Chapter 3

Food Stamp Program

The Food Stamp Program (FSP) stands at the intersection of two sets of Federal programs: those for whom the primary goal is improving access to adequate nutrition and those for whom it is income maintenance. The FSP is particularly important because of its universality; it is an entitlement program with eligibility requirements based almost solely on financial need, while the other major food and nutrition assistance programs (FANPs) are targeted toward certain types of individuals or households. Food stamp benefits are distributed as electronic transfers with an explicit cash value, which can be used only to purchase food for home consumption.

The FSP is the cornerstone of the Nation's nutrition safety net. In FY 2002, the total Federal expenditure for the FSP was $20.7 billion, or about 54 percent of the $38 billion Federal expenditure for FANPs. The program served more than 19 million participants per month (U.S. Department of Agriculture (USDA), Food and Nutrition Service (FNS), 2003a).

Program Overview

The goal of the FSP is to "safeguard the health and well-being of the Nation's population by raising the level of nutrition among low-income individuals." To achieve this objective, the FSP provides electronic benefits that can be used at most retail grocery stores.[18]

The FSP began as a small pilot program in 1961.[19] The program expanded during the 1960s and early 1970s, finally reaching nationwide coverage in 1975. The FSP specifies the household rather than any individual living in the household as the program participant. A household includes all people living together in a dwelling who normally purchase food and prepare meals as a unit. Eligibility is based on the pooled income, resources, and expenditures of all members of the household. Elderly and disabled individuals who cannot prepare and purchase food because of a substantial disability may apply as a separate household, as long as the pooled income of the remainder of the household is less than 165 percent of poverty. Monthly benefit levels increase with the number of people in the household but not at a flat rate per person.

Program Eligibility

To be eligible for the FSP, a household must meet certain financial, work-related, and categorical requirements. Financial requirements include a *gross income limit* of 130 percent of poverty, a *net income limit* (gross income less allowable deductions) of 100 percent of poverty, and a *countable assets limit* of $2,000. Households with elderly or disabled members are not subject to the gross income limit, are eligible for deductions for medical expenses and increased deductions for shelter costs, and have a countable assets limit of $3,000. Households in which all members receive Temporary Assistance for Needy Families (TANF), Supplemental Security Income (SSI), or general assistance are exempt from both income and asset tests.

Work-related eligibility conditions require certain household members to register for work, accept suitable job offers, and comply with State welfare agency work or training programs. Finally, a few groups are categorically ineligible for the FSP, including strikers, most people who are not citizens or permanent residents, postsecondary students, and people living in institutional settings.

Program Participation

Because the FSP is available to most people who meet income and resource standards, the households that participate in the program are quite diverse and represent a broad spectrum of the needy population (Rosso, 2003). In FY 2001, almost all FSP participants lived in poverty. The gross monthly income of 89 percent of FSP households was less than or equal to 100 percent of the poverty guideline. More than half of all FSP households had incomes that were less than or equal to 75 percent of the poverty guideline, and one-third had incomes that were less than or equal to 50 percent of the poverty guideline (Rosso, 2003).

Administrative data for FY 2001 (Rosso, 2003; Tuttle, 2002) indicated that the vast majority (88 percent) of FSP households included either a child, an elderly person (60 or older), or a disabled person. More than half

[18]FSP benefits can be used only to purchase food or seeds and plants used to produce food.

[19]An earlier version of the FSP, which distributed surplus commodities to needy families, came to an end in 1943. For a detailed description of the program and its history, see, for example, Ohls and Beebout (1993).

(54 percent) of all FSP households had children. Of these, more than two-thirds (67 percent) were single-parent households. Twenty percent of FSP households included one or more elderly individuals. The majority (80 percent) of these households were elderly individuals living alone. More than a quarter (28 percent) of all FSP households included a disabled individual, and 58 percent of these households were disabled people living alone. Overall, 51 percent of all FSP participants in FY 2001 were children, 10 percent were elderly, and 13 percent were disabled.

Participation in the FSP has changed dramatically in recent years. The number of participants increased by about 47 percent between 1989 and 1994 (from 18.9 million in 1989 to a record high of 28.0 million in March 1994) (Tuttle, 2002). After that, participation declined steadily through 2000. Between 1994 and 2000, the number of individuals participating in the FSP decreased from 28.0 million to 16.9 million, or by 40 percent (Tuttle, 2002). Between 2000 and 2001, participation increased for the first time in 6 years, by approximately 1 million people, or 6 percent.

A number of investigators have studied the shifts in FSP participation, particularly the unprecedented decline in the mid- to late 1990s. (See, for example, USDA/FNS, 2001; Jacobsen et al., 2001; Figlio et al., 2000; Wilde et al., 2000a, 2000b; Wallace and Blank, 1999.) There is strong evidence that economic conditions played a role in the shifts seen in FSP participation levels over the past 10 to 15 years. The dramatic increase in participation in the early 1990s went hand-in-hand with a declining economy (Tuttle, 2002). Similarly, the drop in participation between 1994 and 2000 was consistent with an improving economy. The recent upswing in participation may be associated with the latest economic downturn.

The relationship between FSP participation and economic indicators does not tell the whole story, however. FSP participation and unemployment rates diverge at some points in time, indicating that factors other than the economy have been in play (Wilde, 2001). Key changes in program policies and regulations may also have contributed to fluctuating FSP rolls, although it is generally believed that the impact of program policies is substantially less than that of economic conditions. The most notable policy changes in recent years include reforms enacted in 1996 as part of the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA). These changes restricted program participation for resident aliens and other subgroups and placed strict limits on participation for "able-bodied adults without dependents" (ABAWDs). (Eligibility restrictions for some resident aliens and several other groups were rescinded in 1998.) Since the PRWORA reforms, participation in the Aid to Families With Dependent Children (AFDC)/TANF programs has decreased dramatically, and such families are accounting for a decreasing share of all FSP households.[20] Between 1995 and 2001, TANF-recipient households fell from 38 percent to 26 percent of all FSP households (Rosso, 2003).

While economic factors and program policies explain a substantial portion of the decline in FSP participation, other factors clearly were also involved. From the mid- to late 1990s, FSP participation declined not only because fewer individuals were eligible, but also because of a noteworthy drop in the percentage of eligible individuals who actually elected to participate. Indeed, the rate of FSP participation among income-eligible people declined from 75 percent in 1994 to 58 percent in 1999 (Cunnyngham, 2002). Factors that may have contributed to this decline include confusion about eligibility, erroneous termination of FSP benefits when TANF cases terminated, effects of TANF diversion programs on the FSP application process, and shortening of FSP certification periods (Kornfeld, 2002). In 2000, FSP participation rates increased slightly for the first time in 5 years, from 58 to 59 percent (Cunnyngham, 2002).

Program Benefits

Food stamp benefits per household are determined by a schedule of maximum benefits per household size. Individual households receive the maximum benefit less 30 percent of the household's net income (households are expected to set aside 30 percent of their non-food stamp disposable income for food). Benefit levels are based on the Thrifty Food Plan, an estimate of what it costs for a household of a given size to purchase the foods required for a nutritious diet. USDA annually determines the cost of the Thrifty Food Plan. Maximum monthly food stamp allotments for FY 2003, before deductions, are shown in table 7.

A key feature of the program before 1979 was the *purchase requirement*. The benefit allotment for households of a given size had a fixed value. Participating households paid cash for their allotment, with the payment amount depending on household income. The

[20]Under PRWORA, the AFDC program was replaced by TANF.

difference between the amount paid and the value of food stamps received was termed the "bonus." The purchase requirement was eliminated in 1979. Subsequently, eligible households simply received what had previously been the bonus amount of coupons.

The FSP originally issued benefits in the form of paper coupons of various denominations. Recipients redeemed these coupons for food at authorized stores. After a series of demonstration projects, FNS authorized States to use electronic benefits transfer (EBT) systems in place of paper coupons. In an EBT system, the recipient receives a credit on a computerized account for the amount of the monthly benefit. To make a purchase, the recipient presents an EBT card and enters a personal identification number (PIN) on a point-of-sale (POS) terminal. The terminal verifies the amount of benefits available, debits the amount of the purchase from the recipient's balance, and records a credit for the retailer. The retailer receives daily an electronic bank deposit for the net amount of FSP redemptions.

