Chapter 6

School Breakfast Program

The School Breakfast Program (SBP) began as a pilot program in 1966. The intent was to provide breakfast at school to children from poor areas who may not have eaten breakfast at home, and to children in rural areas who ate an early breakfast, did chores, and then arrived at school hungry after traveling long distances (Devaney and Stuart, 1998). The program was modeled after the National School Lunch Program (NSLP), which had been in existence for some 20 years when the SBP was established. The combination of the NSLP and SBP was intended to provide "a coordinated and comprehensive child food service [program] in schools" (P.L. 89-842).

Schools that participate in the SBP provide breakfasts to children, regardless of household income. Schools receive Federal reimbursements for each meal served, with higher reimbursements for meals served free of charge or at a reduced price to children from low-income families. In FY 2002, more than 8 million children participated in the SBP on an average school day. Approximately 1.4 billion meals were served, at a total Federal cost of $1.6 billion (U.S. Department of Agriculture (USDA), Food and Nutrition Service (FNS), 2003a).

Program Overview

The SBP was authorized by the Child Nutrition Act of 1966 (P.L. 89-842).[93] Greater Federal subsidies were offered for schools identified as having a "severe need" as a way of encouraging participation by schools in low-income areas (which tended to have higher operating costs). Congress authorized the SBP as a permanent program in 1975. While the program continued to provide greater subsidies to schools in areas of severe need, the authorizing legislation declared that the SBP was targeted to "all schools where it is needed to provide adequate nutrition for all children in attendance" (P.L. 94-105).

In 1989, the Child Nutrition Act was amended with the specific intention of expanding the availability of the SBP in the Nation's schools. The Secretary of Agriculture was required to award startup grants, administered through State agencies, to "a substantial number of States" on a competitive basis. The grants, which were targeted toward school districts that served large proportions of low-income children, were funded at a level of $3 million in 1990. The funds were to be used to help cover nonrecurring costs associated with initiating the SBP.[94] Since 1989, the size of the SBP has more than doubled, increasing from 3.8 million breakfasts per day in FY 1989 to 8.1 million breakfasts per day in FY 2002 (USDA/FNS, 2003a).

The SBP operates in essentially the same manner as the NSLP (see chapter 5). The program is administered by FNS at the Federal level and by school food authorities (SFAs) at the local level. SFAs receive cash reimbursements for each meal served (commodities are tied to the NSLP). For the 2002-03 school year, the basic subsidies were $1.17 for free breakfasts, $0.87 for reduced-price breakfasts, and $0.22 for breakfasts served to children who purchased meals at the full price (referred to as "paid meals").[95] Children eligible for reduced-price breakfasts cannot be charged more than $0.30 per breakfast. SFAs set their own prices for full-price/paid breakfasts, but must operate their school meal service program on a nonprofit basis (USDA/FNS, 2003b). Of the 1.4 billion breakfasts served in FY 2002, 83 percent were served to children who received their meals free or at a reduced price (USDA/FNS, 2003a).

Program Use

In comparison with the NSLP, the SBP is available to fewer children and student participation rates are lower. The SBP is offered in approximately 78 percent of the schools and institutions that offer the NSLP (USDA/FNS, 2003b and USDA/FNS, 2003c). Using data from the first School Nutrition Dietary Assessment Study (SNDA-I), Rossi (1998) found that in schools where the SBP was available, only 78 percent of children who were eligible for free or reduced-price breakfasts were certified to receive meal subsidies. And of those certified, only 37 percent participated in the breakfast program. The combined effect was that at the time the

[93]Much of the text in the program overview section also appears in another report prepared by Abt Associates Inc. (McLaughlin et al., 2002). A preliminary draft of this chapter was used in preparing that report.

[94]Changes made by the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA; Public Law 104-193) eliminated this grant program.

[95]Reimbursement rates are higher for Hawaii and Alaska. In addition, schools that operate in high-poverty areas may qualify for "severe-need" reimbursement. In the 2002-03 school year, severe-need schools could receive up to an additional $0.23 for free and reduced-price breakfasts.

SNDA-I data were collected (1991-92 school year), only 29 percent of children eligible for free and reduced-price breakfast were eating school breakfasts.

Findings from more recent studies are similar. The second School Nutrition Dietary Assessment Study (SNDA-II), completed in the 1998-99 school year, found that 22 percent of children in SBP schools participated in the program on an average day (compared with 60 percent for the NSLP) (Fox et al., 2001). Students approved for free meals participated in the SBP at a higher rate (39 percent) than students approved for reduced-price meals (20 percent) or students who purchased full-price meals (8 percent). Participation was greatest in elementary schools (26 percent) and lowest in high schools (11 percent).

A USDA-sponsored study found that a major factor affecting application and participation decisions related to the NSLP and SBP was the perceived stigma of receiving free or reduced-price school meals (Glantz et al., 1994). This was found to be more of an issue for the SBP and for secondary school students than for the NSLP and elementary school students. Study findings suggested that parents and older students believed that receiving free or reduced-price meals labeled students as poor and set them apart. While program regulations require school districts to ensure that children approved for free and reduced-price meals are not overtly identified, the perception was that simply eating a school breakfast carries a stigma, regardless of one's income status.

Several other factors have been identified as potential barriers to SBP participation. These include scheduling (when breakfast is served relative to the official start of the school day), meal prices, competing a la carte offerings, bus/transportation issues, lack of time to eat, lack of space, and student preferences for other foods (Reddan et al., 2002; Rosales and Jankowski, 2002; Project Bread, 2000).

Offering a free breakfast to all school children, regardless of family income, is viewed as a promising vehicle for increasing participation in the SBP. Under existing Federal regulations, schools may eliminate the burden of determining eligibility for meal benefits and provide all meals free of charge. Under Provisions 2 and 3 of the National School Lunch Act (which govern both the NSLP and the SBP), schools are reimbursed at established rates for a 4-year period.[96] During this period, breakfasts and lunches are offered to all students free of charge and schools do not have to conduct free and reduced-price certifications. State agencies may grant subsequent 4-year extensions if there has been no substantial change in the income level of a school's target population (USDA/FNS, 2003d). School districts are responsible for costs in excess of Federal reimbursements. In the 1999-2000 school year, an estimated 3,154 schools (3.8 percent of all schools) used either Provision 2 or 3 (Abraham et al., 2002).

Some States require that all schools, or schools with a specific proportion of low-income students, participate in the SBP. According to the Food Research and Action Center (FRAC), 37 of the 50 States had their own legislative requirements related to the SBP in the 2002-03 school year, and/or provided funding for school breakfasts (Food Research and Action Center, 2003). Twenty-five States had laws mandating that specific schools participate in the SBP, and 22 States provided some type of funding.[97] Three States (Illinois, Maryland, and Massachusetts) provided State funding for so-called "universal-free" school breakfast in certain schools. In these schools, breakfasts are provided free to all children regardless of household income. In addition, North Carolina provided funding for universal-free school breakfasts for kindergarten students.[98]

The idea of providing universal-free school breakfasts became increasingly popular in the 1990s. Several States and school districts implemented demonstrations to test the feasibility and impact of such programs. Early results indicated that universal-free breakfasts substantially increased participation. Program evaluators also reported positive effects on tardiness, absentee rates, academic achievement, and related outcomes. However, because most of the demonstrations were small, used nonexperimental designs, and had other design and/or data limitations, these findings were considered tentative (McLaughlin et al., 2002).

