 24-hour intakes for both groups exceed 100 percent of the RDA by a wide margin (Exhibit 6.19).

There were a handful of significant differences in students' 24-hour intakes of Food Guide Pyramid food groups by location of school breakfast, but few were large enough to be nutritionally significant (Exhibit G-18). The finding of more servings of non-whole grains at breakfast among the classroom breakfast group was not replicated over 24-hours, although these students consumed slightly fewer servings of whole grains than the non-classroom groups (1 serving versus 1.1 to 1.2 servings) and were the least likely to meet the daily recommendation for dietary fiber (Exhibit 6.19).

²⁷ This finding is somewhat unexpected, given that (1) the SBPP Implementation Study found fewer grains/breads offered in treatment versus control school breakfasts overall, and (2) treatment classroom breakfasts included significantly fewer grain/bread items than non-classroom treatment breakfasts (McLaughlin et al., 2002). One reason for this apparent discrepancy is that factors other than the breakfast foods offered affected students' choices and the amounts of grain products they actually consumed. Another is the difference in how servings of grains/breads were measured for the analysis of breakfast menus and breakfast intakes, the latter being Food Guide Pyramid servings which count the grain-based ingredients in almost all food items.

Exhibit 6.17

Percent of Students Eating Breakfast on a Typical Day, by Availability of Breakfast at School

Breakfast Type ¹	Treatment Schools				Control Schools		Significant Differences
	Classroom		Non-classroom ²		Non-classroom ²		
	Percent	SE	Percent	SE	Percent	SE	
Any food or beverage (Definition 1)	98.33%	(0.63)	96.72%	(0.50)	96.60%	(0.45)	
Food from at least two main food groups ³ and >10% RDA for food energy (Definition 2)	85.24	(1.73)	80.38	(1.11)	75.30	(1.06)	b,c
Food from at least two main food groups ³ and >15% RDA for food energy (Definition 3)	70.95	(2.22)	61.45	(1.36)	58.74	(1.21)	a,b
Number of Students⁴	420		1279		1648		

RDA = Recommended Dietary Allowance

¹ All three definitions of breakfast include all food and beverages, excluding water, reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that the student/parent reported as being part of breakfast.

² Non-classroom locations are primarily school cafeterias.

³ The five main food groups are milk and milk products, meat and meat alternates, grain products, fruit and fruit juices, and vegetables and vegetable juices.

⁴ Includes students who skipped breakfast.

a Difference between Treatment Classroom and Treatment Non-classroom is statistically significant at the .05 level.

b Difference between Treatment Classroom and Control Non-classroom is statistically significant at the .05 level.

c Difference between Treatment Non-classroom and Control Non-classroom is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Exhibit 6.18
Percent of Students Eating More Than One Breakfast, by Availability of Breakfast at School

Breakfast Type ¹	Treatment Schools				Control Schools		Significant Differences
	Classroom		Non-classroom ²		Non-classroom ²		
	Percent	SE	Percent	SE	Percent	SE	
Any food or beverage (Definition 1)	30.24%	(2.24)	15.64%	(1.02)	10.25%	(0.75)	a,b,c
Food from at least two main food groups ³ and >10% RDA for food energy (Definition 2)	12.14	(1.60)	5.08	(0.61)	3.52	(0.45)	a,b
Food from at least two main food groups ³ and >15% RDA for food energy (Definition 3)	7.38	(1.40)	2.58	(0.48)	2.25	(0.37)	a,b
Number of Students⁴	420		1279		1648		

RDA = Recommended Dietary Allowance

¹ All three definitions of breakfast include all food and beverages, excluding water, reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that the student/parent reported as being part of breakfast.

² Non-classroom locations are primarily school cafeterias.

³ The five main food groups are milk and milk products, meat and meat alternates, grain products, fruit and fruit juices, and vegetables and vegetable juices.

⁴ Includes students who skipped breakfast.

Exhibit reads: “Of those students in treatment schools that offer classroom breakfast, 30 percent consumed a breakfast from school and at least one other source, both consisting of any food or beverage other than water.”

Note: Percentages include only those students for whom one source of breakfast food was the school breakfast. Almost all of these students consumed additional breakfast foods at home versus some other source.

a Difference between Treatment Classroom and Treatment Non-classroom is statistically significant at the .05 level.

b Difference between Treatment Classroom and Control Non-classroom is statistically significant at the .05 level.

c Difference between Treatment Non-classroom and Control Non-classroom is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Exhibit 6.19

Mean Food Energy and Nutrient Intake Over 24 Hours, by Availability of Breakfast at School

Dietary Component	Treatment Schools				Control Schools		Significant Differences
	Classroom		Non-classroom ¹		Non-classroom ¹		
	Mean	SE	Mean	SE	Mean	SE	
Food energy (as % 1989 RDA)	101.55	(1.39)	99.84	(0.82)	101.94	(0.74)	
Protein (as % 1989 RDA)	242.29	(4.61)	241.31	(2.53)	247.77	(2.39)	
Percent of Food Energy from:							
Total fat	32.31	(0.31)	31.42	(0.19)	32.03	(0.16)	c
Saturated fat	11.86	(0.15)	11.69	(0.09)	11.95	(0.08)	
Carbohydrate	54.62	(0.37)	55.59	(0.22)	54.97	(0.19)	
Protein	14.31	(0.18)	14.48	(0.10)	14.45	(0.09)	
Vitamins (as percent of RDA)²							
Vitamin A	149.48	(4.48)	170.02	(2.73)	164.29	(2.43)	a,b
Vitamin C	219.82	(8.79)	265.81	(6.32)	259.46	(5.27)	a,b
Vitamin B ₆	204.48	(5.85)	223.21	(3.47)	221.37	(2.84)	a,b
Vitamin B ₁₂	277.01	(8.26)	303.49	(4.89)	311.57	(6.44)	b
Niacin	197.01	(4.55)	212.19	(2.81)	210.68	(2.33)	a,b
Thiamin	231.68	(5.07)	247.27	(2.97)	244.95	(2.59)	a
Riboflavin	291.11	(6.66)	316.10	(3.73)	311.58	(3.34)	a,b
Folate	137.44	(3.35)	154.24	(2.15)	149.56	(1.75)	a,b
Minerals (as percent of RDA)²							
Calcium	127.87	(3.10)	136.30	(1.74)	135.65	(1.61)	
Calcium (as percent of AI)	120.84	(2.96)	129.73	(1.68)	128.78	(1.54)	a,b
Iron	173.17	(3.48)	183.05	(2.42)	182.38	(2.26)	
Magnesium	123.91	(2.79)	138.25	(1.88)	135.85	(1.52)	a,b
Phosphorous	151.17	(4.51)	164.94	(2.73)	162.21	(2.35)	a,b
Zinc	162.55	(4.22)	173.90	(2.43)	173.72	(2.16)	a,b
Other Dietary Components							
Cholesterol (mg)	204.50	(7.01)	201.63	(3.84)	214.32	(4.01)	
Sodium (mg)	3244.12	(54.46)	3235.32	(34.04)	3283.14	(31.46)	
Fiber (gm)	13.45	(0.26)	14.26	(0.18)	14.24	(0.16)	
Fiber (as percent of age-plus-5 gm)	93.85	(1.87)	101.04	(1.30)	100.41	(1.11)	a,b
Number of Students³	420		1279		1648		

RDA = Recommended Dietary Allowance

¹ Non-classroom locations are primarily school cafeterias.

² Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

³ Includes students who skipped breakfast.

a Difference between Treatment Classroom and Treatment Non-classroom is statistically significant at the .05 level.

b Difference between Treatment Classroom and Control Non-classroom is statistically significant at the .05 level.

c Difference between Treatment Non-classroom and Control Non-classroom is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

The availability of classroom breakfast was associated with a small but significantly greater breakfast contribution to total daily intakes of food energy, total fat and saturated fat (as a percent of food energy), and sodium for students in treatment schools compared with students in both of the non-classroom groups. There were a handful of other significant differences between classroom and non-classroom students, but no clear pattern was observed (see Exhibit G-19).