Nearly all States use online EBT systems, in which the POS terminal communicates with a central computer to obtain authorization for each transaction. These online EBT systems use the same technology, and often the same POS equipment, as commercial debit and credit payment systems. Ohio and Wyoming use offline EBT systems, in which a computer chip on the card maintains the recipient's balance and authorizes the transaction.

PRWORA mandated that all FSP benefits be distributed via electronic transfers. The nationwide changeover from coupons to EBT was completed in June 2004 (USDA, 2004).

Table 7—Maximum monthly food stamp benefits before deductions, FY 2003

Number in household	Maximum monthly benefit
	Dollars
1	141
2	259
3	371
4	471
5	560
6	672
7	743
8	849
Each additional person	+106

Nutrition Education

Nutrition education is a relatively recent, though increasing, emphasis in the FSP. In FY 1998, FNS made a "renewed commitment to nutrition education" in the FSP (and all FANPs) and established a special staff within the agency to "refocus efforts toward nutrition and nutrition education" (USDA/FNS, 2003b). The focus on nutrition education as an adjunct to the economic benefits provided by the FSP reflects an important shift in the overarching mission and objectives of the program. As stated in FNS's strategic plan for 2000-05, there is a "growing awareness that making sure people have enough food is not enough; people must have the knowledge and motivation to make food choices that promote health and prevent disease" (USDA/FNS, 2000).

This growing awareness is based on accumulated scientific evidence that dietary patterns are associated with 4 of the 10 leading causes of death—coronary heart disease, certain types of cancer, stroke, and diabetes—and with the development of obesity and hypertension (both of which contribute to these and other chronic diseases) (Frazao, 1999). In addition, diet plays an important role in several other health conditions, including osteoporosis, iron-deficiency anemia, and neural-tube birth defects. Most important, low-income individuals, the target population for the FANPs, are at increased risk of developing many of these health problems (U.S. Department of Health and Human Services (HHS), 2000).

The goal of food stamp nutrition education is to promote healthy food choices and active lifestyles among FSP participants. Four core elements have been defined for nutrition education efforts: dietary quality, food security, food safety, and shopping behavior/food resource management. Although nutrition education is still a very small part of the overall program (less than 1 percent of total program expenditures in FY 2002), efforts in this area have increased substantially in the past decade. In FY 1992, only five States applied for and received optional funding for nutrition education activities in the FSP, and the Federal share of the expenditure for these activities was $661,000. In FY 2002, 48 States had approved nutrition education plans, and Federal expenditures for FSP nutrition education exceeded $174 million (USDA/FNS, 2003b). Most of this increase occurred after FY 1998, when FNS made a

renewed commitment to nutrition education in the FSP. Virtually all of the research discussed in this chapter was conducted before the increased, and still growing, focus on nutrition education in the FSP.

Recent Legislative Changes

The FSP has been legislatively revised several times since its inception, but the basic nature of the benefit and the eligible population have remained relatively stable. As mentioned, the PRWORA legislation of 1996 placed a time limit on benefits for ABAWDs. ABAWDS can receive benefits for only 3 months in a 36-month period unless they are working or are participating in certain types of qualified work experience or workforce programs. States can get approval to exempt ABAWDs from work requirements in designated geographic areas, however, and the legislation provides for other types of exemptions. In addition, PRWORA made most legal immigrants ineligible for the FSP, but such households accounted for only a small percentage of all recipients, and later legislation in 1998 restored benefits to many of them. Other changes include the introduction and expansion of employment-related requirements for various types of households and the replacement of food stamp coupons with electronic benefit transfers.

More recently, the Food Stamp Reauthorization Act of 2002 included several provisions to improve access to the FSP and simplify program administration. The 2002 Act removed the prohibition on benefits for several categories of legally resident aliens, including children, elderly or disabled people, and others legally residing for 5 years. To make benefits more responsive to household circumstances, the 2002 Act modified the standard deduction applied to income when determining benefits, so that the deduction is scaled to family size and indexed to inflation. The 2002 Act also authorized a transitional benefit alternative (TBA) for households leaving TANF and wider use of semiannual income reporting. Several provisions of the act give States more flexibility and encourage efforts to promote FSP access. Most notably, the act lowered the standards for benefit accuracy, replacing the system of enhanced matching tied to payment accuracy with bonuses for a broader range of performance objectives. Finally, the 2002 Act repealed the requirement of PRWORA that EBT systems be cost-neutral (that is, no more expensive than the inflation-adjusted cost of paper coupon issuance).

Assessing Impacts of the Food Stamp Program

FSP benefits are expected to directly affect household *food expenditures*. By increasing food expenditures, the FSP is expected to increase the *nutrients available to participating households*, and therefore the *nutrient intake of individuals in those households*. Through this path, the FSP may improve other nutrition and health outcomes, such as *food security*, *birthweight*, and *iron status*.

This chapter summarizes existing research on the impact of the FSP in each of these areas. Three basic approaches have been used to assess FSP impacts on nutrition- and health-related outcomes:

- Participant vs. nonparticipant designs that compare mean outcomes.
- Dose-response analysis of the effect of the FSP per dollar of benefits.
- Cashout demonstrations that estimate the impact of a single component of the FSP (the use of coupons) to obtain lower-bound estimates of impacts.

As described in chapter 2, dose-response analysis is a variant of the "classic" participant vs. nonparticipant design. Each of these research approaches, and their relative strengths and weaknesses, is now discussed.

Participant vs. Nonparticipant Comparisons

Several studies have estimated impacts of the FSP by comparing outcomes for FSP participants and nonparticipants. These studies generally (but not always) compared FSP participants and FSP-eligible nonparticipants, so that the comparison was limited to people with similar incomes. The comparison is done with multivariate analysis to control for the characteristics of FSP participants and nonparticipants. An indicator of FSP participation captures the direct impact of the FSP—that is, the difference in outcomes between FSP participants and nonparticipants that is unexplained by other characteristics.

Comparisons between FSP participants and income-eligible nonparticipants yield direct estimates of the impacts of the FSP. As discussed in chapter 1, however, such estimates are subject to selection-bias problems because unmeasured characteristics of FSP participants may be correlated with both FSP participation and the outcomes of interest. For example, households

choosing to participate in the FSP may give food expenditures higher priority (compared with households choosing not to participate) even in the absence of the program. In this case, participant vs. nonparticipant comparisons would overstate the impact of the FSP, attributing higher food expenditures to FSP participation when, in fact, households participating in FSP have higher food expenditures even in the absence of the program. Conversely, participant vs. nonparticipant comparisons could understate the impact of the FSP if FSP households are especially needy in unmeasured ways that are unrelated to food (for example, high medical expenses). Such households, in the absence of the FSP, would spend less on food than otherwise-similar nonparticipant households.

Several studies, including most of the more recent ones, have used econometric techniques to attempt to control for selection bias in estimating program impacts. The standard approach is to identify and control for variables (instruments) that affect FSP participation but do not affect the outcomes of interest. However, most FSP studies rely on national survey data that have a limited number of potentially useful variables. Moreover, these methods provide no guarantee that bias has actually been eliminated, and few valid instruments have been identified in the literature.

Dose-Response Analysis

A key feature of the FSP is that the benefit varies across participating households according to estimated need (based on the cost of the Thrifty Food Plan for a given household size and income, minus various exclusions and deductions). The benefit received by a household can be as little as $10 or, in FY 2002 for an eight-person household, as much as $838. Benefits can vary among households of the same size because of differences in total income, in whether income is earned or unearned, and in deductions for housing, child care, and medical expenses.

Several researchers have taken advantage of the variation in FSP benefit amounts and used dose-response analysis to identify the marginal impact of FSP benefits. Dose-response studies generally estimate the impact of the FSP based on variations in benefits and impacts among participants only, ignoring nonparticipants entirely. The overall impact of the FSP is estimated as the impact *per dollar* of FSP benefits multiplied by the average FSP benefit. This approach arguably removes a major source of selection bias because the implicit comparison group is households that have chosen to participate in the FSP but are receiving zero benefits, rather than nonparticipants. Alternatively, nonparticipants may be included in the analysis (with zero benefits). In this case, the coefficient on the FSP participation indicator, if included in the model, indicates the presence of selection bias.[21]

Dose-response analysis is not, however, a panacea. First, functional form is crucial. Because no FSP participants actually receive zero benefits, this approach relies on the researcher's ability to extrapolate the relationship from very low observed benefit levels down to zero. As will be seen later in this chapter, alternative functional form assumptions can lead to different estimates of FSP impacts.