To obtain a more scientifically sound assessment of the potential impacts of providing universal-free school breakfasts, Congress authorized the School Breakfast Program Pilot Project (SBPP) in 1998 (P. L. 105-336). This 3-year demonstration project, administered by FNS, includes a comprehensive evaluation of both the implementation and impact of a universal-free

[96]Schools may operate under Provisions 2 or 3 for one or both meal programs. Currently, more schools operate under these provisions for the SBP than for the NSLP (USDA, FNS, Office of Analysis and Evaluation, 2004).

[97]Counts are not mutually exclusive. Some States provide no funding and/or have no mandates.

[98]Minnesota also provided universal-free breakfast funding from 1999 to 2002. However, the statute that granted the funding was repealed by the State legislature in 2003.

school breakfast program. The project began in the 2000-01 school year and ended at the end of the 2002-03 school year. Results from the first year of implementation, including information on impacts on a variety of student outcomes, were published in late 2002 (McLaughlin et al., 2002). A final report covering all 3 years of the pilot is expected in 2004.

Nutrition Standards

To be eligible for Federal subsidies, SBP meals must meet defined nutrition standards. As described in chapter 5, USDA launched the School Meals Initiative (SMI) in 1995 to improve the nutritional quality of school meals. Prior to the SMI, schools that participated in the SBP were required to follow a meal pattern that specified the types and amounts of foods and beverages to be offered to students of different ages. The basic meal pattern, which was modeled after the NSLP meal pattern, includes:

- Milk: 1 serving per meal
- Fruit, juice, or vegetables: 1 serving per meal
- Meat or meat alternate and bread or bread alternate: 2 servings total per meal.[99]

Under the SMI, new nutrient-based standards were established for SBP meals. SMI nutrition standards specify that breakfasts must provide, over the course of a week, an average of 25 percent of students' daily requirements for energy (calories) and key nutrients (calcium, iron, protein, and vitamins A and C). Breakfasts must also be consistent with the *Dietary Guidelines for Americans* recommendations for intake of fat and saturated fat.[100]

The Healthy Meals for Healthy Americans Act (P.L. 103-448) formally required that school meals be consistent with the *Dietary Guidelines* and that schools begin complying with SMI nutrition standards in the 1996-97 school year unless a waiver was granted by the relevant State agency. The regulatory requirement that school meals be consistent with the *Dietary Guidelines* has been incorporated into the FNS strategic plan. The current goal is that all schools will satisfy these standards by 2005 (USDA/FNS, 2000).

The SNDA-I study demonstrated that, prior to the SMI, breakfasts offered in the SBP were consistent with SMI nutrition standards for key nutrients, but were low in energy relative to defined Recommended Energy Allowances (REAs), high in fat and saturated fat, relative to *Dietary Guidelines* recommendations, and high in sodium relative to the National Research Council's (NRC) recommendation (Burghardt et al., 1993). Data from SNDA-II, collected in the 1998-99 school year (early in SMI implementation), showed improvement in the nutritional profile of SBP meals. Breakfasts offered in 1998-99 continued to meet standards for key nutrients, but were significantly lower in total fat, saturated fat, and sodium than pre-SMI breakfasts (Fox et al., 2001). Indeed, the average nutrient profile of breakfasts offered in the1998-99 school year was consistent with SMI nutrition standards for both total fat and saturated fat. Breakfasts offered in elementary schools were also consistent with the NRC's recommendation for sodium, and breakfasts offered in secondary schools all but met this standard (601 milligrams (mg) sodium, on average, compared with a standard of 600 mg). On average, breakfasts continued to fall short of the benchmark for energy content.[101]

In the years since the SNDA-II data were collected, efforts to implement the SMI nutrition standards have continued at the Federal, State, and local levels. Consequently, even this relatively recent data may not provide an accurate picture of the nutrient content of meals currently offered in the SBP.[102]

The existing literature on SBP impacts needs to be considered cautiously because program operations changed substantially after most of the available research was completed. The SMI and related initiatives may have affected the meals offered to students and students' consumption of those meals. In addition, the concerted efforts made in recent years to increase participation in the SBP may have led to changes in the characteristics of the children being served by the program. This, in turn, may lead to changes in program

[99]One serving from each category or two servings from one of the two categories.

[100]Goals for sodium and cholesterol content are not included in SMI nutrition standards; however, schools are encouraged to monitor levels of these dietary components.

[101]For secondary school breakfasts, the difference between the mean energy content of pre-SMI and post-SMI breakfasts was statistically significant.

[102]The more recent Evaluation of the SBPP (McLaughlin et al., 2002) assessed the nutrient content of SBP meals in elementary schools participating in the SBPP demonstration in the 2000-01 school year. However, data from that study are not directly comparable to data from SNDA-I. The SBPP analysis was based on the meals actually selected by students (weighted nutrient analysis), while the SNDA-I and SNDA-II results discussed above were based on meals offered to students (unweighted nutrient analysis). SNDA-II included both weighted and unweighted analyses. A comparison of weighted analysis results from SNDA-II and the Evaluation of the SBPP suggests that the fat and saturated fat content of SBP meals in elementary schools has continued to decline.

impacts. For these reasons, new research is essential to understanding the nutrition- and health-related impacts of the SBP as it operates today (Guthrie, 2003).

Research Overview

This review, like the other reviews in this report, focuses on research that examined the impact of a federally sponsored food and nutrition assistance program—in this case the SBP—on health- and nutrition-related outcomes. A related body of research focuses on the general impacts of eating breakfast rather than the specific impacts of participating in the SBP (eating an SBP breakfast). Much of this research was conducted in controlled environments or in developing countries, and is not reviewed here. The interested reader can find summaries of these and related studies in two other reports (Jacobson et al., 2001; Briefel et al., 1999).

Relevant SBP research can be divided into two categories: (1) studies that looked at impacts on students' dietary intakes and (2) studies that looked at impacts on academic performance and related outcomes such as attendance, tardiness, and behavior: A few studies (see table 32) also examined impacts on height and/or weight or nutritional biochemistries. (None found significant effects.) The evaluation of the SBPP is the only study to look at all of these outcomes concurrently. The following sections describe each body of research and summarize key findings.

Impacts on Students' Dietary Intakes

The literature search identified 14 studies that attempted to estimate SBP impacts on children's dietary intake (table 32). This includes two national evaluations that included student-level measures—SNDA-I and NESNP (the National Evaluation of School Nutrition Programs)—as well as a reanalysis of the SNDA-I data (Group I). (The third national evaluation conducted by USDA—SNDA-II—did not collect student-level data). Also included are four studies based on secondary analysis of data from national surveys (Group II), five State and local studies (Group III), and two studies of universal-free breakfast demonstrations (Group IV).

The strongest available data on SBP impacts in this area come from the SNDA-I study (Gordon et al., 1995 and Devaney and Stuart, 1998) and from the first-year report of the evaluation of the SBPP (McLaughlin, 2002). SNDA-I is the most recent, comprehensive, and state-of-the-art study designed specifically to study the SBP. It included a nationally representative sample of public and private elementary and secondary schools and a nationally representative sample of students attending those schools. SDNA-I researchers included statistical controls for selection bias in their analysis. SNDA-I data are dated, however, because they were collected before the SMI and before recent initiatives to increase SBP participation.

Data from the SBPP are more recent—collected in spring 2001—but they are not nationally representative and are based on data from six school districts that volunteered to participate in a universal-free breakfast demonstration. The SBPP used a randomized experimental design; however, the evaluation was designed to assess the impact of a universal-free breakfast program rather than the impact of the SBP, per se. The main analyses completed for the first-year SBPP report compared the *entire* treatment group (students in schools where universal-free breakfast was available) with the *entire* control group (students in schools where the standard SBP was available). Results of these analyses provide no information on the question that is central to understanding the impact of the SBP: Do the dietary (or other) outcomes of students who participate in the SBP differ from those of students who do not participate in the program?