Usual 24-Hour Dietary Intake

Results of analyses of usual food energy and nutrient intake are provided in Appendix G (Exhibits G-20 through G-22). No significant differences were observed across the three groups in the percent of students whose usual 24-hour intake met standards for nutrient adequacy (for food energy, protein, and vitamins and minerals). Similarly, no statistically significant relationship was found between the location of breakfast at school and the proportion of students' whose usual intake met other dietary recommendations (e.g., *Dietary Guidelines* goals for total fat and saturated fat).

Students offered universal-free school breakfast in the classroom had significantly lower mean usual intakes of calcium (as a percent of AI), and lower calcium intakes at the 5th and 50th percentile of the distribution than the non-classroom breakfast students. This finding is not particularly meaningful since most students in all three groups were consuming considerably more than the calcium AI level (Exhibit G-21).

Analyses of Nutrition Outcomes by Household Income

The first year report of findings from the SBPP provided some insights into the impacts of the availability of universal-free school breakfast as well as actual participation, among students from low-income families. There was no clear pattern in the observed effects on the nutrition and other outcomes assessed for students eligible for free or reduced-price school meals (household incomes at or below 185 percent of the federal poverty level) relative to students with higher household incomes (paid-eligible status). The higher income group (i.e., paid-eligible status) actually experienced the greatest gains in school breakfast participation as a result of the intervention (McLaughlin et al., 2002).

A series of analyses were conducted to compare nutrition outcomes across children with household incomes that would place them in one of the three school meals eligibility groups: free, reduced-priced, or paid. The type of school breakfast available or consumed (universal-free versus regular SBP) was not considered in these analyses. The nutrition outcomes examined include breakfast consumption and dietary intake on a given day, and usual dietary intake. Results suggest that household income is not strongly associated with these outcomes among students in the SBPP sample.

Measures and Analytic Variables

As for previous analyses described in this chapter, data from the 24-hour dietary recall were used to construct measures of dietary intake. Household income, in relation to the federal poverty level, was

determined on the basis of Parent Survey responses to questions on household size and income.²⁸ Students were then classified into one of three groups:

1. **Less than 130 percent of poverty:** students who would be classified as eligible for free meals;
2. **Between 130 and 185 percent of poverty:** students who would be classified as eligible for reduced-price meals; or
3. **Above 185% of poverty:** students who would be classified as eligible for paid meals.

The full set of nutrition outcome measures (breakfast consumption, target day food and nutrient intake, and usual dietary intake) were examined. All students for whom both dietary data and income information were available are included in the breakfast analyses (n = 3,270). Twenty-four-hour outcomes include only those students who completed a full 24-hour recall (n = 3,217).²⁹

Findings

Results of the analyses of nutrition outcomes by household income are discussed below. Very few significant differences between income groups were observed. Additional tabulations of results can be found in Appendix G.

Breakfast Consumption

Findings on the relationship between household income and the likelihood of consuming breakfast on a given day are presented in Exhibit G-23. The percent of students who ate any breakfast or a substantive breakfast (Definition 2 or 3) on the target day did not vary by income group/school meal eligibility status.

A student was identified as eating more than one breakfast if breakfast food was obtained from school and at least one other source (e.g., home, other). Exhibit 6.20 shows that a significantly larger share of students in either of the two lower income groups ate more than one (non-substantive) breakfast than those with household incomes above 185 percent of poverty. There were no differences in the percent of students eating two or more *substantive* breakfasts (Definition 2) between the three income groups.

Food and Nutrient Intake at Breakfast

Findings for the comparisons of food energy and nutrient intake at breakfast are shown in Exhibit 6.21. Mean food energy intake did not differ, but we observed lower mean intakes of a handful of other dietary components among students in the lowest income group (below 130 percent of poverty)

²⁸ Note that income data were collected for the year 2000, corresponding roughly with the baseline period for the SBPP. Household income may have changed for some students by the end of the first year of SBPP implementation when dietary data were collected (Spring 2001).

²⁹ The sample is distributed as follows: 27 percent with income less than 130 percent of poverty, 16 percent with income between 130 and 185 percent of poverty, and 57 percent with income above 185 percent of poverty.

Exhibit 6.20**Percent of Students Eating More Than One Breakfast, by Household Income, Relative to the Federal Poverty Level**

Breakfast Type ¹	<130%		130-185%		>185%		Significant Differences
	Percent	SE	Percent	SE	Percent	SE	
Any food or beverage (Definition 1)	20.49%	(1.35)	18.59%	(1.72)	12.65%	(0.77)	b,c
Food from at least two main food groups ² and >10% RDA for food energy (Definition 2)	6.16	(0.80)	6.85	(1.12)	4.56	(0.48)	
Food from at least two main food groups ² and >15% RDA for food energy (Definition 3)	3.81	(0.64)	3.52	(0.82)	2.09	(0.33)	b
Number of Students³	893		511		1866		

RDA = Recommended Dietary Allowance

¹ All three definitions of breakfast include all food and beverages, excluding water, reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that the student/parent reported as being part of breakfast.

² The five main food groups are milk and milk products, meat and meat alternates, grain products, fruit and fruit juices, and vegetables and vegetable juices.

³ Includes students who skipped breakfast.

Exhibit reads: "Of those students with household income below 130 percent of poverty, 20 percent consumed a breakfast from school and at least one other source, both consisting of any food or beverage other than water."

Note: Percentages include only those students for whom one source of breakfast food was the school breakfast. Almost all of these students consumed additional breakfast foods at home versus some other source.

a Difference between <130% and 130-185% is statistically significant at the .05 level.

b Difference between <130% and >185% is statistically significant at the .05 level.

c Difference between 130-185% and >185% is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

Exhibit 6.21

Mean Food Energy and Nutrient Intake at Breakfast, by Household Income, Relative to the Federal Poverty Level

Dietary Component	<130%		130-185%		>185%		Significant Differences
	Mean	SE	Mean	SE	Mean	SE	
Food energy (as % 1989 RDA)	20.81	(0.42)	21.57	(0.55)	20.86	(0.29)	
Protein (as % 1989 RDA)	41.97	(0.95)	44.87	(1.34)	42.76	(0.71)	
Percent of Food Energy from:							
Total fat	24.19	(0.42)	24.97	(0.57)	23.38	(0.29)	c
Saturated fat	9.70	(0.19)	9.98	(0.24)	9.27	(0.13)	c
Carbohydrate	65.43	(0.51)	64.38	(0.67)	66.33	(0.36)	c
Protein	12.14	(0.16)	12.39	(0.20)	12.20	(0.12)	
Vitamins (as percent of RDA)¹							
Vitamin A	57.87	(1.66)	65.44	(2.46)	62.14	(1.25)	a
Vitamin C	85.71	(3.65)	86.71	(4.77)	84.78	(2.70)	
Vitamin B ₆	76.05	(2.48)	82.89	(3.49)	78.71	(1.81)	
Vitamin B ₁₂	92.43	(3.19)	104.61	(5.06)	98.85	(2.58)	
Niacin	57.12	(1.71)	61.86	(2.50)	60.83	(1.31)	
Thiamin	76.02	(1.97)	80.60	(2.72)	79.22	(1.40)	
Riboflavin	106.39	(2.74)	114.83	(3.78)	111.03	(1.95)	
Folate	48.30	(1.30)	52.18	(1.91)	52.36	(1.05)	
Minerals (as percent of RDA)¹							
Calcium	36.64	(0.88)	38.00	(1.23)	37.29	(0.67)	
Calcium (as percent of AI)	34.84	(0.85)	36.10	(1.18)	35.44	(0.64)	
Iron	58.89	(1.78)	65.70	(2.59)	65.75	(1.48)	b
Magnesium	31.95	(0.85)	32.89	(1.07)	32.40	(0.63)	
Phosphorous	37.77	(1.12)	39.80	(1.48)	38.48	(0.79)	
Zinc	47.51	(1.55)	55.74	(2.57)	52.90	(1.30)	a,b
Other Dietary Components							
Cholesterol (mg)	41.05	(2.71)	54.73	(5.16)	44.46	(2.23)	a
Sodium (mg)	512.82	(13.06)	575.93	(19.14)	564.84	(10.50)	a,b
Fiber (gm)	2.50	(0.08)	2.61	(0.11)	2.60	(0.06)	
Fiber (as percent of age-plus-5 gm)	17.63	(0.56)	18.47	(0.77)	18.32	(0.40)	
Number of Students²	893		511		1866		