Second, some selection bias may remain because those households that choose to participate when the "dose" is low—that is, households that receive only a small FSP benefit—may be unlike households that participate in order to receive a large benefit. This difference seems a less serious matter, however, than the potential differences between participants and nonparticipants.

Similarly, unmeasured household characteristics likely affect both the FSP benefit and food expenditures (as well as other outcomes). When households that have the same measured characteristics but different FSP benefits are compared, one is tempted to think of the comparison as an experiment in which Household A, which is essentially similar to Household B, receives more food stamps and spends some amount more on food as a consequence. However, if the reason Household A is getting more food stamps than Household B is that Household A is receiving an excess shelter cost deduction while Household B is living in a rent-free situation, one cannot expect outcomes absent the FSP to be the same for both households.

Despite these caveats, dose-response analysis holds promise for assessing the impact of the FSP. While this approach is not as strong as randomly assigning FSP benefits to households, dose-response analysis is stronger than participant vs. nonparticipant comparisons because it is less subject to (although not free from) selection-bias problems.

[21]Selection bias may be said to occur if the expected value of the outcome absent the FSP, conditional on the other variables in the model, is different for FSP participants than for nonparticipants. Omitting an indicator of FSP participation from the specification when it should be present (i.e., when outcomes would be different even in the absence of the program) subjects the coefficient on the FSP benefit amount to an omitted-variables bias that is proportional to the true coefficient on FSP participation.

Cashout Demonstrations

The FSP provides to eligible households monthly cash value benefits, which can be spent only for food. In the cashout demonstrations, participating households were given checks rather than food stamp coupons, eliminating the restriction that benefits can be spent only for food. Impacts of cashout can be interpreted as lower-bound estimates of the FSP impact, corresponding to the effects of just one program component—namely, the earmarking of benefits.[22]

Lower-bound estimates would not be particularly useful, given the many available estimates of the impacts of the FSP as a whole, except that two of the cashout demonstrations were randomized experiments. If these studies find that coupon recipients spend significantly more on food than cash-benefit recipients, the conclusion (without fear of selection bias) is that the FSP does affect food expenditures. Moreover, if the measured difference is, say, $0.20 per dollar of benefits, the conclusion is that the effect of food stamp coupons on household food expenditures is *at least* $0.20 on the dollar—and, in fact, that it is at least $0.20 more on the dollar than the presumably positive effect on food expenditures of ordinary income. Similarly, the effect of cashout on household nutrient availability, as measured in the two randomized experiments, may represent the effect of the FSP in general.

Food Expenditures

The FSP is virtually certain to result in increased food purchases, if for no other reason than that the program increases participating households' incomes and the income elasticity for food is positive. That is, increasing a household's income by $1,000 per year would always be expected to increase its food expenditures by some fraction of that amount.

Economists have debated whether giving households coupons that must be spent on food consumed at home is more effective at increasing food expenditures than simply giving them a non-earmarked income supplement. (See, for example, Southworth, 1945; Senauer and Young, 1986; Moffitt, 1989.) A simple theory of rational behavior implies that coupons should have the same effect as cash because households can use the coupons to free up the money they would otherwise have spent on groceries. Nonetheless, a substantial body of evidence shows that coupons are more effective than cash in increasing food expenditures. This idea is often expressed in terms of the *marginal propensity to spend on food*, or MPS_F.[23] This quantity represents the increase in food expenditures per dollar increase in income. The MPS_F has been found to vary between different types of income, being higher for food stamps than for other sources. Explanations for this difference are as follows:

- For some households, the amount of the benefit is greater than desired food expenditures. These households are "constrained" because they are unable to spend food stamp benefits on nonfood items, MPS_F=1.
- In multiple-adult households, food stamps are under the control of the "food manager" in the household, while a cash benefit can be co-opted by other adults to purchase other items.[24]
- When food stamp benefits are received as a lump sum at the beginning of the month, the household has many urgent and competing needs. The food stamps can be used only for food, and so are promptly spent for food.[25] An equivalent cash benefit received at the beginning of the month, in contrast, might be spent in part on other things, such as health insurance or rent. As the month proceeds, the household cannot go without food altogether, so more non-food-stamp income is allocated for this purpose, even though the household spent heavily on food at the beginning of the month.
- Because food stamps are a steady and reliable income source for low-income households, they are treated as "permanent income."[26] Hence, they have more power

[22]The households still may have treated these benefits as lightly earmarked because they were formally identified as a food assistance benefit. If so, the cashout impacts are an even lower underestimate of the total impact of the FSP.

[23]Some authors use the notation MPC_F (marginal propensity to consume food). This refers not to the consuming (or eating) of food, but to households allocating their income to *consumption goods* of various kinds instead of to savings. To avoid any confusion, the MPS_F notation is used here.

[24]This explanation was tested using data from the San Diego cashout experiment by comparing impacts between one- and multiple-adult households (Breunig et al., 2001). The "food manager" hypothesis would suggest that cashout would reduce food expenditures by a greater amount in multiple-adult households, which was indeed found to be the case. The authors remark that although the household as a whole is unconstrained in its food expenditures, one of the adults may be constrained if he or she does not spend anything on food. Giving the household cash instead of food stamps leads to the constrained adult's controlling a greater fraction of the household's resources.

[25]A study in Reading, PA, found that food stamp recipients using electronic benefits transfers spent 19 percent of their monthly benefits on the day of issuance and 70 percent within the first week (Bartlett and Hart, 1987). Quite similarly, a more recent study in Maryland found that recipients spent 23 percent of their benefits on the day of disbursement and 71 percent within the first week (Cole, 1997).

[26]Permanent income refers to normal or expected income over a long period of time. Current income is the sum of permanent income and (positive or negative) transitory income (see Friedman, 1957).

to affect routine and nonpostponable expenditures like food than do income sources that fluctuate greatly.

- Finally, the psychological effect of earmarked benefits cannot be ignored. It seems to be human nature not to treat food stamps in the same way as cash. When constrained to spend a certain minimum amount on food, even if the constraint is not binding, households evidently end up allocating more of their budget to food.[27]

Research Overview

Since the mid-1970s, dozens of researchers have investigated the impact of the FSP on household food expenditures. The literature search identified 32 such studies completed since 1973. Key characteristics of these studies are summarized in table 8. Studies have been classified by the three alternative research approaches discussed above: participant vs. nonparticipant comparisons (Group I), dose-response estimates of the MPS_F (Group II), and cashout demonstrations (Group III). Participant vs. nonparticipant and dose-response studies are further subdivided by data source (national survey data or State and local studies). Cashout studies are separated on the basis of design (randomized experiment ("pure" cashout) or quasi-experiment).

Of the 32 studies, 7 used participant vs. nonparticipant comparisons to estimate the impact of the FSP on household food expenditures, 20 used dose-response analyses to estimate the marginal impact of FSP benefits, and 5 estimated impacts of food stamp cashout.[28] In addition to varying in the basic research approach, these studies varied with respect to data source, definition and measurement of food expenditures, and model specification. With just a few exceptions (Kisker and Devaney, 1988; Lane, 1978), researchers used some form of multivariate modeling in their analysis.

Five of the seven participant vs. nonparticipant studies are based on secondary analyses of data collected in national surveys, including the Nationwide Food Consumption Survey (NFCS) and the Bureau of Labor Statistics' Consumer Expenditure Survey (BLS-CES). The other two studies that used participant vs. nonparticipant comparisons are based on State and local data. Fifteen of the 20 dose-response studies used national survey data and 5 used State and local data. Finally, two of the five studies of food stamp cashout are based on cashout demonstrations that used experimental designs (in Alabama and San Diego) and three are based on demonstrations that used quasi-experimental designs (in Washington State, Alabama, and Puerto Rico).

Most studies of the impact of the FSP on food expenditures measured household food expenditures as expenditures for foods used at home, although some studies also examined impacts on total food expenditures (food used at home and away from home). Food stamp benefits can be applied only toward food used at home, but several authors who examined both measures concluded that FSP participation induces households to substitute food at home for food away from home.

Some studies defined food expenditures as food purchases during a specified period, while others also included the value of nonpurchased food. A small number of studies measured food expenditures as food actually used during a particular period.