However, SBPP researchers completed a separate analysis that does provide some insight on this issue. A statistical procedure was used to estimate impacts on students who *actually participated* in the universal-free school breakfast program. In the analysis of dietary intakes, universal-free breakfast participation was defined as consumption of a school breakfast on the day dietary intake data were collected. The Bloom correction (Bloom, 1984) was used to adjust the estimate of the average impact on the entire treatment group, based on the difference between the proportion of students in treatment and control schools who ate breakfast on a typical school day. Results provide unbiased estimates of the impact of participating in universal-free school breakfast.[103] These findings are suggestive of the impact of participating in the regular SBP some 6 years after the SMI was launched.[104]

A recent study by Gleason and Suitor (2001) also deserves comment. This study used data from the

[103]For more information, see McLaughlin et al. (2002), chapter 4 and appendices C and F.

[104]The characteristics of meals provided in universal-free breakfast programs are likely to be comparable to those provided in the regular SBP (see McLaughlin et al., 2002). However, the characteristics and consumption behaviors of students who choose to participate in universal-free school breakfast and students who choose to participate in the regular SBP may not be comparable.

Table 32—Studies that examined the impact of the School Breakfast Program on students' dietary intakes

Study	Outcome(s)	Data source[1]	Data collection method	Population (sample size)	Design	Measure of participation	Analysis method
Group I: National evaluations							
Devaney and Stuart (1998) (SNDA-I)	Likelihood of eating breakfast	Nationally representative sample of students from 329 public and private schools	Single 24-hour recall	Children and adolescents in grades 1-12 (n=2,966)	Participant vs. nonparticipant	Ate SBP breakfast on recall day	Multivariate regression with selection-bias adjustment
Gordon et al. (1995) (SNDA-I)	Nutrient intake at breakfast and over 24 hours Food intake at breakfast	Nationally representative sample of students from 329 public and private schools	Single 24-hour recall	Children and adolescents in grades 1-12 (n=2,966)	Participant vs. nonparticipant	Ate SBP breakfast on recall day	Multivariate regression with selection-bias adjustment (nutrients) Bivariate t-tests (foods)
Wellisch et al. (1983) (NESNP)	Nutrient intake at breakfast and over 24 hours[2]	Nationally representative sample of students from 276 public schools	Single 24-hour recall	Children and adolescents in grades 1-12 (n=2,180)	Participant vs. nonparticipant	Ate SBP breakfast and NSLP lunch on recall day (nonparticipants ate NSLP lunch only)	Multivariate regression
Group II: Secondary analysis of national surveys							
Gleason and Suitor (2001)	Nutrient intake at breakfast and over 24 hours Food intake at breakfast and over 24 hours	1994-96 CSFII	2 nonconsecutive 24-hour recalls	Children and adolescents in SBP schools ages 6-18 (n=2,693)	Participant vs. nonparticipant	Ate SBP breakfast on recall day	Comparison of regression-adjusted means
Basiotis et al. (1999)	Nutrient intake over 24 hours Food intake over 24 hours	1994-96 CSFII	2 nonconsecutive 24-hour recalls	Low-income children ages 6-18 (sample size not reported)	Participant vs. nonparticipant	Ate SBP breakfast on recall day	Multivariate regression
Devaney and Fraker (1989)	Nutrient intake at breakfast and over 24 hours	1980-81 NESNP	Single 24-hour recall	Children ages 5-10 (n=2,118) and 11-21 (n=2,809)	Participant vs. nonparticipant	Ate SBP breakfast on recall day	Multivariate regression

See notes at end of table.

Continued—

Table 32—Studies that examined the impact of the School Breakfast Program on students' dietary intakes—Continued

Study	Outcome(s)	Data source[1]	Data collection method	Population (sample size)	Design	Measure of participation	Analysis method
Hoagland (1980)	Nutrient intake over 24 hours[2]	1971-74 HANES-I	Single 24-hour recall	Children and adolescents ages 6-21 (n=412)[3]	Participant vs. nonparticipant	Ate school breakfast on recall day	Analysis of variance
Group III: State and local studies							
Nicklas et al. (1993a)	Nutrient intake at breakfast	Bogalusa Heart Study (1984-85 and 1987-88)	Single 24-hour recall	Children age 10 (n=393)	Participant vs. nonparticipant	Ate school breakfast on recall day	Analysis of variance
Nicklas et al. (1993b)	Nutrient intake over 24 hours	Bogalusa Heart Study (1984-85 and 1987-88)	Single 24-hour recall	Children age 10 (n=393)	Participant vs. nonparticipant	Ate school breakfast on recall day	Analysis of variance
Emmons et al. (1972)	Nutrient intake at breakfast and over 24 hours[2]	All students in 2 school districts in rural New York State (1970-71)	Single 24-hour recall	Children in grades 1-4 (n=844)	Participants, before vs. after[4]	Took 70% or more of school meals offered during study period	Comparison of means (type of statistical test not reported)
Hunt et al. (1979)	Nutrient intake over 24 hours	2 schools in Compton, CA (1970-71)	Single 24-hour recall	Children in grades 3-6 (n=555)	Participant vs. nonparticipant[5]	60% participation in SBP on days in school during experimental period	Analysis of variance
Price et al. (1978)	Nutrient intake over 24 hours	Students in schools/districts in 8 regions in Washington State; Blacks and Mexican-Americans were oversampled (1971-73)	3 nonconsecutive 24-hour recalls, including 1 weekend day	Children ages 8-12 (n=728)[6]	Participant vs. nonparticipant	Usually ate school breakfast 4-5 times/week	Multivariate regression

See notes at end of table.

Continued—

Table 32—Studies that examined the impact of the School Breakfast Program on students' dietary intakes—Continued

Study	Outcome(s)	Data source[1]	Data collection method	Population (sample size)	Design	Measure of participation	Analysis method
Group IV: Studies of universal-free breakfast							
McLaughlin et al. (2002)	Nutrient intake at breakfast and over 24 hours Food intake at breakfast and over 24 hours[2,7]	70 matched pairs of school units in 6 school districts[8]	24-hour recall, with second recall for subsample (usual intake)	Children in grades 2-6 (n=4,290)	Randomized experiment	Ate universal-free breakfast on recall day[9]	Multivariate regression with Bloom correction to assess impact on universal-free breakfast participants (subgroup analyses)
Cook et al. (1996)	Nutrient intake at breakfast	Elementary schools in Central Falls, RI, matched with schools in Providence, RI	Single breakfast recall	Children in grades 3-6 (n=225)	Participant vs. nonparticipant	Ate SBP breakfast on recall day	Not well described.

[1] Data sources:
CSFII = Continuing Survey of Food Intake of Individuals.
NHANES-I = First National Health and Nutrition Examination Survey.
NESNP = National Evaluation of School Nutrition Programs.

[2] Also examined impacts on height and/or weight, but reported no significant findings.

[3] The study compared SBP participants with students who did not have access to the SBP. Only three SBP participants were included in the sample.

[4] Study compared intakes before and after introduction of free lunch (one district) and free lunch and breakfast (one district). Results reported for four different subgroups based on baseline characteristics: nutritionally adequate, nutritionally needy, low-income (eligible for free lunch), not low income.

[5] Study examined the effect of introducing a free breakfast program, comparing students in experimental school to control school that had no breakfast program.

[6] School breakfast was not the main focus of the study. Only 20 children in the sample consumed a school breakfast.

[7] The study also examined impacts on BMI and food security and found no significant effects.