RDA = Recommended Dietary Allowance

¹ Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

² Includes students who skipped breakfast.

a Difference between <130% and 130-185% is statistically significant at the .05 level.

b Difference between <130% and >185% is statistically significant at the .05 level.

c Difference between 130-185% and >185% is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

relative to one or both of the other two groups. Differences were significant for vitamin A, iron, zinc, cholesterol, and sodium.³⁰

Students' breakfast intakes of the Food Guide Pyramid food groups were similar, with one exception, regardless of household income. Those with household incomes below 130 percent of poverty consumed slightly more fruit at breakfast than students in either of the other two income groups (Exhibit G-25). Although statistically significant, this difference amounts to only one tenth of a serving, on average.

Food and Nutrient Intake Over 24 Hours

Virtually no differences in 24-hour food energy or nutrient intake were observed between income groups. With regard to food groups, students with household incomes below 130 percent of poverty consumed slightly but significantly fewer servings of whole grains and added sugars than those with incomes above 185 percent of poverty. Results of these analyses are provided as Exhibits G-26 and G-27.

Exhibit 6.22 shows that breakfast contributed somewhat less toward the daily intake of selected vitamins and minerals (e.g., vitamin A, folate, iron, zinc) among students with incomes under 130 percent of poverty compared with other students. The differences for zinc, iron, and possibly folate appear to be related to the consumption of smaller amounts of breakfast cereals among the lower income groups.

Usual 24-Hour Dietary Intake

Results of analyses of usual food energy and nutrient intake are provided in Exhibits G-28 through G-30. No significant differences were observed across the three income groups in the percent of students whose usual 24-hour dietary intake met standards for nutrient adequacy or other dietary recommendations (e.g., *Dietary Guidelines* goals for total fat and saturated fat).

The significant differences in mean usual intake of food energy and protein (as a percent of RDA), and for calcium (as a percent of AI) are small, especially in light of the high mean intakes of protein and calcium across all three groups (Exhibit G-29).

Household Characteristics of Food Secure and Food Insecure Households

Household food security was one of the outcome measures included in the Spring 2001 data collection for this evaluation. As reported in the first year findings (McLaughlin et al., 2002), neither the availability of nor participation in universal-free school breakfast had an impact on household food security. Because of the importance of the issue and the opportunity provided by this sample of

³⁰ Additional analyses were conducted to determine if the availability of universal-free school breakfast had a differential impact on breakfast intake for the three income groups. Results are presented in Appendix G, Exhibits G-24a-c. Notable findings include significantly higher mean intakes of several vitamins and minerals among treatment students with income below 130 percent of poverty compared with their controls ($p < .01$ to $.05$).

Exhibit 6.22

Percent Contribution of Breakfast to Nutrient Intake Over 24 Hours, by Household Income, Relative to the Federal Poverty Level

Dietary Component	<130%		130-185%		>185%		Significant Differences
	Mean	SE	Mean	SE	Mean	SE	
Food energy	20.60%	(0.37)	21.23%	(0.46)	20.23%	(0.23)	
Macronutrients:							
Protein	17.02	(0.36)	18.50	(0.49)	17.75	(0.25)	
Total fat	16.78	(0.44)	17.19	(0.57)	15.78	(0.27)	
Saturated fat	17.82	(0.47)	18.47	(0.61)	16.81	(0.30)	
Carbohydrate	24.00	(0.42)	24.51	(0.54)	23.55	(0.27)	
Vitamins							
Vitamin A	34.78	(0.73)	39.00	(1.04)	36.35	(0.54)	a
Vitamin C	30.70	(0.89)	33.35	(1.20)	29.96	(0.61)	c
Vitamin B ₆	31.05	(0.68)	34.47	(0.90)	32.31	(0.48)	a
Vitamin B ₁₂	28.37	(0.71)	31.33	(0.96)	29.99	(0.53)	
Niacin	25.87	(0.57)	28.53	(0.75)	27.05	(0.39)	a
Thiamin	30.01	(0.55)	32.01	(0.71)	30.78	(0.36)	
Riboflavin	32.68	(0.57)	34.96	(0.76)	33.29	(0.40)	
Folate	30.97	(0.62)	33.67	(0.83)	33.00	(0.42)	a,b
Minerals:							
Calcium	27.10	(0.57)	28.49	(0.76)	27.00	(0.40)	
Iron	30.50	(0.62)	33.31	(0.83)	32.61	(0.43)	a,b
Magnesium	23.00	(0.43)	23.94	(0.56)	23.07	(0.30)	
Phosphorous	22.43	(0.43)	24.07	(0.59)	22.98	(0.31)	
Zinc	25.71	(0.59)	28.63	(0.82)	27.71	(0.44)	a,b
Other Dietary Components							
Cholesterol	17.09	(0.62)	19.09	(0.94)	18.08	(0.46)	
Sodium	16.42	(0.38)	17.95	(0.55)	17.34	(0.26)	
Fiber	17.46	(0.44)	18.45	(0.59)	18.16	(0.31)	
Number of Students¹	872		508		1837		

¹ Includes students who skipped breakfast.

a Difference between <130% and 130-185% is statistically significant at the .05 level.

b Difference between <130% and >185% is statistically significant at the .05 level.

c Difference between 130-185% and >185% is statistically significant at the .05 level.

Source: *Impact Study—24-Hour Dietary Recall Interview, Spring 2001*

elementary school students, additional analyses on the food security measure were conducted. Specifically, analyses were run to examine the relationship between household food security and student and family characteristics.

Measure and Analytic Variables

As described in McLaughlin et al., (2002), the Household Food Security Scale is a continuous, linear scale that measures the degree of severity of food insecurity in a household in terms of a single numerical value. The 18 items on the scale have a 12-month reference period. The scale includes both qualitative and quantitative aspects of the household's food supply (e.g., well-balanced meals, how often the money for food ran out), as well as psychological and behavioral responses by household members to the supply of food (e.g., worrying about the food supply, limiting the kinds of food purchased). The scale of food insecurity is expressed by numerical values from 0 to 10, and describes the stages of food insecurity from "food secure" (score of 0) to "food insecure with hunger" at its most severe (score of 10).

Two characteristics of the Household Scale should be noted. First, the measure reflects the household's experience over the previous 12 months. Thus, a household would be considered food insecure even if there had been only a short period of food insecurity over the course of the year. Second, it is a household measure, and not designed for assessing individual-level estimates of food insecurity.

The set of analyses performed for this report included the following student and household characteristics: school meal eligibility status, minority status, body mass index of the student, household size, income level, status as single-parent household, and parent education. The analyses describe the characteristics for each level of food security, e.g., students from food secure households are more likely to be eligible for paid meals, be nonminority, etc.³¹

Findings

Exhibit 6.23 provides the results of the analyses of food security status by household characteristics. Except for household size, the results suggest a fairly linear relationship between food security status and the household characteristics used in the analysis. In general, the higher the level of food insecurity, the more likely it is that the household has that characteristic (or less likely in the case of "percent of incomes greater than 70,000 per year," "percent two-income households," or "percent college degree or above"). For example, 31 percent of those students from households who are food secure were at risk for overweight versus 37 percent for students from food insecure without hunger households. Similarly, 40 percent of food secure households were eligible for free and reduced-price meals. The likelihood of becoming eligible increases considerably as one becomes more food insecure: 86 percent for food insecure without hunger, and 92 percent for food insecure with moderate hunger.