The bulk of the impact estimates are derived from models of the form:

$$FOOD\_EXP = b_0 + b_1\ FSP + b_2\ BENEFIT + b_3\ OTHER\ INC + b_4\ X + u$$

Where:

FOOD_EXP is household expenditure on food;

FSP is an indicator of participation in the Food Stamp Program;

BENEFIT is the size of the food stamp benefit (zero for nonparticipants);

OTHER INC is the amount of other income available to the household; and

X is a vector of household characteristics.

Three main variations on this model have been used: Models may include FSP, BENEFIT, or both. Four of the seven participant vs. nonparticipant studies estimated models with FSP but not BENEFIT, and three of these studies included both FSP and BENEFIT. Half

[27]A classic example of the effect of earmarking is the difference in behavior between a person who loses a $40 concert ticket and a person who loses $40 en route to buying a concert ticket. The loss of the ticket (earmarked) is much more likely to result in the person's forgoing the concert than is the loss of the money. (This example is taken from Amos Tversky, a cognitive psychologist who studied human-choice behavior and the limits of the rational choice model.) Similarly, a recipient whose food stamp benefit is cut by $40 is likely to curtail food expenditures more than one whose cash assistance is curtailed by $40.

[28]Three of the studies in Group I also include dose-response estimates. These studies have not been double-counted as part of the 20.

Table 8—Studies that examined the impact of the Food Stamp Program on household food expenditures

Study	Data source[1]	Measure of expenditures[2]	Population (sample size)	Design	Measure of participation	Analysis method
Group IA: Participant vs. nonparticipant comparisons—Secondary analysis of national surveys						
Hama and Chern (1988)	1977-78 NFCS elderly supplement	At-home Nonpurchased food included Per person per week	FSP-eligible households with elderly members (n=1,454)	Participant vs. nonparticipant	Participation dummy	Simultaneous food expenditure/nutrient availability equation[3]
Kisker and Devaney (1988)	1979-80 NFCS-LI	At-home Nonpurchased food included Per ENU per week	FSP-eligible households (n~2,900)	Participant vs. nonparticipant	Participation dummy	Bivariate t-tests
Basiotis et al. (1983)	1977-78 NFCS-LI	At-home Nonpurchased food included Per household per week	FSP-eligible households (n=3,562)	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Price (1983)	1973-74 BLS-CES	At-home Purchased food only Per equivalent adult per week	All households (n=10,359)	Participant vs. nonparticipant; also dose-response	Participation dummy; benefit amount	Multivariate regression
Salathe (1980)	1973-74 BLS-CES	At-home, away, total Purchased food only Per person per week	FSP-eligible households (n=2,254)	Participant vs. nonparticipant; also dose-response	Participation dummy; benefit amount	Multivariate regression
Group IB: Participant vs. nonparticipant comparisons—State and local studies						
Lane (1978)	Kern County, CA (1972-73)	At-home Nonpurchased food included Per person per month	FSP-eligible households (n=329)	Participant vs. nonparticipant	Participation dummy	Bivariate comparisons based on proportion of income spent on food
West et al. (1978)	Washington State (1972-73)	At-home Nonpurchased food included Per equivalent adult per month	FSP-eligible households with child age 8-12 (n=332)	Participant vs. nonparticipant; also dose-response[4]	Participation dummy; bonus amount	Weighted multivariate regression

See notes at end of table.

Continued—

Table 8—Studies that examined the impact of the Food Stamp Program on household food expenditures—Continued

Study	Data source[1]	Measure of expenditures[2]	Population (sample size)	Design	Measure of participation	Analysis method
Group II A: Dose-response estimates—Secondary analysis of national surveys						
Kramer-LeBlanc et al. (1997)	1989-91 CSFII	At-home, total Purchased food only Per household per week	FSP participant households (n=790)	Dose-response	Benefit amount	Multivariate regression
Levedahl (1991)	1979-80 NFCS-LI	At-home, total Purchased food only	FSP participants who used all their food stamps (n=1,210)	Dose-response	Bonus value	Multivariate regression
Fraker et al. (1990)	1985 CSFII	Expenditures on food during previous 2 months	FSP- and WIC-eligible households (n=515)	Dose-response	Participation dummy; benefit amount	Multivariate regression
Devaney and Fraker (1989)	1977-78 NFCS-LI	Aided recall of food used in last 7 days	FSP-eligible households (n=4,473)	Dose-response	Participation dummy; bonus value	Multivariate regression
Basiotis et al. (1987)	1977-78 NFCS-LI	At-home Nonpurchased food included Per household per week	FSP-eligible households (n~3,000)	Dose-response	Participation dummy; bonus value	Simultaneous equations for food cost/nutrient availability/nutrient intake relationship
Senauer and Young (1986)	1978 PSID	At-home Purchased food only Per household per month	FSP participant households (n=573)	Dose-response	Bonus value	Multivariate regression
Smallwood and Blaylock (1985)	1977-78 NFSC-LI	At-home Purchased food only Per person per week	FSP-eligible households (n=3,582)	Dose-response	Participation dummy; expected weekly bonus value	2-equation selection-bias model
West (1984)	1973-74 BLS-CES	At-home, away, total Purchased food only Per equivalent adult per week	FSP-eligible households (n=2,407)	Dose-response	Participation dummy; bonus value	Multivariate regression
Allen and Gadson (1983)	1977-78 NFCS-LI	At home, away, total Purchased food only Per household per week	FSP-eligible households (n=3,850)	Dose-response	Bonus value	Multivariate regression
Chen (1983)	1977-78 NFCS-LI	Aided recall of food used in last 7 days	FSP participant households (n=1,809)	Dose-response	Participation dummy; bonus value	Multivariate regression

See notes at end of table.

Continued—

Table 8—Studies that examined the impact of the Food Stamp Program on household food expenditures—Continued

Study	Data source[1]	Measure of expenditures[2]	Population (sample size)	Design	Measure of participation	Analysis method
Brown et al. (1982)	1977-78 NFCS-LI	Aided recall of food used in last 7 days	FSP participant households (n=911)	Dose-response	Bonus value	Multivariate regression
Chavas and Yeung (1982)	1972-73 BLS-CES	At-home Purchased food only Per household per week	FSP-eligible households, southern region (n=659)	Dose-response	Bonus value	Seemingly unrelated regression model, interactions between bonus value and demographic variables[5]
Johnson et al. (1981)	1977-78 NFCS-LI	At-home Nonpurchased food included Per household per week	Low-income households (n=4,535)	Dose-response	Participation dummy; bonus value	Multivariate regression
Benus et al. (1976)	1968-72 PSID	Annual expenditures for food used at home	All households (n~3,300)	Dose-response	Participation dummy; bonus value	Dynamic adjustment model
Hymans and Shapiro (1976)	1968-72 PSID	Annual expenditures for food used at home	All households (n~3,300)	Dose-response	Participation dummy; bonus value	Multivariate regression
Group IIB: Dose-response estimates—State and local studies						
Breunig et al. (2001)	San Diego cashout demonstration (1990)	At-home Purchased food only Per person per month	FSP participant households receiving coupons (n=487)	Dose-response	Benefit amount	Multivariate regression
Levedahl (1995)	San Diego cashout demonstration (1990)	At-home Purchased food only Per person per month	FSP participant households receiving coupons (n=494)	Dose-response	Benefit amount	Multivariate regression
Ranney and Kushman (1987)	Counties and county groups in California, Indiana, Ohio, Virginia (1979-89)	At-home Nonpurchased food included	FSP-eligible households (n=896)	Dose-response	Participation dummy; bonus value	Multivariate regression
Neenan and Davis (1977)	Polk County, FL (1976)	At-home Purchased food only Per household per month	FSP participant households (n=123)	Dose-response	Participation dummy	Multivariate regression

See notes at end of table.