[8] The study focused on students in grades 2-6. For sampling/matching purposes, schools with different grade configurations (e.g., K-2 and 3-5) were considered one unit. There were a total of 73 treatment schools and 70 control schools.

[9] The study's main analysis compared outcomes for the entire treatment group with outcomes for the entire control group. Findings discussed in this report, however, are from a separate analysis that estimated impacts on students who actually participated in universal-free breakfast on the day of the recall.

1994-96 wave of the Continuing Survey of Food Intakes by Individuals (CSFII) to study food and nutrient intakes of SBP participants and nonparticipants. Although well done and based on more recent data than SNDA-I, this study is not as strong as either SNDA-I or the evaluation of the SBPP, for at least two reasons. First, the CSFII data are generalizable to the U.S. population as a whole, but not to schoolchildren specifically. Second, Gleason and Suitor did not attempt to control for selection bias, presumably because of the lack of relevant variables in the CSFII dataset. Indeed, the authors caution that, because of likely selection bias, the estimates presented in their report should *not* be interpreted as estimates of SBP impacts.

Impacts on the Likelihood That Students Will Eat Breakfast

The overarching goal of the SBP is to provide breakfast to children who might otherwise not eat before starting the school day. The original analysis of the SNDA-I data (Gordon et al., 1995) found that the likelihood that a child would eat breakfast before school began was not significantly different for children in schools that did and did not offer the SBP. About 12 percent of the children in each type of school ate no breakfast. This analysis was flawed, however, because it defined children who ate breakfast as those who consumed at least 50 calories between the time of waking and 45 minutes after the start of school, a threshold that could include extremely small snacks. As an example, an average-size sandwich cookie provides approximately 50 calories.

A reanalysis of the SNDA-I data, completed by Devaney and Stuart (1998), considered three different definitions of "breakfast." Each definition was based on foods consumed between waking and 45 minutes after the start of school and included foods consumed at home and at school. The three definitions were:

(1) Consumption of any food or beverage (except water).

(2) Consumption of food or beverages that contributed more than 10 percent of the REA.

(3) Consumption of food or beverages from at least two of five major food groups PLUS more than 10 percent of the REA.

Results of this analysis indicated that, for the student population as a whole, the availability of the SBP had no significant impact on the likelihood of breakfast consumption, regardless of the definition used. Among students from low-income households, however, availability of the SBP was associated with a significantly greater likelihood that students would eat a more substantial breakfast, (a breakfast that satisfied definition 2 or 3). At the same time, availability of the SBP made it significantly less likely that low-income students would consume a nominal breakfast (a breakfast that provided 10 percent or less of the REA).[105] These results, summarized in table 33, suggest that, at the time the SNDA-I data were collected, the primary objective of the SBP was being met. That is, low-income students were more likely to eat breakfast if the SBP was available in their school.[106]

Impacts on Dietary Intake

Table 34 summarizes results of studies that compared dietary intakes of SBP participants and nonparticipants at breakfast. (As noted previously, the evaluation of the SBPP (McLaughlin et al., 2002) actually compared intakes of participants and nonparticipants in schools where universal-free breakfasts were available). Table 35 provides comparable data for intakes over 24 hours. Both tables are divided into five sections: food energy

[105]The results differed slightly for elementary and secondary school students. For those in secondary school, a significantly greater likelihood of breakfast consumption was observed only for the most stringent breakfast definition (2 food groups and more than 10 percent of the REA).

[106]The Evaluation of the SBPP (McLaughlin et al., 2002) assessed the impact of a universal-free breakfast program on the likelihood that students would eat breakfast. These data are not included in this review because they have limited applicability to the regular SBP, where free breakfasts are available only to students who are certified to receive that benefit.

Table 33—Low-income students' breakfast consumption patterns by SBP availability

	Type of breakfast consumed			
		Any food or beverage:		Food from two food groups
SBP availablility	None	≤10% REA	>10% REA	*plus* >10% REA
		Percent		
SBP available	12.5	13.0*	6.1*	67.4*
SBP not available	13.3	22.8	8.6	54.8

Notes: *SBP vs. non-SBP difference is statistically significant ($p<0.01$).

REA = Recommended Energy Allowance.

Results reported are for elementary students. For secondary students, a significantly greater likelihood of breakfast consumption was observed only for the most stringent definition (two food groups and >10 percent of REA).

Source: Devaney and Stuart (1998), reanalysis of data from SNDA-I (Gordon et al., 1995).

Table 34—Findings from studies that examined the impact of the School Breakfast Program on students' dietary intakes at breakfast

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Food energy and macronutrients				
Food energy	Gleason (2001) [national] Cook (1996) [1 city] Gordon (1995) [national] Nicklas (1993a) [1 city] Devaney (1989) [national] {5 to 10}	McLaughlin (2002) [6 districts] Devaney (1989) [national] {11 to 21}		
Protein	Cook (1996) [1 city] Gordon (1995) [national] Nicklas (1993a) [1 city] Wellisch (1983) [national]	McLaughlin (2002) [6 districts] Gleason (2001) [national]		
Carbohydrates	Nicklas (1993a) [1 city]		McLaughlin (2002) [6 districts] Gleason (2001) [national]	Gordon (1995) [national]
Fat	Cook (1996) [1 city] Nicklas (1993a) [1 city]	Gleason (2001) [national] Gordon (1995) [national]	McLaughlin (2002) [6 districts]	
Saturated fat	Gleason (2001) [national]	Gordon (1995) [national]	McLaughlin (2002) [6 districts] Nicklas (1993a) [1 city]	
Vitamins				
Vitamin A	Cook (1996) [1 city] Emmons (1972) [2 districts] {nutritionally needy}	McLaughlin (2002) [6 districts] Gleason (2001) [national] Gordon (1995) [national]	Devaney (1989) [national] {5 to 10}	Wellisch (1983) [national] Devaney (1989) [national] {11 to 21}
Vitamin B_6	Cook (1996) [1 city]	McLaughlin (2002) [6 districts] Gordon (1995) [national]	Gleason (2001) [national] Devaney (1989) [national]	Wellisch (1983) [national]
Vitamin B_{12}		Gleason (2001) [national] Gordon (1995) [national]	McLaughlin (2002) [6 districts]	
Vitamin C	Gleason (2001) [national] Emmons (1972) [2 districts] {low-income}	McLaughlin (2002) [6 districts] Gordon (1995) [national]		

See notes at end of table.

Continued—

Table 34—Findings from studies that examined the impact of the School Breakfast Program on students' dietary intakes at breakfast—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Vitamin E		Gleason (2001) [national]		
Folate		McLaughlin (2002) [6 districts]	Gleason (2001) [national] Gordon (1995) [national]	
Niacin	Hunt (1979) [2 schools]	McLaughlin (2002) [6 districts] Gordon (1995) [national]	Gleason (2001) [national]	Wellisch et al. (1983) [national]
Riboflavin	Gleason (2001) [national] Gordon (1995) [national] Emmons (1972) [2 districts] {low-income}	McLaughlin (2002) [6 districts]		
Thiamin		McLaughlin (2002) [6 districts] Gleason (2001) [national] Gordon (1995) [national]		Wellisch et al. (1983) [national]
Minerals				
Calcium	McLaughlin (2002) [6 districts] Gleason (2001) [national] Cook (1996) [1 city] Gordon (1995) [national] Devaney (1989) [national] Wellisch (1983) [national] Emmons (1972) [2 districts] {all incomes}			
Iron	Cook (1996) [1 city]	McLaughlin (2002) [6 districts]	Gleason (2001) [national] Gordon (1995) [national]	Devaney (1989) [national] Wellisch (1983) [national]
Magnesium	Gleason (2001) [national] Gordon (1995) [national] Devaney (1989) [national] Wellisch (1983) [national]	McLaughlin (2002) [6 districts]		

See notes at end of table.