³¹ Another set of analyses was run to describe the proportion of students with specific characteristics for all four levels of food security, so that one could report, for example, that 95 percent of the students eligible for paid school meals were food secure, compared with 61 percent of those eligible for free and reduced price meals. A set of bar graphs (Exhibit G-34 through G-44) depicting the household characteristics of students at each level of food security appears in Appendix G.

Exhibit 6.23**Food Security Status, by Household Characteristic**

Background Characteristics	Food Secure		Food Insecure without Hunger		Food Insecure with Moderate Hunger		Food Insecure with Severe Hunger		Significant Differences
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	
School Meal Eligibility Status									
Percent free/reduced lunch	39.8	(1.0)	86.0	(1.5)	91.6	(2.1)	100.0	(0.0)	a,b
Ethnicity									
Percent minority	32.5	(0.9)	53.3	(2.2)	52.3	(3.7)	45.3	(6.8)	a,b
BMI									
Percent at risk for overweight	31.1	(0.9)	36.9	(2.1)	37.6	(3.6)	39.6	(6.7)	a
Percent overweight	15.5	(0.7)	20.2	(1.8)	20.2	(3.0)	24.5	(5.9)	a
Household Size									
Average number of people in household	4.4	(0.03)	4.9	(0.07)	4.9	(0.1)	5.0	(0.3)	--
Average number of children in household	2.5	(0.02)	2.8	(0.06)	3.1	(0.1)	3.2	(0.2)	--
Income									
Percent <\$20,000 per year	10.7	(0.6)	37.8	(2.1)	47.8	(3.7)	60.4	(6.7)	a,b,c,d,e
Percent >\$70,000 per year	26.3	(0.9)	1.9	(0.6)	0.0	(0.0)	0.0	(0.0)	a
Percent two-income households	56.2	(1.0)	36.8	(2.1)	24.7	(3.2)	22.6	(5.8)	a,b,c,d,e
Family Structure									
Percent single-parent families	20.8	(0.8)	33.5	(2.0)	48.3	(3.8)	54.7	(6.8)	a,b,c,d,e
Education of Parent/Guardian									
Percent < high school degree	7.1	(0.5)	23.6	(1.8)	23.6	(3.2)	22.6	(5.8)	a,b,c
Percent college degree or above	36.4	(0.9)	13.6	(1.9)	10.1	(2.3)	15.1	(4.9)	a,b,c
Number of Students	2609		535		178		53		

a = Difference between Food Secure and Food Insecure without Hunger is statistically significant at the .05 level.

b = Difference between Food Secure and Food Insecure with Moderate Hunger is statistically significant at the .05 level.

c = Difference between Food Secure and Food Insecure with Severe Hunger is statistically significant at the .05 level.

d = Difference between Food Insecure without Hunger and Food Insecure with Moderate Hunger is statistically significant at the .05 level.

e = Difference between Food Insecure without Hunger and Food Insecure with Severe Hunger is statistically significant at the .05 level.

f = Difference between Food Insecure with Moderate Hunger and Food Insecure with Severe Hunger is statistically significant at the .05 level.

Source: *Impact Study—Parent Survey and Height and Weight Measures, Spring 2001*

School Breakfast Participation Patterns in Treatment Schools and Their Relationship to Student Demographic Characteristics

Participation in universal-free school breakfast was considered a key outcome measure in terms of determining impacts on students and schools. Additionally, as reported earlier, there was an overall moderate increase in participation, on the order of about 16 percentage points in the first year of the SBPP, which was maintained over the subsequent two years of the pilot. However, not all students followed this pattern, and some never participated. It was thus of interest to determine if there were particular patterns of school breakfast participation followed over the course of the SBPP, and whether or not there were students with certain demographic characteristics that followed a particular participation pattern

Measures and Analytic Variables

The participation data described in the “Impacts on School Breakfast Participation” section of Chapter Five were used in this analysis. The first step was to develop a set of plots (with frequencies) that identified participation patterns for treatment school students only. Another set of analyses was run to explore whether patterns of participation among treatment school students were related to demographic characteristics of students. Treatment school students with three or four data points (baseline and Year 1 were required, plus Year 2 and/or 3) were included in this analysis.

Growth curve analyses were also run on the data for treatment school students, separately for each demographic subgroup (defined by school meal eligibility status, minority status, gender and age), to answer the question of whether the rates of change (or slopes) in school breakfast participation were different for males versus females, minority versus nonminority, etc., across the three years of SBPP implementation.

Findings

The most frequent patterns of participation for students with data for baseline and all three implementation years are presented in Appendix G (pages G-37 through G-40). Across the entire sample of treatment school students with four data points ($n = 853$), two patterns occurred most frequently. Thirty-three percent stayed at roughly the same level of participation that they had at baseline (i.e., increasing or decreasing participation by less than 20 percent). Eighteen percent increased participation between baseline and Year 1 by over 20 percent, and maintained this increased participation level for Years 2 and 3.

Our analyses found little relationship between participation and demographic characteristics. Minority status and school meals eligibility were related to participation at baseline, but these demographic factors were not related to the amount of change from baseline to Year 1, Year 1 to Year 2, or Year 2 to Year 3.

Exhibit 6.24 shows the results of the growth curve analyses for breakfast participation for each of the four demographic characteristics. There were no significant differences in the growth curve analyses for gender, minority status, and school meal eligibility status, indicating that the rate of change did not differ for these variables (e.g., males had the same rates of change in participation as females for each of the years assessed). Only age (grades 1 and 2 versus grades 3 or above) was significant, mainly due to changes in participation among younger students (grades 1 and 2) from baseline to

Exhibit 6.24

Change in School Breakfast Participation in Treatment Schools, by Demographic Characteristics¹

Change	Percentage Points	SE	Percentage Points	SE
School Meal Eligibility Status	Paid		Free/Reduced	
Baseline to Year 1	23.3 <i>n</i> =861	(1.0)	23.8 <i>n</i> =915	(1.0)
Year 1 to Year 2	3.2 <i>n</i> =624	(1.1)	0.8 <i>n</i> =648	(1.1)
Year 2 to Year 3	-4.3 <i>n</i> =458	(1.3)	-2.8 <i>n</i> =421	(1.4)
Minority Status	Non-white		White	
Baseline to Year 1	24.0 <i>n</i> =657	(1.2)	23.3 <i>n</i> =1119	(0.9)
Year 1 to Year 2	1.6 <i>n</i> =452	(1.3)	2.2 <i>n</i> =820	(1.0)
Year 2 to Year 3	-4.3 <i>n</i> =323	(1.6)	-3.1 <i>n</i> =556	(1.2)
Gender	Female		Male	
Baseline to Year 1	23.5 <i>n</i> =938	(1.0)	23.6 <i>n</i> =838	(1.0)
Year 1 to Year 2	0.9 <i>n</i> =693	(1.1)	3.3 <i>n</i> =579	(1.2)
Year 2 to Year 3	-3.7 <i>n</i> =488	(1.3)	-3.2 <i>n</i> =391	(1.4)
Age	Older²		Younger³	
Baseline to Year 1	22.2* <i>n</i> =813	(1.1)	24.7 <i>n</i> =963	(1.0)
Year 1 to Year 2	1.7 <i>n</i> =457	(1.3)	2.0 <i>n</i> =815	(1.0)
Year 2 to Year 3	-3.1 <i>n</i> =160	(2.1)	-3.9 <i>n</i> =719	(1.1)

¹ Change is expressed in terms of the percentage point difference in school breakfast participation from year to year. For example, if baseline school breakfast participation is 7 percent and it increases to 30 percent in Year 1, the change is presented as 23 percentage points.