Continued—

Table 8—Studies that examined the impact of the Food Stamp Program on household food expenditures—Continued

Study	Data source[1]	Measure of expenditures[2]	Population (sample size)	Design	Measure of participation	Analysis method
West and Price (1976)	Washington State (1972-73)	At-home Nonpurchased food included Per equivalent adult per month	Households with children ages 8-12[6] (n=995)	Dose-response	Bonus value	Multivariate regression
Group IIIA: Cashout demonstrations—Experimental design						
Fraker et al. (1992)	Alabama cashout demonstration (1990)	At-home, away, total Purchased food only and nonpurchased food included Per household, ENU, and AME per month	FSP participants (n=2,386)	Random assignment of participants to check or coupon	Group membership dummy; benefit amount	Multivariate regression
Ohls et al. (1992)	San Diego cashout demonstration (1990)	At-home, away, total Purchased food only and nonpurchased food included Per household, ENU, and AME per month	FSP participants (n=1,143)	Random assignment of participants to check or coupon	Group membership dummy; benefit amount	Multivariate regression
Group IIIB: Cashout demonstrations—Nonexperimental design						
Cohen and Young (1993)	Washington State cashout demonstration (1990)	At-home, away, total Purchased food only and nonpurchased food included Per household, ENU, and AME per month	Households participating in AFDC and who applied after FIP[7] implementation (n=780)	Comparison of treatment and matched comparison counties	Group membership dummy; benefit amount	Multivariate regression
Davis and Werner (1993)	Alabama ASSETS demonstration (1990)	At-home, away, total Purchased food only Per household and AME per month	ASSETS and FSP participants (n=1,371)	Comparison of treatment and matched comparison counties	Group membership dummy; benefit amount	Multivariate regression

See notes at end of table.

Continued—

Table 8—Studies that examined the impact of the Food Stamp Program on household food expenditures—Continued

Study	Data source[1]	Measure of expenditures[2]	Population (sample size)	Design	Measure of participation	Analysis method
Beebout et al. (1985)	1977 Puerto Rico supplement to the NFCS and 1984 Puerto Rico HFCS	At-home, total Nonpurchased food included Per household and AME per week	Participant and FSP-eligible nonparticipant households using 1977 eligibility criteria (n= 3,995)	Pre-cashout compared with cashout (1977 vs. 1984)	Group membership dummy; participation dummy; benefit amount	2-equation selection-bias models

[1]Data sources:
ASSETS = Avenues to Self-Sufficiency through Employment and Training Services.
BLS-CES = Bureau of Labor Statistics' Consumer Expenditure Survey.
CSFII = Continuing Survey of Food Intakes by Individuals.
HFCS = Household Food Consumption Survey.
NFCS = Nationwide Food Consumption Survey.
NFCS-LI = Nationwide Food Consumption Survey - Low Income Supplement.
PSID = Panel Study of Income Dynamics.

[2]Includes indications of whether the dependent variable corresponds to food consumed at home, food consumed away from home, or all food; whether measure(s) represent only food purchased with cash, credit, or food stamp coupons or include the estimated dollar value of home-grown food, gifts, etc.; whether expenditures are measured per person, per household, per adult male equivalent (AME), per equivalent adult, or per equivalent nutrition unit (ENU); and the time unit for expenditures.

[3]Does not treat FSP as endogenous.

[4]Eligible participants were isolated in the nonparticipant group.

[5]Main effects were not reported.

[6]Eligible participants not isolated in the nonparticipant group.

[7]FIP = Family Independence Program.

of the dose-response models included BENEFIT only, and half included both FSP and BENEFIT.

When only FSP is included in the model, a direct estimate of the impact of the program is obtained from the value of b_1, the coefficient on the participation dummy. When BENEFIT is included in the model, b_2 is the MPS_F out of food stamps while b_3 is the MPS_F out of nonfood stamp income. In models with both FSP and BENEFIT, b_1 represents the impact of the FSP on food expenditures that is independent of the benefit level—for example, FSP nutrition education may have a fixed effect on food expenditures regardless of the FSP benefit amount. Alternatively, b_1 may be interpreted in these models as the *selection effect*, or the expected difference in expenditures *absent the FSP* (or if FSP benefit levels were zero) between individuals with similar characteristics who do and do not choose to participate in the FSP. Some researchers excluded this term when including nonparticipants in their samples, risking a bias in the estimated MPS_F if there is indeed a selection effect (Kramer-LeBlanc et al., 1997; Chavas and Yeung, 1982). Other researchers excluded nonparticipants altogether, analyzing only variations in benefit levels and dropping the FSP term (Levedahl, 1995, 1991; Senauer and Young, 1986; Neenan and Davis, 1977).

Numerous variations on these model specifications are found in the literature. For example:

- Household expenditures on food may be dollars spent over a particular period or the monetary value of food consumed from household supplies during the period.
- Household food expenditures may be normalized to account for the household's size, age/sex composition, meals eaten away from home, and/or economies of scale; or alternatively, household food expenditures that have not been normalized may be analyzed with household size and composition included as covariates.
- Other income may be subdivided to estimate the separate effects of different income sources on food expenditures.
- The food stamp benefit and income may enter the equation nonlinearly, for example, in quadratic or logarithmic form.

The measure of food expenditures is often determined by the data. For example, researchers using national survey data often do not have a choice because available measures are limited. As shown in table 8, researchers using the 1968-72 PSID were limited to annual expenditures for food used at home, which is not likely to be a very precise measure.

Normalization of household food expenditures to account for household size and composition is usually done by standardizing food expenditure on a per capita basis, or by one of several alternatives that reflect relative nutritional needs of household members, including "equivalent adults" (EAs), counting additional family members less heavily because of economies of scale; "adult male equivalents" (AMEs), counting family members according to caloric requirements; or "equivalent nutrition units" (ENUs), counting family members according to caloric requirements and percentage of meals eaten at home.

Research Results

The following sections summarize findings from research that examined the impact of the FSP on food expenditures. The discussion addresses results, in turn, for each of the three design/analysis approaches.

Participant vs. Nonparticipant Comparisons

Seven studies used participant vs. nonparticipant comparisons to directly estimate the impact of the FSP on food expenditures. As expected, all of these studies found that FSP participants spent more on food than did nonparticipants (table 9). Although the studies were conceptually similar, they varied substantially in how they measured food expenditures. Some used money spent on food for at-home use over the course of a week, while others used the monetary value of food consumed out of household supplies over a week or a month.[29] Furthermore, some studies analyzed total household food expenditures, while others normalized household food expenditures to account for household composition.

The numerical estimates shown in table 9 are taken directly from the cited studies and hence vary in their units. Some pertain to food expenditures per week, others per month, and so on. To achieve some roughly comparable measure across studies, the last column in table 9 shows the estimated impacts as a percentage of food expenditures. Depending on how the authors reported sample characteristics, these values were calculated either as a percentage of sample mean food expenditure or as a percentage of the "counterfactual"—the amount participants would have spent on food absent the FSP.

[29]Authors analyzing national survey data did not have a choice in this regard. The studies conducted by Lane (1978) and West et al. (1978), however, were based on data collected specifically for this purpose.

Hama and Chern (1988) estimated a simultaneous model of food expenditure, but treated FSP participation as exogenous. Price (1983) estimated a model based on nonparticipants and then compared predicted values (evaluated at the mean values of participants' characteristics) with participants' actual expenditures. Basiotis et al. (1983), Salathe (1980), and West et al. (1978) simply used FSP participation dummies.

Four of the available studies cannot be generalized to the FSP population as a whole. Studies by West et al. (1978) and Hama and Chern (1988) used samples that made up only part of the eligible population—households with children ages 8-12 and households with one or more elderly members, respectively. In addition, West et al. (1978) and Lane (1978) used samples that were geographically restricted—to the State of Washington and to a single county in California, respectively. Findings from the studies completed by Kisker and Devaney (1988) and Lane (1978) are limited because the authors did not estimate multivariate models.

Although the potential for selection bias remains, the strongest evidence in this group of studies comes from the work done by Basiotis et al. (1983), Price (1983), and Salathe (1980). Putting aside differences in methodology and measurement and assuming that an FSP household contains, on average, two people, estimates from these three studies suggest that FSP participation increases household food expenditures by $2-$4 per week. The absolute effect corresponds to 18-20 percent of at-home food expenditures.