Continued—

Table 34—Findings from studies that examined the impact of the School Breakfast Program on students' dietary intakes at breakfast—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Phosphorus	McLaughlin (2002) [6 districts] Gleason (2001) [national][1] Gordon (1995) [national] Wellisch (1983) [national]			
Zinc		Gleason (2001) [national] McLaughlin (2002) [6 districts] Gordon (1995) [national]		
Other dietary components				
Cholesterol		Gleason (2001) [national] Gordon (1995) [national] Nicklas (1993a) [1 city]		McLaughlin (2002) [6 districts] Devaney (1989) [national]
Fiber	Gleason (2001) [national]	McLaughlin (2002) [6 districts]		
Sodium	Gleason (2001) [national] Nicklas (1993a) [1 city]	Gordon (1995) [national]	McLaughlin (2002) [6 districts]	
Added sugars	Nicklas (1993a) [1 city]		McLaughlin (2002) [6 districts]	Gleason (2001) [national]
Food group servings				
Dairy	McLaughlin (2002) [6 districts] Cook (1996) [1 city] Gordon (1995) [national]	Gleason (2001) [national]		
Fruits	McLaughlin (2002) [6 districts] Gleason (2001) [national] Cook (1996) [1 city] Gordon (1995) [national]			
Grains	Gordon (1995) [national] Cook (1996) [1 city] Gleason (2001) [national] {non-whole grains}	McLaughlin (2002) [6 districts] Gleason (2001) [national] {total grains}	Gleason (2001) [national] {whole grains}	

See notes at end of table.

Continued—

Table 34—Findings from studies that examined the impact of the School Breakfast Program on students' dietary intakes at breakfast—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Meat	Gordon (1995) [national]	Gleason (2001) [national]		McLaughlin (2002) [6 districts]
Vegetables		McLaughlin (2002) [6 districts] Gleason (2001) [national] Gordon (1995) [national]		

Notes: Cell entries show the senior author's name, the publication date, and the scope of the study (for example, national vs. 1 city or 1 State). Where findings pertain only to a specific subgroup rather than the entire study population, the cell entry also identifies the subgroup {in brackets}.

Nonsignificant results are reported in the interest of providing a comprehensive picture of the body of research. As noted in chapter 1, a consistent pattern of nonsignificant findings may indicate a true underlying effect, even though no single study's results would be interpreted in that way. Readers are cautioned to avoid the practice of "vote counting," or adding up all the studies with particular results. Because of differences in research design and other considerations, findings from some studies merit more consideration than others. The text discusses methodological limitations and emphasizes findings from the strongest studies.

Findings for Gordon et al. (1995) are based on selection-bias-adjusted models. Authors note that results were essentially identical to results of standard regression model.

Findings for Cook et al. (1996) are based on comparisons between universal-free breakfast participants and nonparticipants in matched control schools (nutrients) and home-breakfast consumers in universal-free schools (foods).

Wellisch et al. (1983) also assessed intakes of calcium and vitamin C. They found no difference between SBP participants and nonparticipants, but did not report point estimates.

Findings for Emmons (1972) are based on comparison of intakes before and after introducing free lunch and free lunch and breakfast programs. Differences reported as significant are those where pre/post difference was significant for district in which both breakfast and lunch were introduced, but not in the district where only lunch was introduced. The study assessed impacts in four subgroups (see table 33). Only significant findings are reported here.

Table 35—Findings from studies that examined the impact of the School Breakfast Program on students' dietary intakes over 24 hours

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Food energy and macronutrients				
Food energy	Gleason (2001) [national] Gordon (1995) [national] Nicklas (1993b) [1 city] Hoagland (1980) [national]	Hunt (1979) [2 schools]	McLaughlin (2002) [6 districts] Devaney (1989) [national]	
Protein	Gordon (1995) [national] Nicklas (1993b) [1 city] Hoagland (1980) [national]		McLaughlin (2002) [6 districts] Gleason (2001) [national] Hunt (1979) [2 schools]	
Carbohydrates		McLaughlin (2002) [6 districts] Hunt (1979) [2 schools]	Gleason (2001) [national] Gordon (1995) [national]	Nicklas (1993b) [1 city]
Fat	Nicklas (1993b) [1 city]	Gleason (2001) [national] Basiotis (1999) [national] Gordon (1995) [national] Hunt (1979) [2 schools]	McLaughlin (2002) [6 districts]	
Saturated fat	Basiotis (1999) [national]	Gleason (2001) [national] Gordon (1995) [national]	McLaughlin (2002) [6 districts]	Nicklas (1993b) [1 city]
Vitamins				
Vitamin A		McLaughlin (2002) [6 districts] Devaney (1989) [national] {11-21} Hoagland (1980) [national]	Gleason (2001) [national] Gordon (1995) [national] Hunt (1979) [2 schools]	Devaney (1989) [national] {5-10}
Vitamin B_6		Gordon (1995) [national]	McLaughlin (2002) [6 districts] Gleason (2001) [national] Devaney (1989) [national] {5-10}	Devaney (1989) [national] {11-21}
Vitamin B_{12}		Gordon (1995) [national]	McLaughlin (2002) [6 districts] Gleason (2001) [national]	
Vitamin C	Gleason (2001) [national] Hoagland (1980) [national] Price (1975) [1 State]	Gordon (1995) [national]	McLaughlin (2002) [6 districts]	Hunt (1979) [2 schools]

See notes at end of table.

Continued—

Table 35—Findings from studies that examined the impact of the School Breakfast Program on students' dietary intakes over 24 hours—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Vitamin E			Gleason (2001) [national]	
Folate		McLaughlin (2002) [6 districts] Gordon (1995) [national]	Gleason (2001) [national]	
Niacin	Hoagland (1980) [national]	Gordon (1995) [national]	McLaughlin (2002) [6 districts] Gleason (2001) [national] Hunt (1979) [2 schools]	
Riboflavin	Price (1975) [1 State]	McLaughlin (2002) [6 districts] Gleason (2001) [national] Gordon (1995) [national]	Hoagland (1980) [national] Hunt (1979) [2 schools]	
Thiamin	Gordon (1995) [national] Price (1975) [1 State]	Gleason (2001) [national] Hoagland (1980) [national]	McLaughlin (2002) [6 districts] Hunt (1979) [2 schools]	
Minerals				
Calcium	Gleason (2001) [national] Gordon (1995) [national] Devaney (1989) [national] Wellisch (1983) [national] Price (1975) [1 State]	Hoagland (1980) [national] Hunt (1979) [2 schools]	McLaughlin (2002) [6 districts]	
Iron	Hoagland (1980) [national]	Gordon (1995) [national]	McLaughlin (2002) [6 districts] Gleason (2001) [national] Devaney (1989) [national] {11-21} Hunt (1979) [2 schools]	Devaney (1989) [national] {5-10}
Magnesium	Gordon (1995) [national] Wellisch (1983) [national]	Gleason (2001) [national] Devaney (1989) [national]	McLaughlin (2002) [6 districts]	
Phosphorus	Gleason (2001) [national] Gordon (1995) [national] Wellisch (1983) [national] Hoagland (1980) [national] Price (1975) [1 State]		McLaughlin (2002) [6 districts]	

See notes at end of table.