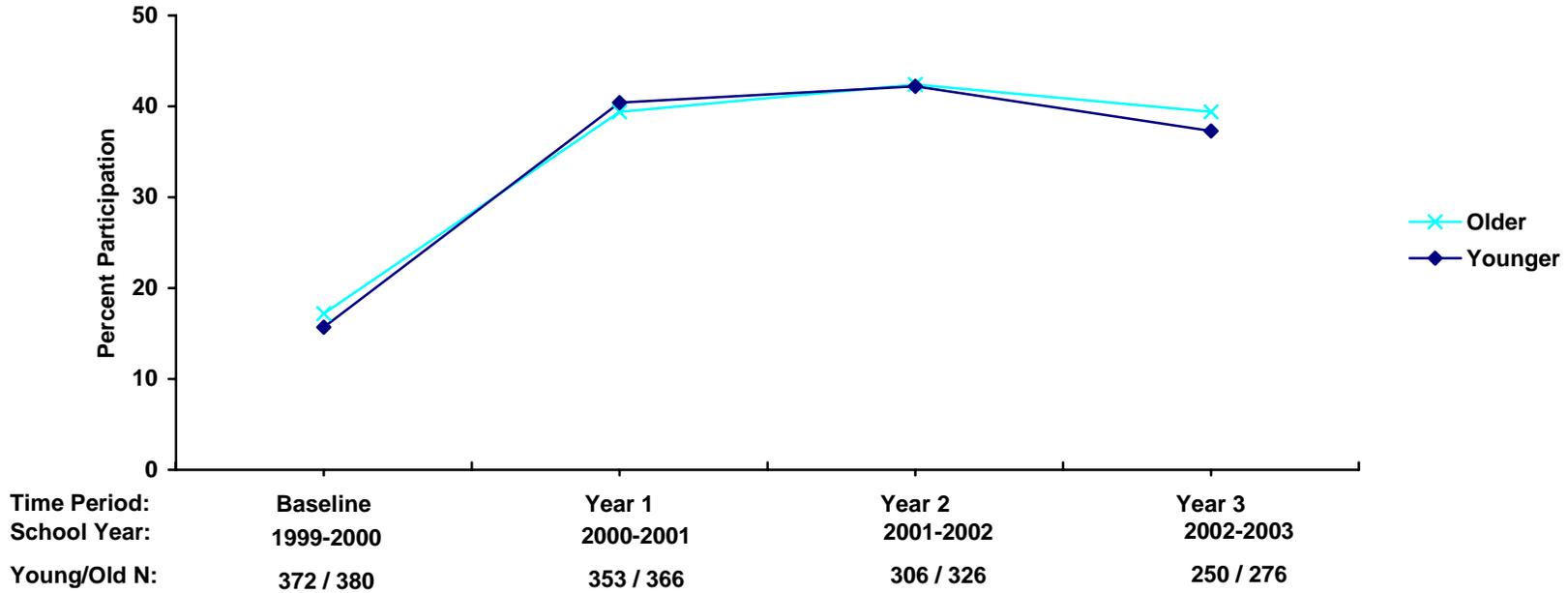
² Older students: grades 3, 4, and 5 during SY 1999-2000.

³ Younger students: grades 1 and 2 during SY 1999-2000.

*Difference between older and younger students is statistically significant at the .05 level.

Source: *Impact Study—Student-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, 2002-2003.*

Year 1 (Exhibit 6.25). They had the lowest level of school breakfast participation at baseline and the biggest jump to Year 1. The analyses of the change from Year 1 to Year 2 and from Year 2 to Year 3 for these younger students, however, did not reveal any further significant change. Thus, this set of demographic variables does not seem to predict change in school breakfast participation from year to year, except in the case of the younger students at baseline.

Exhibit 6.25
Plot of Treatment School Breakfast Participation Over Time, by Age


Sources: *Impact Study – School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.*

Chapter Seven

Discussion of Findings

The School Breakfast Program Pilot Project (SBPP) was a three-year effort to understand the implementation and impact of universal-free school breakfast in **elementary** schools across the United States. Six school districts participated in the SBPP, representing rural, suburban, and urban areas that served families with a range of incomes, and overall provided a racial and ethnic mix that represented the country as a whole. In about half of the elementary schools in each of the six districts, free breakfast was available to all students, regardless of income. The remaining elementary schools continued to offer students the regular School Breakfast Program (SBP). The school districts maintained this commitment for three school years, from 2000-2001 through 2002-2003.

The evaluation of the SBPP is a Congressionally mandated study that gathered data from a baseline school year, the year before the SBPP was implemented, and for the three years of SBPP implementation. An experimental design was used, with the schools in each district first matched on a number of characteristics (e.g., average enrollment, school meal eligibility status) and then randomly assigned to either treatment (universal-free school breakfast) or control (regular SBP) status. The evaluation focused on both the implementation and impact of the SBPP.

The Implementation Study gathered data primarily through site visits and telephone interviews in Spring 2001, toward the end of the first year, and in Spring 2003, toward the end of the pilot. The objectives of the Implementation Study were to document how universal-free school breakfast was implemented and to assess the effect of implementation on paperwork, costs, and other administrative requirements in participating schools. The objectives of the Impact Study were to determine the effects of universal-free school breakfast on school breakfast participation and on an array of student outcomes, including dietary intake, school attendance and tardiness, classroom behavior and discipline, and academic achievement. The Impact Study sample included about 4,300 students attending grades 2 through 6 in the 153 schools in the study. Data were collected for this student-level sample and, for a more limited set of measures, for the entire school. In Spring 2001, toward the end of the first year of SBPP implementation, data were gathered from students, parents, and teachers, as well as from school records. In the baseline and final two years of the SBPP, school record data were collected again for the school and student sample. Response rates were generally high, ranging from 80 to 100 percent for the first year of data collection, and from 71 to 100 percent in subsequent years.

The findings following the first year of SBPP implementation (SY 2000-2001) are presented fully in a separate report (McLaughlin et al., 2002). In the current report, these first year findings are summarized and presented along with findings from Years 2 and the 3 of SBPP implementation (SY 2001-2002 and SY 2002-2003).

Universal-free breakfast offered the promise of overcoming some of the perceived barriers to participation in school breakfast, in particular, the perceived stigma associated with participation (Food Research and Action Center, 2003). However, the cost for implementing universal-free school breakfast nationwide is considerable, estimated in 2000 by FNS to be between \$1 billion and \$3 billion annually. There is thus a need to know whether providing free breakfast to students regardless

of income has important benefits not realized through the regular SBP as it is currently implemented. Hence, this evaluation was not a study of the impacts of breakfast or of school breakfast. The key question asked was whether SBPP led to improved outcomes when compared to the status quo, the regular SBP.

Implementation Study Findings

The findings with respect to the two Implementation Study objectives are presented below. The findings are summarized for all three years of the pilot.

- **Document the various ways in which schools choose to implement universal-free school breakfast.**

The SBPP provided the six school districts in this evaluation a great amount of autonomy in how they implemented universal-free school breakfast in their treatment schools, and indeed each district tailored the pilot program to its local context. The decision to apply to be a part of the SBPP was made at the district level, but once the districts were chosen, most of the key program decisions were made at the school level.

In general, SBPP implementation went smoothly. For the most part, schools were able to get the pilot up and running in a matter of weeks, despite the short interval between the selection of school districts and the start of school. Some schools implementing universal-free school breakfast had to adopt new procedures for delivering and serving food, collecting trash, and keeping records. In general, however, these issues did not cause major problems for SBPP implementation.

Determining whether breakfast would or would not be eaten in the classroom turned out to be a key decision, as participation was much higher for students with the classroom breakfast option. Of the 79 treatment schools, 14 served breakfasts that were eaten in the classroom in Year 3 of the SBPP, down from 18 in Year 1. For twelve schools, breakfast was consistently eaten in the classroom over the three pilot years.