Dose-Response Studies

Of the 23 of the 32 identified studies, 23 used dose-response models to study the impact of FSP participation on household food expenditures, including the 20 studies in Group II (table 8), as well as 3 studies from Group I (Price, 1983; Salathe, 1980; West et al., 1978) that used both direct and dose-response estimates. The dose-response studies related food expenditures to the FSP benefit amount, calculating the MPS_F out of food stamps. Table 10 shows the MPS_F from food stamps, as estimated

Table 9—Findings from studies that examined the impact of the Food Stamp Program on household food expenditures using participant vs. nonparticipant comparisons

Study	Population	Measure	Estimated impact	
			Absolute	As a share of food expenditures[1]
			Dollars	*Percent*
Hama and Chern (1988)	Households with 1 or more people 65+	Per capita at-home food expenditures per week	0.64	3.7
Kisker and Devaney (1988)	FSP-eligible households	Money value of food used at home per "equivalent nutrition unit" per week	2.49	10.8
Basiotis et al. (1983)	FSP-eligible households	At home food cost per household per week	3.70	20.4
Price (1983)	All households	Expenditures for at-home food per week per adult equivalent	2.01	18.2
Salathe (1980)	FSP-eligible households	Per capita at home food purchases per week	At home: 1.45 Total: .88	18.8 9.4
Lane (1978)	FSP-eligible households	At home food expenditures + value of food in-kind, per person per month	3.26	10.9
West et al. (1978)	FSP-eligible households with child ages 8-12	Value of food consumed at home per month per "equivalent adult"	5.14	13.0

[1]These percentages were calculated relative to either the *sample mean* as reported by the author (Basiotis et al., $18.11; Hama and Chern, $17.48; Kisker and Devaney, $23.14), or the author's estimated counterfactual value—that is, what participants would have spent on food if they did not receive food stamps or what nonparticipants actually did spend on food (Lane, $30.00; West et al., $39.63; Salathe, $7.71 and $9.28; Price, $11.03).

in these studies. This table relies heavily on table IV.1 in Fraker (1990), which summarized 17 studies.

Fraker completed a careful analysis of the bulk of this research. He remarked that the estimates of the MPS_F varied greatly in size, ranging from 0.17 at the low end to 0.64 and 0.86 at the high end.[30] The two highest estimates are clearly outliers, since the third-highest estimate is 0.47 and four other estimates are in the range of 0.42-0.45.

Fraker goes on to explain why the two highest estimates are so different from the others. One of the estimates, obtained from a dynamic-adjustment model, represents "the full long-run or steady-state responses of households to changes in food stamp (and other food subsidy) benefits." The other estimate is based on an unstable model that yields vastly different estimates for two half-samples of the data. Both estimates rely on a measure of non-food stamp income that excludes welfare and nonwelfare transfer payments but includes some imputed income elements, and both estimates mingle other FANP benefits (such as school lunches) with the FSP benefit. Consequently, these two estimates can be discounted, leaving a set of estimates "roughly evenly distributed over the range of 0.17 to 0.47, indicating that a $1.00 increase in the value of the food stamp benefit of a typical recipient household would lead to additional food expenditures of between $0.17 and $0.47."

The studies listed in table 10 span the period before and after the elimination of the purchase requirement (EPR) in the FSP. Before the EPR, participants were required to use the food stamps they paid for, as well as the bonus stamps, to purchase food. After the EPR, only the bonus amount was given in stamps. Fraker stated that estimates based on data collected before the EPR are likely to be biased upward, relative to the current MPS_F, because the EPR should have led to many more participants being unconstrained in their food purchases—that is, treating their food stamp allotment as cash. Their MPS_F should therefore be much lower, close to that of non-food stamp income.[31] Yet, Fraker notes that "the three estimates that are based on post-EPR data range from 0.23 and 0.29 and are only slightly toward the low end of the distribution of all estimates."[32]

Four of the more recent post-EPR estimates that were not available to Fraker (Breunig et al., 2001; Kramer-LeBlanc et al., 1997; Levedahl, 1995, 1991) do not support the notion that the MPS_F has declined since 1979. Their values are 0.40, 0.35, 0.26, and 0.69, respectively. A possible explanation for this apparent paradox is that the EPR substantially increased participation, drawing households into the program that were

[30]The estimate of 0.64, which is from Hymans and Shapiro (1976), is not included in table 10. Where Fraker's table IV.1 gave multiple estimates from the same study, table 10 includes only the most general estimate—in this case, the estimate from the full sample and not those from two half-samples. The estimate of 0.69 shown in table 10 (Levedahl, 1991) was not included in the research reviewed by Fraker.

Table 10—Findings from studies that examined the impact of the Food Stamp Program on household food expenditures using dose-response analyses[1]

Study		Estimated MPS_F from food stamps
Breunig et al. (2001)[2]		0.40
Kramer-LeBlanc et al. (1997)[2]		.35
Levedahl (1995)[2]		.26
Levedahl (1991)[2]		.69
Fraker et al. (1990)		.29
Devaney and Fraker (1989)	Weighted:[3]	.42
	Unweighted:	.21
Basiotis et al. (1987)		.17
Ranney and Kushman (1987)[2]		.40
Senauer and Young (1986)	Pre-EPR:[4]	.30
	Post-EPR:[4]	.26
Smallwood and Blaylock (1985)		.23
West (1984)	Participants:	.17
	Eligibles:	.47
Allen and Gadson (1983)		.30
Chen (1983)	Pre-EPR:[4]	.20
	Post-EPR:[4]	.23
Price (1983)[2]		.42
Brown et al. (1982)		.45
Chavas and Yeung (1982)		.37
Johnson et al. (1981)		.17
Salathe (1980)		.36
West et al. (1978)		.31
Neenan and Davis (1977)		.45
Benus et al. (1976)		.86
Hymans and Shapiro (1976)		.29
West and Price (1976)		.30[5]

[1]Adapted and expanded from Fraker (1990), table IV.1. The MPS_F is the fraction of each additional dollar of income that is spent on food.

[2]These studies were not included in Fraker (1990).

[3]Using sample weights from the NFCS.

[4]EPR = Elimination of the purchase requirement.

[5]Fraker reports this value as 0.37, citing p. 729 of West and Price. This appears to be an error on Fraker's part. The text there reads: "The marginal propensity to obtain food out of bonus stamp income (0.30) is still below the average propensity of food stamp recipients to consume out of all income (0.37)." The latter value is apparently the ratio of food expenditures to total income for food stamp recipients. Data reported in the article are not sufficient, however, to make this calculation directly.

[31]Fraker also presents estimates of the MPS_F out of non-food stamp income, which are not discussed here. They range from 0.05 to 0.24 and are invariably lower than the corresponding MPS_F out of food stamps from the same study.

[32]These estimates come from Chen (1983), Senauer and Young (1986), and Fraker et al. (1990).

not willing to spend as much on food as the purchase requirement necessitated. These new participants might indeed be constrained in their food purchases, even if the constraint was removed for those who would have participated under the old system.

All of the estimates reported in table 10 are subject to caveats. Most studies have criticized their predecessors and further criticism has been applied in review articles. Among the issues affecting some or all of the estimates are the following:

- Early studies used data collected before 1975, when uniform national standards for food stamp eligibility and benefits were implemented.

- Many studies used data that are not nationally representative samples of FSP eligibles—that is, that were restricted to a particular geographic area or demographic subgroup.

- The functional form of the relationship between food stamps and food expenditures may be misspecified. (Levedahl (1991) reestimates the expenditures equation with three common functional forms plus the one he believes is correct and gets alternative values of the MPS_F, ranging from 0.29 to 0.69.)

- Many researchers identify constrained households as those in which monthly food expenditures exceed their allotment by no more than a small margin and exclude these households from the analysis. No further mention is then made of the constrained households for which, indeed, the FSP increases food expenditures markedly.

- If, as seems plausible, FSP households have a higher MPS_F out of non-food-stamp income than nonparticipant households, a model that includes both participants and nonparticipants and does not fully account for selection bias will overestimate the MPS_F from food stamps.

- Sample weights may have been used improperly (or not at all). Devaney and Fraker (1989) found that using weights in the NFCS nearly doubled the estimated MPS_F.[33]

- Faulty accounting for the effects of household size and composition on food expenditures may lead to a biased estimate. Blaylock (1991) estimated food expenditure elasticities of 0.778 when both food expenditures and income were measured on a per household basis, 0.687 when both were measured on a per capita basis, and 0.521 when food expenditures were measured on a basis that accounted for economies of scale and income was measured on a per capita basis. Assuming that the last of the cited estimates applies, the household-based estimates are too large by nearly 50 percent.[34]

The Levedahl (1991) estimate of 0.69 is so distant from the others that it requires further comment. In a later article (1995), Levedahl stated:

> The theoretical and empirical results presented in this paper demonstrate that, except for the specification used by Senauer and Young, approximations used to estimate the food expenditure equation of food stamp recipients are misspecified. ...Given the availability of this specification, it would be difficult to justify using a functional form that was not flexible when estimating the food expenditure equation of food stamp recipients.