Continued—

Table 35—Findings from studies that examined the impact of the School Breakfast Program on students' dietary intakes over 24 hours—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Potassium	Nicklas (1993b) [1 city]			
Zinc		Gleason (2001) [national] Gordon (1995) [national]	McLaughlin (2002) [6 districts]	
Other dietary components				
Cholesterol		Gleason (2001) [national] Gordon (1995) [national] Nicklas (1993b) [1 city]	Basiotis (1999) [national]	McLaughlin (2002) [6 districts] Devaney (1989) [national]
Fiber		Gleason (2001) [national]	McLaughlin (2002) [6 districts]	
Sodium	Nicklas (1993b) [1 city]	Gleason (2001) [national] Gordon (1995) [national]	McLaughlin (2002) [6 districts] Basiotis (1999) [national]	
Added sugars	Nicklas (1993b) [1 city]	McLaughlin (2002) [6 districts]	Gleason (2001) [national]	
Food group servings				
Dairy	Gleason (2001) [national] Basiotis (1999) [national]	McLaughlin (2002) [6 districts] Hunt (1979) [2 schools]		
Fruits	Gleason (2001) [national] Basiotis (1999) [national]	McLaughlin (2002) [6 districts]	Hunt (1979) [1 school]	
Grains		Gleason (2001) [national]	McLaughlin (2002) [6 districts] Hunt (1979) [2 schools]	Basiotis (1999) [national]
Meat		Gleason (2001) [national] Basiotis (1999) [national]	McLaughlin (2002) [6 districts]	Hunt (1979) [2 schools]
Vegetables		Basiotis (1999) [national]	McLaughlin (2002) [6 districts] Gleason (2001) [national] Hunt (1979) [2 schools]	
Soda				Gleason (2001) [national]

See notes at end of table.

Continued—

Table 35—Findings from studies that examined the impact of the School Breakfast Program on students' dietary intakes over 24 hours—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants scored higher	Participants scored higher/same	Participants scored lower	Participants scored lower
Summary measures				
Total HEI	Basiotis (1999) [national]			

Notes: Cell entries show the senior author's name, the publication date, and the scope of the study (for example, national vs. 3 schools). Where findings pertain only to a specific subgroup rather than the entire study population, the cell entry also identifies the subgroup {in brackets}.

Nonsignificant results are reported in the interest of providing a comprehensive picture of the body of research. As noted in chapter 1, a consistent pattern of nonsignificant findings may indicate a true underlying effect, even though no single study's results would be interpreted in that way. Readers are cautioned to avoid the practice of "vote counting," or adding up all the studies with particular results. Because of differences in research design and other considerations, findings from some studies merit more consideration than others. The text discusses methodological limitations and emphasizes findings from the strongest studies.

Wellisch et al. (1983) also assessed intakes of energy, protein, magnesium, vitamin A, vitamin B_6, niacin, thiamin, iron, and vitamin C. They found no significant effects but did not report point estimates.

Price et al. (1978) also assessed intakes of energy, protein, calcium, phoshorus, iron, vitamin A, thiamin, riboflavin, and niacin. They reported no significant effects, but did not provide point estimates.

and macronutrients, vitamins, minerals, other dietary components, and food group servings. The text follows this general organization, but discusses findings for vitamins and minerals in one section. As in all such tables included in this report, results for each study are reported using the primary author's name. In the interest of providing a comprehensive picture of the body of research, both significant and nonsignificant results are reported in tables 35 and 36 and in all other "findings" tables. As noted in chapter 1, a consistent pattern of nonsignificant findings may indicate a true underlying effect, even though no single study's results would be interpreted in that way. Readers are cautioned, however, to avoid the practice of "vote counting," or adding up all the studies with particular results. Because of differences in research design and other considerations, findings from some studies merit more consideration than others. The text discusses methodological limitations and emphasizes findings from the strongest studies.

In this case, emphasis is given to findings from SNDA-I (Gordon et al., 1995) for the reasons cited previously. Findings from the evaluation of the SBPP (McLaughlin et al., 2002) are considered to provide some insight into potential changes in program impact over time. To provide additional context for these observations, data from the SBPP evaluation are considered in light of data from the SNDA-II study (Fox et al., 2001).

Findings reported for SNDA-I are based on results of regression models that controlled for selection bias using an instrumental variables approach. The models used are analogous to those used in assessing NSLP impacts (see chapter 5). However, Gordon and her colleagues found few substantive differences between results of models that did and did not attempt to control for selection into the SBP and noted that statistical tests rejected the presence of selection bias. They appropriately caveat this comment with the observation that the available identifying variables were not strong predictors of SBP participation. In estimating impacts on 24-hour nutrient intake, models adjusted for self-selection into the NSLP but not the SBP.

Energy and Macronutrients

Most studies completed prior to the implementation of the SMI, including the SNDA-I study (Gordon et al., 1995), found that SBP participants consumed more food energy and protein at breakfast than nonparticipants (table 34) and that this boost persisted over the course of the day (table 35). Of the studies that examined both breakfast and 24-hour intakes, only the Devaney and Fraker (1989) reanalysis of NESNP data found that the SBP increment in food energy was not maintained over 24 hours.

With regard to other macronutrients, SNDA-I found that SBP participants consumed significantly less carbohydrates at breakfast than nonparticipants and, although the differences were not significant, tended to consume more fat and saturated fat, both at breakfast and over 24 hours.

The evaluation of the SBPP (McLaughlin et al., 2002), the only post-SMI study identified, found no significant differences in energy and macronutrient intakes of universal-free breakfast participants and nonparticipants, either at breakfast or over 24 hours. Moreover, the general trend was the reverse of the trend observed in SNDA-I. That is, on average, point estimates for the percentage of calories from fat and saturated fat were lower for universal-free breakfast participants than nonparticipants.

These results imply a change in the nutrient profile of SBP meals over time. The suggested trend—that SBP meals are lower in energy and protein and lower in fat and saturated fat (as a percentage of total energy) than they were at the time the SNDA-I data were collected—is consistent with findings from SNDA-II (Fox et al., 2001). SNDA-II compared the nutrient content of SBP breakfasts offered in 1998-99 with SBP breakfasts offered in 1991-92 (SNDA-I).

Vitamins and Minerals

Among studies completed prior to the SMI, there is a virtual consensus that the SBP increased students' intakes of three minerals—calcium, phosphorus, and magnesium—both at breakfast and, when assessed, over the full day. There is also a consistent finding that the SBP increased riboflavin intake at breakfast, but this effect generally did not persist over the full day. All of these nutrients (calcium, phosphorus, magnesium, and riboflavin) occur in concentrated amounts in milk.

Findings from the Evaluation of the SBPP (McLaughlin et al., 2002) are somewhat consistent with this picture, but suggest that the current impact of school breakfast on mineral intake is smaller than previously estimated and that none of the impacts persist over 24 hours. In the SBPP evaluation, universal-free breakfast participants were found to consume significantly more calcium and phosphorus at breakfast than nonparticipants,

but neither of these differences persisted over 24 hours. Differences for magnesium and riboflavin were not statistically significant for either time point. In addition, the SBPP evaluation estimated *usual* daily (24-hour) intakes and assessed the impact of universal-free breakfast on the likelihood that students had *adequate* intakes. No significant differences were found between students who participated in universal-free breakfast and those who did not.

Data from SNDA-II provide a potential explanation for the apparent change in impact over time. SNDA-II found that SBP breakfasts offered in 1998-99 provided 5-6 percent less calcium than breakfasts offered at the time SNDA-I data were collected, although breakfasts offered at both points in time more than satisfied the program standard of providing one-fourth of children's daily calcium needs (Fox et al., 2001). This pattern was observed for both elementary and secondary schools. SNDA-II did not assess magnesium, phosphorus, or riboflavin content.