Classroom breakfast seemed to pose some particular challenges requiring extra effort by school staff, including teachers and custodians. School administrators appear to have been conflicted by the attraction of achieving increased rates of school breakfast participation by offering free breakfast in the classroom, and the drawbacks of adding to the workload of staff (e.g., teachers and custodians). Though based on a small sample, teachers who had not experienced breakfast in the classroom were generally opposed to the idea, while teachers who had had breakfast in the classroom were much more supportive. Notably, while a primary concern anticipated for classroom implementation was loss of teacher preparation time or instruction time, Year 1 interviews (Spring 2001) with teachers in schools with classroom breakfast reported little or no effect.

Administrators, school staff, parents, and students were generally pleased with universal-free school breakfast. When interviewed near the end of the pilot in Spring 2003, principals said that the experience with universal-free school breakfast had been positive or very positive. Although administrators had expected negative reactions from parents, this never occurred.

- **Assess the effect of universal-free school breakfast on paperwork, costs, and other administrative requirements.**

There was little evidence that the implementation of universal-free school breakfast had any impact on administrative paperwork. The majority of SFA directors, cafeteria workers, and principals reported no effects on paperwork or administrative reporting. Eighty-seven percent of treatment school principals reported that the SBPP had no effect on the accuracy and integrity of record keeping. A little over a third of the 14 principals in schools with classroom breakfast thought that the SBPP did, in fact, affect the accuracy or integrity of record keeping, but they were split on whether it improved or diminished accuracy.

Furthermore, there was no evidence from the review of breakfast menus near the end of Year 1 that the implementation of universal-free school breakfast had an effect on schools' compliance with the SBP nutrition standards or the degree to which the breakfasts served to students met other dietary recommendations.

Cost data gathered for the first year of SBPP implementation showed that the treatment schools fared materially better than the control schools.¹ The analysis of costs found that increased participation led to lower per-meal labor costs in treatment schools, with the combined food and labor costs per breakfast about 11 percent lower in treatment than in control schools. This per-meal cost was 18 percent lower than control schools for treatment schools with classroom breakfast. Overall, treatment schools, reimbursed at the free meal rate for all breakfasts served, had revenues about 40 percent higher than food and labor costs. Control schools, which continued to be reimbursed based on participants' school meal eligibility, had revenues about 28 percent higher than these costs.²

Treatment schools also experienced an increased workload and some need for additional staff. The workload of cafeteria staff increased and additional assistance was needed to supervise the increased number of breakfast participants. However, these increases stabilized during the second and third years of the pilot.

Impact Study Findings

The objectives for the Impact Study and the related findings are presented below.

- **Assess the effects of universal-free school breakfast on student participation.**

¹ In the Spring 2003 data collection, Implementation Study interviews included questions on cost, but actual cost data were collected only in Spring 2001.

² While food and labor costs make up the major share of breakfast costs, other costs, such as supplies, contract services, depreciation, and indirect charges by the school district, also would affect this estimate. In addition, other minimal sources of revenue, such as à la carte sales, were not included. A prior nationally representative study of meal costs (Glantz et al., 1994) found that costs other than food and labor added about 12 percent to reported costs in SY 1992-1993. Adding these additional costs, assuming their relative size has not changed, narrows the financial advantage enjoyed by treatment schools taking part in the SBPP. In the earlier study, food and labor costs exceeded the SY 1992-1993 reimbursement rate for free breakfasts.

School Breakfast participation rose significantly in the first year of the SBPP, increasing by about 16 percentage points for treatment school students over and above the 1 percentage point increase realized for control school students. Participation remained stable for both groups over the second and third year of the pilot, with no significant changes in the control group or treatment group over this period.

Results from the first year indicated considerable variation in the participation increase experienced in each district. This ranged from 7 percentage points in one district to 34 percentage points in the district where school breakfast was eaten in the classroom in treatment schools. Similar to the reported findings from Year 1, implementation of universal-free school breakfast led to significant district-level increases in participation in treatment schools in both Years 2 and 3 relative to the baseline year. In Years 2 and 3, each district also showed net increases in treatment school breakfast participation, ranging from about 11 percentage points higher than baseline in Years 2 and 3 to 30 percentage points higher than baseline in Year 2 for the district with classroom breakfast in most treatment schools.

- **Assess the effects of universal-free school breakfast on student outcomes.**

Over the three years of the SBPP, the results revealed no consistent pattern of positive effects on student outcomes associated with the availability of universal-free school breakfast. An important first step in looking at differences was to look at breakfast consumption and food and nutrient intake at breakfast and over 24 hours, since the consumption of a nutritious breakfast serves as a potential pathway for all other short- and long-term outcomes. Data collection toward the end of Year 1 found that the rate of skipping breakfast altogether was low overall—less than 4 percent for students in both treatment and control schools. The likelihood of consuming a substantive breakfast, defined as food from at least two food groups and more than 10 percent of the 1989 Recommended Dietary Allowance (RDA) for food energy, was significantly higher among students attending treatment schools (80 percent) than those attending control schools (76 percent).

One potential but unintended effect of universal-free school breakfast is that some children would consume more than one breakfast on a given day, one at home and one at school. This study does not dispel that notion. Using the same definition of a substantive breakfast as above, treatment school students were more likely to consume more than one substantive breakfast (i.e., two or more) than their controls, by a difference of three percentage points. However, the incidence of consumption of more than one nutritionally substantive breakfast for both groups was low (seven percent for treatment school students, four percent for controls). Nonetheless, students who consumed the additional breakfasts had higher food energy intakes at both breakfast and over a 24-hour period than those who only ate one breakfast. These students consumed approximately double (40 percent) the RDA for food energy for breakfast compared to those who consumed only one breakfast (20 percent). In addition, students who consumed more than one breakfast had higher food energy intakes in terms of the percent of the RDA for food energy over 24 hours (122 percent versus 101 percent for one-breakfast eaters).

Almost all students (93 to 100 percent) in both treatment and control schools had 24-hour dietary intakes that were adequate for vitamins and minerals, based on Dietary Reference Intakes (DRIs); and

they exceeded 80 percent of the RDA for food energy and protein.³ On the other hand, few students in either group met the *Dietary Guidelines* recommendations for total fat, saturated fat, or sodium. The availability of universal-free school breakfast was thus not related to students' likelihood of meeting daily dietary requirements and other recommendations.

Data from the first year of the SBPP showed a significantly higher number of daily disciplinary incidents requiring a trip to the principal's office for treatment school students when compared to controls. The incidence was also significantly higher in the morning. In Year 2, there was a significant impact in the afternoon, with treatment schools reporting a higher average number of incidents than controls. In Year 3, there were no differences.

No pattern of significant results was found towards the end of the first year for the full array of other student outcomes, including cognitive and social/emotional functioning, food insecurity, body mass index, health status, attendance, tardiness, academic achievement, and incidence of school nurse visits. There were only scattered statistically significant differences between treatment and control school students on these measures.

Record data continued to be collected in Years 2 and 3 on academic achievement, attendance, tardiness, and incidence of disciplinary visits to the principal and visits to the school nurse. While there are some scattered differences for a few outcomes, again, no pattern of differences was found in these subsequent data collections.

Findings from Supplementary Analyses

Additional analyses were performed to address other questions related to the provision of universal-free school breakfast and breakfast in general. These questions were not the main focus of the study, but are natural extensions of this focus, given the data collected and findings for the four primary objectives summarized above. Most of these analyses were done outside the experimental framework established for studying the impact of universal-free school breakfast. The results are therefore more exploratory in nature, and should not be considered definitive.