The Senauer and Young specification that Levedahl was recommending is the double-log form, which gave Levedahl an MPS_F out of food stamps of 0.29 in his 1991 paper and 0.26 in the 1995 paper (using San Diego cashout demonstration data). One, therefore, can reasonably conclude that the 0.69 estimate, based on translog specification, is an outlier.

The Cashout Demonstrations

Finally, findings from the five cashout studies (table 11) provide lower-bound estimates of the impact of the FSP. Included in this group are the following:

- Two studies of "pure" cashout demonstrations in Alabama and San Diego, in which the only difference between groups was the form of the food stamp benefit (cash vs. check).

- Two studies of other cashout demonstrations—Alabama Avenues to Self-Sufficiency Through Employment and Training Services (ASSETS) and Washington Family Independence Program

[33]In a comment on the Devaney and Fraker (1989) paper, Kott (1990) suggested that the effect of weights could be due to differences in the MPS_F between low-income households that lived in high-poverty vs. low-poverty areas, which was a sample stratifier. The latter group was undersampled, and if its MPS_F is substantially higher than that of the former group, then a weighted estimate of the overall MPS_F would be higher than the unweighted version.

[34]The elasticity of food expenditures with respect to income, η_F, is the percentage increase in food expenditures associated with a 1-percent increase in income. If a household spends one third of its income on food, then its MPS_F is equal to η_F X 1/3. Blaylock's analysis, based on the 1982 CES, used total expenditures as the measure of income and did not break out the effects of food stamps per se.

(FIP)—in which other programmatic changes were made simultaneously.

- One study of the conversion in Puerto Rico from food stamps to the cashed-out Nutrition Assistance Program (NAP).

The impact of cashout may be interpreted as the effect of one of the two components of food stamp benefits, namely the coupon format. The cashout effect is a lower bound of the total impact of the FSP because it excludes the effect on food expenditures of giving households more money. Note that the cashout effects are expected to be *negative*: They represent the effect of not providing benefits in coupon form.

The direct estimates of differences in food expenditures provide comparisons that are free of a major potential source of selection bias: Both check and coupon recipients are FSP participants. Other biases are possible, however, as the Puerto Rico study used a pre-/post-design, with a 7-year interval, and both the Alabama ASSETS and Washington State demonstrations were based on matched treatment and comparison counties. The pure cashout demonstrations in Alabama and San Diego were, however, true experiments. An additional limitation of the cashout studies is their limited generalizability. While many of the studies discussed were based on national surveys, each cashout evaluation reports results from a single State.

The estimated impacts on expenditures per AME or ENU per month for *food used at home* range from -$0.34 (Alabama "pure" cashout) to -$25 (Alabama ASSETS).[35] In percentage terms, the range is from -0.3 to -21.9 percent. It is generally acknowledged that

[35]Estimate based on 4.3 weeks per month. Results are discussed on an AME or ENU basis, so the Puerto Rico study can be included in the comparison.

Table 11—Findings from studies that examined the impact of food stamp cashout on household food expenditures

	Study/demonstration				
Estimated impact	Cohen and Young (1993)/ Washington (FIP)	Davis and Werner (1993)/ Alabama (ASSETS)	Fraker et al. (1992)/ Alabama (pure cashout)	Ohls et al. (1992)/ San Diego (pure cashout)	Beebout et al. (1985)/ Puerto Rico (FSP conversion)
On purchased food used at home per household per month:					
Absolute (dollars)	-28.08	-56.44	2.66	-22.25	
Percent	-12.1	-26.8	1.1	-7.5	
On purchased food used at home per AME/ENU per month:					
Absolute (dollars)	-22.12	-25.43	-.34	-9.39	-2.95
Percent	-17.2	-21.9	-.3	-6.9	-2.4
On total food expenditures per household per month:					
Absolute (dollars)	-25.60	-54.47	2.16	-23.85	
Percent	-7.3	-23.6	.9	-7.3	
On total food per AME/ENU per month:					
Absolute (dollars)	-26.62	-23.62	-.99	-10.98	-1.00
Percent	-13.4	-18.5	-.7	-7.3	-.5
On MPS_F out of food stamp benefits			.01	-.17	-.06

Notes:
AME = Adult Male Equivalent.
ASSETS = Avenue to Self-Sufficiency through Employment and Training Services.
ENU = Equivalent Nutrition Unit.

the Puerto Rico conversion and the Alabama "pure" cashout demonstration were not realistic tests of the differences between checks and coupons. In Puerto Rico, food stamps were used as a second currency even before the changeover, so they were, in a sense, already cashed out. In Alabama, the issues were that cashout was introduced with little publicity as a short-term demonstration, and food assistance was issued as a separate check that was not combined with AFDC. Hence, check recipients were still likely to treat their food stamp benefits as earmarked for food. The San Diego result, an impact of -$9.39 (-6.9 percent), seems the strongest, being unconfounded with other changes and based on an experimental design.

Four of the five studies reviewed also estimated impacts on *total food expenditures*. The estimated impacts were quite similar to those for food at home, indicating that offering food stamps as coupons rather than cash reduces expenditures on food away from home only slightly, if at all.

The authors of three of the cashout studies also estimated the MPS_F for food stamp checks vs. coupons. The difference between the two estimates is again a lower-bound estimate of the impact of the FSP. These differences were quite small in Puerto Rico and the "pure" cashout demonstration in Alabama, but an impact of 0.17 was found in San Diego. Because of its strong design, the San Diego study settles, in the affirmative, the question of whether the FSP increases food expenditures more than would a cash grant. As an aside, the MPS_F for food stamp coupons, per se, was estimated as 0.28 in this study, typical of other estimates.

Household Nutrient Availability

Most studies that examined nutrition-related impacts of the FSP, especially the more recent ones, focused on impacts on the dietary intake of individuals residing in FSP households. A smaller number of studies examined nutrient availability at the household level. These two outcomes are logically sequential. The hypothesis is that the FSP benefit leads to increased food spending, which leads to increased household nutrient availability, which, in turn, leads to increased intake by individual household members. This section focuses on the middle, or household, link in this chain.

As discussed in the preceding section, FSP participation definitely leads to an increase in food expenditures. One would suppose that, by spending more on food, households would increase the availability of food energy and at least some nutrients. This seemingly obvious effect may not occur for several reasons, however, particularly for nutrients that are in short supply. Participating households may increase expenditures on food in ways that actually reduce the availability of some nutrients, for example, by choosing foods that are convenient or especially palatable, but lower in nutrients.[36] They may also purchase more expensive forms of the same food, resulting in no net gain in nutrients. In addition, nonparticipants may obtain more of their food from nonpaid sources, such as friends, relatives, soup kitchens, and food pantries (Gleason et al., 2000).

Moreover, even if increased food expenditures lead to increased nutrient availability, there is no guarantee that this effect will be consistently positive. For example, increased expenditures may lead to greater availability of nutrients and food components that Americans consume to excess, including fats, cholesterol, sodium, and added sugars.

Assessment of household nutrient availability is based on detailed records of household food use for an extended period, usually 1 week. Information on quantities of food withdrawn from the household food supply is translated into nutrient equivalents to represent the amount of food energy and nutrients available to household members. Although household nutrient availability thus excludes the nutrient content of food consumed away from home, it is still an important measure because the FSP is intended to have its beneficial effects specifically through improving in-home food consumption.

The amount of energy and nutrients available is evaluated relative to the Recommended Dietary Allowances (RDAs) and the household's size and composition. Household nutrient requirements are generally defined based on AMEs, which take into consideration the number of individuals in the household and their differing nutrient requirements based on age, gender, and pregnancy/lactation status, or ENUs, which further adjust for the number of meals each family member eats at home and the number of meals served to guests.

Research Overview

The literature search identified 14 studies that examined the impact of the FSP on household nutrient availability (table 12). All but three of these studies (Bishop et al., 2000; Devaney and Moffitt, 1991;

[36]See, for example, Prato and Bagali (1976).