Other Dietary Components

SNDA-I (Gordon et al., 1995) found that SBP participants consumed more cholesterol and sodium than nonparticipants (negative trends), both at breakfast and over 24 hours. However, none of the differences were statistically significant.

The SBPP evaluation (McLaughlin et al., 2002) found that universal-free breakfast participants consumed significantly *less* cholesterol than nonparticipants, both at breakfast and over 24 hours. In addition, mean sodium intakes were lower for universal-free breakfast participants; however the difference was not statistically significant. The SBPP evaluation also assessed fiber intake and intake of added sugars. There was no significant difference between universal-free breakfast participants and nonparticipants for either measure.

The apparent shift in program impacts over time implied by the SBPP data is consistent with data from SNDA-II. SNDA-II found that SBP breakfasts offered in 1998-99 were significantly lower in cholesterol and sodium than breakfasts offered in 1991-92 (Fox et al., 2001).

Food Intake

A few researchers have examined SBP impacts on food consumption patterns. SNDA-I researchers (Gordon et al., 1995) examined the percentage of students that consumed one or more foods from specific food groups at breakfast. Simple weighted tabulations were reported and the statistical significance of differences between groups was assessed using bivariate t-tests. McLaughlin et al. (2002) and Gleason and Suitor (2001) computed the number of Food Guide Pyramid servings consumed by each child and assessed differences between groups using multivariate regressions. Both analyses looked at breakfast consumption as well as consumption over 24 hours.

Basiotis and his associates (1999) used data from the 1994-96 CSFII to compare scores for food-based components of the Healthy Eating Index (HEI). These scores are based on comparisons of Food Guide Pyramid servings to age-specific recommendations. The paper presents results of bivariate t-tests but reports that results of multivariate analyses were consistent.

Findings from McLaughlin et al. (2002) provide the strongest suggestive evidence of current SBP impacts. These data indicate that universal-free breakfast participants consumed significantly more servings of fruit and dairy products at breakfast than nonparticipants, and significantly fewer servings of meats and meat substitutes. However, data on 24-hour intakes indicate that all of these effects dissipated over the course of the day.

Impacts on School Performance and Cognitive/Behavioral Outcomes

The most recent (and expanding) focus of the relevant SBP literature considers impacts of eating school breakfast on a variety of cognitive and behavioral outcomes related to school performance. Characteristics of eight studies identified through the literature review are summarized in table 36. (As noted previously, research conducted outside the United States or in controlled environments has not been included in this review.) With one exception (Meyers, 1989), these studies were done to evaluate universal-free breakfast programs rather than the actual SBP. Consequently, findings from these studies provide, at best, suggestive evidence of potential SBP impacts. Because the SBP does not offer breakfasts free of charge to all students, impacts observed in demonstrations of universal-free breakfast cannot be assumed to apply to the regular SBP.

Studies in this group used one of two approaches to defining a comparison group. The approach used most often was to compare schools that offered universal-free breakfast (treatment schools) with matched schools that offered the regular SBP (control schools). The criteria used to match schools and the relative comparability of the schools ultimately selected varied across studies. Some studies used a pre/post design,

Table 36—Studies that examined the impact of universal-free breakfast programs on school performance and behavioral/cognitive outcomes

Study	Outcomes	Data source	Data collection method	Population (sample size)	Design	Measure of participation	Analysis method
Peterson et al. (2003)	Attendance, academic achievement, health, and discipline	455 schools in Minnesota (1998-2002)	School records and standardized test scores	All children for attendance measures; children in grades 3 and 5 for academic measures (n=43,067)	Participant vs. nonparticipant	Enrolled in universal-free SBP school	Logistic regression
McLaughlin et al. (2002)	Cognitive functioning, attendance, tardiness, behavior academic achievement, student health status[1]	70 matched pairs of school units in 6 school districts (1999-2001)[2]	School records and standardized test scores	Children in grades 2-6 (n=4,290)	Randomized experiment	Ate universal-free breakfast on day of measurement (short-term cognitive functioning)[3] Cumulative participation in universal-free breakfast over the year (all other measures)[3]	Multivariate regression with Bloom correction to asses impact on universal-free breakfast participants (subgroup analysis)
Murphy et al. (2001a)	Attendance and academic achievement	48 schools in Baltimore (1995-2000)	School records and standardized test scores	All children in sample schools (n=not stated)	Participants, before vs. after, separate groups, plus participants vs. nonparticipants, before and after	Enrolled in universal-free SBP school	Analysis of variance

See notes at end of table.

Continued—

Table 36—Studies that examined the impact of universal-free breakfast programs on school performance and behavioral/cognitive outcomes—Continued

Study	Outcomes	Data source	Data collection method	Population (sample size)	Design	Measure of participation	Analysis method
Murphy et al. (2001b)	Attendance, tardiness, academic achievement	55 schools in Maryland (1997-2000)	School records and standardized test scores	Varied by outcome for both schools and students	Participants, before vs. after, separate groups, plus participants vs. nonparticipants, before and after	Enrolled in universal-free SBP school	Analysis of variance; bivariate t-tests
Murphy et al. (2000)	Attendance, tardiness, academic achievement, emotional functioning	30 schools in Boston, MA (1998-2000)	School records, standardized test scores, parent and student interviews	All children in sample schools (n=not stated)	Participants, before vs. after	Frequency of eating breakfast during 1 index week	Analysis of variance
Murphy et al. (1998)	Attendance, psychological measures, academic achievement	1 school in Baltimore; 2 schools in Philadelphia (dates not reported)	School records and parent, teacher, and student interviews	Children in grades 3-8 (n=133)[4]	Participants, before vs. after	Frequency of eating breakfast during 1 index week	Logistic regression
Cook et al. (1996)	Attendance, tardiness	All elementary schools in Central Falls, RI, matched with schools in Providence, RI (1994)	School records	Children in grades Pre-K-6 (n=not reported)	Participant vs. nonparticipant	Enrolled in universal-free SBP school	Not well described
Meyers et al. (1989)[5]	Attendance, tardiness, academic achievement	16 schools in Lawrence, MA (1985-87)	School records and standardized test scores	Children in grades 3-6 (n=1,023)	Participant vs. nonparticipant	Ate SBP on 3 of 5 days during 1 selected week during school year	Multivariate regression

[1]The study also examined impacts of BMI and food security and found no effects.

[2]The study focused on students in grades 2-6. For sampling/matching purposes, schools with different grade configurations (e.g., K-2 and 3-5) were considered as one school unit. There were a total of 73 treatment schools and 70 control schools.

[3]The study's main analysis compared outcomes for the entire treatment group with outcomes from the entire control group. Findings discussed in this report, however, are from a separate analysis that estimated impacts based on students' actual participation in universal-free breakfast. Impacts on short-term outcomes were estimated on the basis of participation on the day of measurement and impacts on longer term outcomes were estimated on the basis of cumulative participation over the year.

[4]For school-recorded data (maximum sample). Sample sizes varied for interview data (n=85) and teacher ratings (n=76).

[5]The Meyers et al. study (1989) was not a study of universal-free breakfast. The study compared outcomes in schools that did and did not implement the SBP.

where data collected before the implementation of universal-free breakfast was compared with data collected after implementation.

In this research, impacts were generally measured on the basis of group membership rather than on individual behavior. As discussed in the preceding description of the SBPP evaluation, impact analyses generally compared the *entire* treatment group (students in schools where universal-free breakfast was available) with the *entire* control group (students in schools where the standard SBP was available). This is a much less precise definition of participants and nonparticipants than is used in the research that examined SBP impacts on students' dietary intake and limits the confidence one can place in the findings, relative to potential impacts of the regular SBP.