One concern associated with non-experimental analyses is that the two groups being compared may differ systematically in ways unrelated to their grouping as, for example, breakfast skippers or non-skippers, substantive or non-substantive breakfast eaters. Observed differences in food and nutrient outcomes may be due to pre-existing differences in eating habits rather than the variable of interest (e.g., skipping breakfast). A test for selection bias was conducted for the non-experimental analyses presented in Chapter Six. The results, presented in Appendix H, were reassuring, except for the comparisons based on breakfast source (home only or school only) and breakfast location (classroom or non-classroom), where selection bias seemed to be an issue. Even so, with all non-experimental analyses one can never prove that the groups are comparable, and the results should be interpreted with caution.

Summaries of the results of all additional analyses (experimental and non-experimental) are reported by question below.

³ DRIs were not available for food energy or protein at the time of these analyses.

What are the effects of participation in universal-free school breakfast on student outcomes?

The experimental design looked at the effects of the SBPP on those students that attended schools where universal-free school breakfast was available. Using a method designed to maintain the integrity of the experimental design (based on Bloom, 1984), analyses were conducted to look at the impacts on students who actually participated in universal-free school breakfast, not just those to whom it was available. This analytic method requires certain assumptions to be made about the impacts. The method and assumptions are described in Appendix C of the report on the first year of findings (McLaughlin et al., 2002). The results are described in Appendix F in McLaughlin et al. (2002). The magnitude of the impacts were much larger for those that actually participated, and included a larger percentage of treatment school participants eating a substantive breakfast (20 percentage points higher) and eating more than one breakfast (16 percentage points higher) compared to their control counterparts.⁴ Cholesterol intake at breakfast and over 24 hours was markedly less for participants (i.e., amounting to a reduction of about one sixth of the recommended daily intake at breakfast and 18 percent of the recommended daily maximum over 24 hours). Breakfast contributed more to the nutrient intake of participating students, relative to similar students in the control group, with the most notable difference of 11 percentage points for calcium. Student and parent attitudes about school breakfast were notably more positive for participating students, on the order of 60 to 65 percentage points higher than their control counterparts.

The negative behavior ratings reported in the main experimental analyses were higher for universal-free school breakfast participants than for their controls, with teachers rating students 4 points higher on oppositional behavior.

What are the patterns of student participation that emerged from three years of providing universal-free school breakfast? Are student demographic characteristics related to particular patterns of participation?

Across the entire sample of those students with four data points from baseline to Year 3 (n = 853), two patterns of participation occurred most frequently. Thirty-three percent stayed at roughly the same level of school breakfast participation that they had at baseline (i.e., increasing or decreasing participation by less than 20 percent). Eighteen percent increased participation between baseline and Year 1 by over 20 percent, and maintained this increased participation level for Years 2 and 3. The other 49 percent of the sample followed a variety of combinations of staying at the same level, increasing, or decreasing participation across the three years of SBPP.

Our analyses found little relationship between student demographic characteristics and participation. Minority status and school meal eligibility were related to participation at baseline, but these demographic factors were not related to the amount of change from baseline to Year 1, Year 1 to Year 2, or Year 2 to Year 3.

Growth curve analyses performed separately on treatment student participation for gender, minority status, school meal eligibility, and age found only age was significant, due mainly to the jump of

⁴ In using the Bloom (1984) correction to estimate impacts on participants only, treatment school participants are compared to the subset of controls who would have participated had they been assigned to the treatment group, not to all controls. The term "control counterparts" is used to distinguish these students from all controls.

younger students from baseline to Year 1. Thus, this set of demographic variables did not seem to predict the pattern a student would follow, except in the case of younger students (grades 1 and 2) at baseline to Year 1.

Did students who increased their participation in school breakfast enjoy better outcomes than students who maintained the same level of participation at baseline?

In the first report of findings (McLaughlin et al., 2002), a set of non-experimental analyses focused on students that increased their participation in school breakfast by two or more days per week compared to the previous year. The analyses compared these so called “changers” to “non-changers” on an array of outcomes, including measures of cognitive functioning, food insecurity, health, classroom behavior, and academic achievement. Statistically significant differences were in the negative direction, with changers scoring more poorly on teacher ratings of hyperactivity, an index of an attentional disorder, and their ability to focus and follow instructions. Changers also had lower gains in reading achievement than non-changers. Changers did attend school and were tardy less often than non-changers, and parental attitudes toward school breakfast were higher for this group. These analyses were repeated, restricting the sample to students from low-income families. Only the difference in parental attitudes (more positive for low-income changers) was significant. In these analyses, increased participation did not result in better outcomes. However, given the non-experimental nature of this analysis, one cannot attribute any resulting differences to the consumption of school breakfast alone.

Do outcomes vary depending on the dietary intake of students, that is, whether they had a more substantive breakfast or skipped breakfast altogether?

A series of analyses was conducted to determine what relationships exist, if any, between student outcomes and the amount of breakfast consumed. Specifically, analyses addressed the effects on students of consuming a robust or substantive breakfast as well as the consumption of little or no breakfast (breakfast skipping).

Substantive Breakfast Eaters

Substantive eaters were defined in three different ways:⁵

- **Definition 2:** Consumption of breakfast containing food from at least two of five main food groups⁶ and greater than 10 percent of the RDA for food energy
- **Definition 3:** Consumption of food from at least two of five main food groups and greater than 15 percent of the RDA for food energy
- **Definition 4:** Consumption of food from at least three main food groups and greater than 25 percent of the RDA for food energy—this definition approximates the minimum requirement (25 percent of RDA) currently used for food energy in reimbursable breakfasts offered through the SBP.

⁵ Definition 1 identified students that consumed any food or beverage and was not used in this analysis.

⁶ The five food groups are (1) milk and milk products, (2) meat and meat equivalents, (3) grain products, (4) fruits and fruit juices, and (5) vegetables and vegetable juices.

Seventy-eight percent of students were identified as having consumed a substantive breakfast on the target day based on Definition 2; 61 percent based on Definition 3; and 18 percent based on Definition 4. Substantive eaters were more likely than non-substantive eaters to be male and younger, regardless of how substantive breakfast was defined.

Overall, comparisons of the dietary intakes of substantive and non-substantive breakfast eaters resulted in a number of statistical differences, with the substantive eaters generally consuming more food energy, nutrients, and Food Guide Pyramid servings (grains, fruits, dairy, discretionary fat, and added sugars) at breakfast and over 24 hours than non-substantive eaters. Substantive eaters were more likely to consume a breakfast from both home and school on the target day, with almost half of these students eating a Definition 2 substantive breakfast from both sources.

Not surprisingly, breakfast made a more important contribution to the 24-hour dietary intake of substantive versus non-substantive breakfast eaters, in terms of food energy and all of the dietary components measured. However, mean 24-hour food energy intake exceeded the RDA for substantive breakfast eaters, based on all three definitions of substantive breakfast.

Breakfast Skippers

Breakfast “skipping” was defined in two different ways for the analyses conducted for this report. Students were defined as “target day skippers” if, on the day they were assessed, they had consumed less than 2.5 percent of the RDA for food energy. This definition was used to assess target day nutrition and cognitive outcomes (i.e., food and nutrient intake over 24 hours, tests of attention and memory). “Usual breakfast skippers” were defined using the Parent Survey, and included students who were reported by their parents to consume breakfast two times a week or less (out of the five school days). Usual breakfast skipping was used in the analysis of usual dietary intake, food security, body mass index (BMI), and behavioral and health measures.

The number of breakfast skippers in the sample was relatively small, ranging from 122 to 177, depending on the analysis. An analysis of the demographic characteristics of skippers and non-skippers showed that the groups were similar except that breakfast skippers were significantly more likely to be non-white compared to non-skippers.

The results for dietary intake are, for the most part, in line with expectations and findings from past studies. Breakfast skippers consumed significantly less food energy (as a percent of the RDA) over a 24-hour period, on average, than non-breakfast skippers (79 percent versus 102 percent). They also consumed significantly less in the way of protein, total carbohydrate, vitamins, minerals, cholesterol, sodium, and dietary fiber. However, target day breakfast skippers consumed more total fat and saturated fat as a percent of total food energy.