As noted previously, however, the evaluation of the SBPP included a separate analysis that compared universal-free breakfast participants and nonparticipants on the basis of actual participation in the school breakfast program. For analyses that focused on school-performance outcomes, participation was defined on the basis of either same-day or cumulative participation over the implementation year, depending on the outcome. This more precise definition of universal-free breakfast participation, combined with the randomized design, dictates that considerably more credence be given to results of the SBPP study than to the other studies.

In interpreting these findings, however, it is important to note that (1) breakfast skipping was low in SBP schools; most children ate something for breakfast either at school, home, or elsewhere and (2) findings are based on data from the first year of a 3-year demonstration and may not hold across all 3 years.

Key findings for all studies are summarized in table 37 and are discussed below, by outcome.

Attendance and Tardiness

Attendance and/or tardiness are important school performance outcomes because they may serve as mediators of any effect breakfast consumption may have on learning. If the presence of a breakfast program encourages attendance and/or discourages tardiness, the program may have a positive influence on school performance simply by increasing the amount of time students spend at school.

Five of the seven studies that looked at the effect of universal-free school breakfast on attendance rates reported a significant positive effect. Similarly, all five of the studies that assessed impacts on tardiness found significant reductions in tardiness at universal-free schools. The stronger evaluation of the SBPP, which used a randomized design and estimated impacts based on cumulative program participation over the course of the intervention year, found no significant differences in attendance or tardiness.[107]

Academic Achievement

All of the studies in this group considered the impact of offering universal-free breakfasts on academic achievement. Most studies used standardized test scores to assess impacts, although a few used student grades.

As table 37 clearly illustrates, results of the SBPP evaluation stand in stark contrast to results of most of the other studies. As noted earlier in this chapter, USDA sponsored the evaluation of the SBPP to provide a scientifically sound study of this issue. Virtually all of the other studies in this group are limited to one geographic area (one city or State), most had small sample sizes, and there was no consistency across studies in the measures used to assess achievement. Moreover, all of these studies are subject to problems of selection bias because they used nonexperimental designs. Finally, as Ponza and his colleagues (1999) point out, the analyses used in many of these studies are open to question because they did not adequately control for clustering.

The SBPP evaluation does not suffer from the design and measurement weakness that limit the other studies in this group. As such, it provides definitive data on the impact of universal-free breakfast participation. The SBPP study compared gains in standardized test scores for reading and math for universal-free breakfast participants and nonparticipants (defined on the basis of cumulative annual participation rates), and found no significant differences.

Cognitive Functioning

The SBPP evaluation also examined the impact of same-day participation in universal-free breakfast on three different measures of cognitive functioning: stimulus discrimination, digit span, and verbal fluency. These measures assess students' memory and retrieval skills as well as attentional abilities, and all three were expected to be sensitive to the immediate effects, if

[107] Data on tardiness were not consistently available at the student and/or school level.

Table 37—Findings from studies that examined the impact of universal-free breakfast programs on school performance and behavioral/cognitive outcomes

	Significant impact	No significant impact		Significant impact
Outcome	Participants better	Participants better/same	Participants worse	Participants worse
Attendance	Murphy (2001a) [1 city] Murphy (2000) [1 city] Murphy (1998) [3 schools] Cook (1996) [1 city] Meyers (1989) [1 city]	Murphy (2001b) [1 State]	McLaughlin (2002) [6 districts] Peterson (2003) [1 State]	
Tardiness	Murphy (2001b) [1 State] Murphy (2000) [1 city] Murphy (1998) [3 schools] Cook (1996) [1 city] Meyers (1989) [1 city]	McLaughlin (2002) [6 districts]		
Academic achievement	Murphy (2000) 1 city Murphy (2001a) [1 city] Murphy (2001b) [1 State] {school-wide scores} Murphy (1998) [3 schools] Meyers (1989) [1 city]	Peterson (2003) [1 State] {3rd grade math; 5th grade math, reading, writing} Murphy (2001b) [1 State] {individual data}	McLaughlin (2002) [6 districts]	Peterson (2003) [1 State] {3rd grade reading}
Behavior/ emotional functionality	Murphy (2001b) [1 State] {suspensions} Murphy (2000) [1 city] Murphy (1998) [3 schools]	Murphy (2001b) [1 State] {office referrals}	McLaughlin (2002) [6 districts] {other scales} McLaughlin (2002) [6 districts] {ability to focus and follow instructions}	McLaughlin (2002) [6 districts] {teacher-rated oppositional scale}
Nurse referrals/reported health status		McLaughlin (2002) [6 districts] Murphy (2001b) [1 State]		

Notes: Cell entries show the senior author's name, the publication date, and the scope of the study (for example, national vs. 3 schools). Where findings pertain only to a specific subgroup rather than the entire study population, the cell entry also identifies the subgroup {in brackets}.

Nonsignificant results are reported in the interest of providing a comprehensive picture of the body of research. As noted in Chapter 1, a consistent pattern of nonsignificant findings may indicate a true underlying effect, even though no single study's results would be interpreted in that way. Readers are cautioned to avoid the practice of "vote counting," or adding up all the studies with particular results. Because of differences in research design and other considerations, findings from some studies merit more consideration than others. The text discusses methodological limitations and emphasizes findings from the strongest studies.

McLaughlin et al. (2002) also assessed impacts on short-term cognitive functioning and food security and found no significant effects.

any, of breakfast consumption. The analysis revealed only very minor differences between groups, and none of the differences was statistically significant.

Other Outcomes

Studies of universal-free school breakfast have also examined measures of student behavior and health. The evaluation of the SBPP found a significant and negative effect of universal-free breakfast participation (defined on the basis of cumulative participation rates over the demonstration year) on teacher-rated behavioral opposition, but no effects on a variety of other behavioral measures.

The evaluation of the SBPP also examined impacts of universal-free breakfast participation on student health status, Body Mass Index (BMI) (a measure of weight status), and food security status. No significant effects were reported.

Summary

The available research suggests that low-income students are more likely to consume a substantial breakfast when the SBP is available to them. Pre-SMI research indicated that SBP participants had significantly higher intakes of nutrients provided by milk (calcium, phosphorus, magnesium, and riboflavin) at breakfast and/or over 24 hours. There was also strong evidence that SBP participants consumed significantly more food energy and protein at breakfast than nonparticipants, as well as less carbohydrates. In addition, although differences were not statistically significant, mean intakes of fat and saturated fat, as a percentage of total energy intake, as well as intakes of cholesterol and sodium, were greater for SBP participants than nonparticipants. Data from the post-SMI SBPP evaluation suggest that, currently, there are few significant differences in the nutritional quality of breakfasts consumed by SBP participants and those consumed by nonparticipants, and that differences that are observed dissipate over the course of the day. While not definitive, the patterns observed in the SBPP data are consistent with the most recent national study of the nutritional characteristics of SBP meals (SNDA-II).

Although data from the SBPP and SNDA-II studies are useful, the true impact of the post-SMI SBP on students' dietary intakes is unknown. As discussed in detail in chapter 5, there is a critical need for an updated study of both the NSLP and the SBP and the programs' impacts on children.

Data from several State and local studies of universal-free school breakfast demonstrations reported that the availability of a universal-free breakfast program had a positive impact on attendance, tardiness, academic achievement, and/or related outcomes. However, the methodologically superior evaluation of the SBPP found no such effects. The only significant impact reported in the first-year report of the SBPP evaluation was an increase in oppositional behavior among long-term participants in unversal free breakfast. The project's final report, expected in 2004, will confirm whether these results held over all 3 years of the demonstration.

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