The results for Food Guide Pyramid food groups are in line with the findings on nutrient intake. Target day breakfast skippers consumed significantly fewer servings of grain products, fruits, and dairy products than breakfast non-skippers (on the order of one-half to one and a half servings).

Analyses comparing usual breakfast skippers and non-skippers on dietary adequacy showed that virtually all students had usual 24-hour intakes that met standards for protein and most (10 out of 13) vitamins and minerals assessed. Usual breakfast skippers were significantly less likely than non-

skippers to have adequate intakes of vitamin A, folate, and phosphorous. Differences in the likelihood of meeting dietary recommendations for food energy and the macronutrients (fat, carbohydrate, cholesterol, sodium, and dietary fiber) did not reach statistical significance.

Skipping breakfast was not related to performance on measures of cognitive functioning, classroom behavior ratings, food security, attendance, tardiness, or gains in achievement. Breakfast skippers had significantly higher BMI percentiles than non-skippers (68th versus 63rd percentile), although they were not more likely to be overweight or at risk for overweight. Usual skippers had smaller gains in school breakfast participation over the school year than non-skippers. Thus, while food and nutrient intake was generally less for breakfast skippers and there was evidence of inadequate intake on some micronutrients, breakfast skippers did not perform more poorly on these other student outcomes.

Do nutrition outcomes differ by location of breakfast, either by source of breakfast (home versus school) or school location (classroom versus non-classroom)?

Analysis by breakfast source and location provided a broad array of significant differences on nutrition outcomes, including breakfast consumption, food and nutrient intake at breakfast and over 24 hours, and contribution of breakfast to intake over 24 hours. Note that in testing for selection bias in the non-experimental analyses presented in Chapter Six, the results for breakfast location suggest that this analysis is probably affected by selection bias. The findings from the location analysis are summarized below, but given the bias indicated in our testing, they should be interpreted with caution.

Breakfast Source

Analyses on source of breakfast were limited to whether or not students ate breakfast at home, school, or both home and school on the target day. The results suggest that students who ate breakfast exclusively from school were significantly more likely to consume a Definition 2 (but not Definition 3) substantive breakfast than students who had breakfast only from home (85 compared with 75 percent). Yet, while those who ate at school were more likely to meet the food-component-based criterion for Definition 2 (at least two foods from the five main food groups), their mean food energy and nutrient intake at breakfast was lower than for students who ate exclusively from home (or from both home and school). Students who ate exclusively from school also had a somewhat different food group intake than those who ate exclusively from home, including a smaller number of servings of grains and dairy products, and lower amounts of discretionary fat and added sugars. Findings for 24-hour intakes of food energy and nutrients by breakfast source were similar to those found for breakfast.

In general, students who ate breakfast from home exclusively had breakfasts that contributed more to total daily intake of food energy, macronutrients, and some vitamins and minerals than students who ate breakfast at school only.

Location of School Breakfast

Location analyses included three groups: treatment students who had breakfast available to them in the classroom, treatment students who had breakfast available to them in the cafeteria, and students who did not have universal-free school breakfast available to them (i.e., non-classroom control group students). Students in treatment schools with classroom breakfast were more likely to eat a

substantive breakfast on the target day than either group of students with non-classroom breakfast. A larger share of treatment classroom students ate two or more breakfasts (substantive or not) than other students (treatment non-classroom or control). Students in treatment classroom schools had higher breakfast intakes of food energy, total fat, and sodium, yet they consumed less of certain vitamins and minerals than the other students. The only nutritionally important finding in the analysis of food group servings is that students in treatment classroom schools ate more servings of grain products than either of the other groups.

There does not appear to be a relationship between location of school breakfast and intake over 24-hours of food energy or macronutrients (e.g., protein, fat). Students in treatment classroom schools consumed significantly less of most vitamins and minerals, relative to the RDA, although the 24-hour intakes for classroom and non-classroom groups exceeded 100 percent of the RDA. There were also no significant differences among the groups in terms of nutrient adequacy or the likelihood of usual intake meeting other dietary recommendations.

Do nutrition outcomes for students from low-income households differ from students from higher income households?

A series of analyses comparing students in families with incomes in the following ranges—below 130 percent of the federal poverty level (i.e., those eligible for free school meals); 130 to 185 percent (i.e., those eligible for reduced-price school meals); and above 185 percent—revealed few differences in nutrition outcomes. There was no difference between income groups in the likelihood of consuming breakfast regardless of how breakfast was defined. However, a significantly larger share of students with household incomes in the lower two groups (below 185 percent of poverty) ate something (non-substantive) for breakfast from both home and school. Other differences included a significantly lower intake at breakfast for students with household incomes less than 130 percent of poverty for a few dietary components (vitamin A, iron, zinc, cholesterol and sodium), and slightly but significantly more servings of fruits at breakfast for this same group. For the majority of outcomes included in the analyses, however, there were no differences based on the three income categories. Household income was not related to meeting standards for dietary adequacy or other recommendations based on usual intake.

What are the characteristics of students in the sample based on their level of food insecurity?

There was a strong relationship between food security and the majority of household characteristics assessed in this analyses, including school meal eligibility status, minority status, household income, status as single-parent family, and parent education. There was also a relationship found between the BMI of students and their household food security status. As one might expect, those students with households that are food secure were less likely to be eligible for free or reduced-price school meals, minority, low-income, from a one-income household, from a single-parent family, or have parents with only a high school education. Conversely, those students with food insecure households were more likely to be in households with these characteristics. Notably, there seems to be a linear relationship between household characteristics and food security status. Using risk of overweight as an example, 31 percent of those who were food secure are at risk for overweight. This risk increased as food insecurity worsened, to 37 percent for food insecure without hunger, 38 percent for food insecure with moderate hunger, and 40 percent for food insecure with severe hunger.

Conclusions

The results of this evaluation suggest that universal-free school breakfast can be fairly easily implemented and administered in elementary school settings that vary in terms of geographic region, racial/ethnic mix, and students' household income. Key stakeholders, including administrators at the school district and school levels, school staff, parents, and students were generally supportive of the concept of universal-free school breakfast. Serving school breakfast in the classroom was linked to the greatest increases in student participation, but barriers continued to exist to more widespread implementation of breakfast in the classroom. Most notably, the increased workload for staff and the opposition of teachers in particular were expressed as deterrents. At the same time, however, the data from the first year of the evaluation suggest that the majority of teachers in schools with classroom breakfast had a positive experience, while those who had not experienced classroom breakfast were opposed to the idea. In a recent report on Minnesota's Fast Break to Learning Initiative, researchers reported that participation rates were highest when there was a school-wide policy about breakfast that included teacher input, such as entire classes going to the cafeteria together to get breakfast (Peterson et al., 2003).

The findings on SBPP impact suggest that when compared to elementary students in schools offering the regular SBP, there are few added benefits to students of offering universal-free school breakfast. Despite the increases in participation that were realized in the first year of the SBPP and sustained in the subsequent years, and the greater likelihood of consuming a nutritionally substantive breakfast, there were no noteworthy effects on students either positive or negative, on the wide array of outcomes measured over the course of the evaluation. These included short-term outcomes measured on the same day as a child was offered the opportunity to eat school breakfast, including cognitive functioning in the period after breakfast and dietary intake over the course of the day, and more long-term outcomes including performance on standardized achievement tests.

These findings do not negate the importance of breakfast. As described earlier, there is an entire body of literature that suggests positive nutrition and cognitive benefits to eating breakfast. Nor do they negate the significance of the SBP, which provides an important meal to students who might not eat otherwise. What they do suggest is that simply offering school breakfast to all elementary school students free of charge should not be expected to increase academic outcomes beyond what occurs in schools already offering the SBP.

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