Table 12—Studies that examined the impact of the Food Stamp Program on household availability of food energy and nutrients

Study	Data source[1]	Data collection method	Population (sample size)	Design	Measure of participation	Analysis method
Group IA: Participant vs. nonparticipant comparisons—Secondary analysis of national surveys						
Hama and Chern (1988)	1977-78 NFCS elderly supplement	Aided recall for food use from household supply (7 days)	FSP-eligible households with elderly members (n=1,454)	Participant vs. nonparticipant	Participation dummy	Simultaneous food expenditure/nutrient availability equation[2]
Kisker and Devaney (1988)	1979-80 NFCS-LI	Record of household food use (7 days)	FSP-eligible households (n~2,900)	Participant vs. nonparticipant	Participation dummy	Bivariate t-tests
Allen and Gadson (1983)	1977-78 NFCS-LI	Aided recall for food use from household supply (7 days)	FSP-eligible households (n=3,850)	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Basiotis et al. (1983)	1977-78 NFCS-LI	Aided recall for food use from household supply (7 days)	FSP-eligible households (n=3,562)	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Scearce and Jensen (1979)	1972-73 BLS-CES	Food category amount and expenditure diary	FSP-eligible, southern region (n=1,360)	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Group IB: Participant vs. nonparticipant comparisons—Local studies						
Lane (1978)	Kern County, CA (1972-73)	24-hour recall of food consumed at home	FSP-eligible households (n=329)	Participant vs. nonparticipant	Participation dummy	Bivariate comparisons
Group II: Dose-response estimates—Secondary analysis of national surveys						
Devaney and Moffitt (1991)	1979-80 NFCS-LI	Record of household food use (7 days)	FSP-eligible households (n=2,925)	Dose-response	Benefit amount	Multivariate regression; selection-bias models
Basiotis et al. (1987)	1977-78 NFCS-LI	Aided recall for food use from household supply (7 days)	FSP-eligible households (n~3,000)	Dose-response	Participation dummy; bonus value	Simultaneous equations for food cost/nutrient availability/nutrient intake relationship
Johnson et al. (1981)	1977-78 NFCS-LI	Aided recall for food use from household supply (7 days)	Low-income households (n=4,535)	Dose-response	Participation dummy; bonus value	Multivariate regression

See notes at end of table.

Continued—

Table 12—Studies that examined the impact of the Food Stamp Program on household availability of food energy and nutrients—Continued

Study	Data source[1]	Data collection method	Population (sample size)	Design	Measure of participation	Analysis method
Group IIIA: Cashout demonstrations—Experimental design						
Bishop et al. (2000)	Alabama cashout demonstration (1990) and San Diego cashout demonstration (1990)	7-day food use from records and recall	Alabama FSP participants (n=2,184) San Diego FSP participants (n=935)	Random assignment of participants to check or coupon	Group membership dummy	Stochastic dominance methods
Fraker et al. (1992)	Alabama cashout demonstration (1990)	7-day food use from records and recall	FSP participants (n=2,386)	Random assignment of participants to check or coupon	Group membership dummy; benefit amount	Multivariate regression
Ohls et al. (1992)	San Diego cashout demonstration (1990)	7-day food use from records and recall	FSP participants (n=1,143)	Random assignment of participants to check or coupon	Group membership dummy; benefit amount	Multivariate regression
Group IIIB: Cashout demonstrations—Nonexperimental design						
Cohen and Young (1993)	Washington State cashout demonstration (1990)	7-day food use from records and recall	Households participating in AFDC and who applied after FIP[3] implementation (n=780)	Comparison of treatment and matched comparison counties	Group membership dummy; benefit amount	Multivariate regression
Beebout et al. (1985)	1977 Puerto Rico supplement to the NFCS and 1984 Puerto Rico HFCS	7-day food use from records and recall	Participant and FSP-eligible nonparticipant households using 1977 eligibility criteria (n= 3,995)	Pre-cashout compared with cashout (1977 vs. 1984)	Group membership dummy; participation dummy; benefit amount	2-equation selection-bias models

[1] Data sources:
BLS-CES = Bureau of Labor Statistics' Consumer Expenditure Study.
HFCS = Household Food Consumption Survey.
NFCS = Nationwide Food Consumption Survey.
NFCS-LI = Nationwide Food Consumption Survey - Low Income Supplement.

[2] Does not treat FSP as endogenous.

[3] FIP = Family Independence Program.

Scearce and Jensen, 1979) were included in the previous section on impacts on food expenditures. Six of the identified studies (Group I) used participant vs. nonparticipant comparisons. Five of these studies used national survey data, and one used local data. Group II includes three dose-response studies, all of which are based on secondary analysis of national survey data.

The studies in Groups I and II, most of which are described in Fraker's (1990) excellent review, employed a variety of modeling approaches. Some used structural models that estimated the FSP effect on expenditures and then the effect of expenditures on nutrient availability. Other researchers estimated reduced-form models, treating nutrient availability as a function of FSP benefits without regard to any intermediate mechanisms.

Group III includes the four cashout demonstrations described previously, as well as a more recent study that involved secondary analysis of data from the Alabama and San Diego demonstrations.[37] As described in the preceding section, two of the cashout studies used random assignment (Fraker et al., 1992; Ohls et al., 1992), one used matched treatment and control groups (Cohen and Young, 1993), and one used a pre-/ post-design to compare households in Puerto Rico before and after the FSP was cashed out (Beebout et al., 1985). Of the two randomized experiments, the San Diego study (Ohls et al., 1992) is generally considered to be the strongest because it did not suffer from implementation problems encountered in the Alabama study (Fraker et al., 1992).

The estimation approach for the San Diego, Alabama, and Washington cashout studies was to compare regression-adjusted mean nutrient availability for households in the treatment and control or comparison groups. In the Puerto Rico cashout study, a structural modeling approach was used to estimate the effect of cashout on expenditures and then the effect of expenditures on nutrient availability (Beebout et al. 1985).

In interpreting findings from the cashout studies, one should remember that these studies were designed to measure only the effect of the *form* of the FSP benefit—food coupons or cash—rather than the full program impact, including the dollar value of the benefit and the form in which it was delivered. The randomized design used in the San Diego study, in particular, makes that study's evidence particularly powerful when it indicates positive impacts. If one program component has a positive impact, then the program as a whole must have a positive impact. However, when no significant impact is detected, one cannot conclude that the overall program has no impact.

With the exception of the cashout studies, all of the studies that examined the impact of the FSP on household nutrient availability are based on data that were collected between the early 1970s and 1980. Applying findings from these studies to today's FSP population must be done with some caution.

Although the same general caution can be raised about research on food expenditures, a compelling argument can be made that impacts on nutrition-related outcomes are more sensitive to temporal considerations than impacts on food expenditures. For example, the American food supply has changed dramatically in the past 20-25 years, with important implications for both nutrient availability and individual dietary intake. Americans are eating substantially more grains than they were two decades ago, particularly refined grains, as well as record-high amounts of caloric sweeteners and some dairy products, and near-record amounts of added fats (Putnam and Gerrior, 1999).

In addition to myriad new products in the market and changes in food enrichment policies and standards over time, a number of sociodemographic trends may have influenced food-purchasing behaviors. These trends include, for example, a rise in the amount of food eaten away from home, smaller households, more two-earner and single-parent households, an aging population, and increased ethnic and racial diversity (Putnam and Gerrior, 1999).

The data on household nutrient availability are also subject to the limitations that affect much of the available research on nutrition-related impacts of FANPs, as discussed in chapter 2. In assessing impacts on household nutrient availability, most researchers used the "more is better" approach that was the state of the art at the time. However, increased availability of energy or nutrients at the household level may or may not influence the likelihood that individual household members consume adequate diets. And, in the case of food energy, fat, cholesterol, and sodium, increased availability may not be a positive effect. (Only one study examined impacts on the availability of fat, and none looked at availability of cholesterol or sodium.)

[37]Excluded from this table is a recent study of food security and nutrient availability by Cohen et al. (1999). The authors analyzed only variations in nutrient availability among participant households, so program impacts could not be estimated.

Finally, two features of data on household nutrient availability tend to impart a substantial amount of measurement error to the estimates. First, the translation of foods into nutrients is only an approximation. Second, the samples of data on foods withdrawn from stocks and used are small and subject to sampling variability. These characteristics may obscure differences between participant and nonparticipant households.

Research Results

Table 13 summarizes findings of studies that examined the impact of the FSP on household nutrient availability. The table focuses on the question of whether the FSP had any statistically significant impact on the availability of a given nutrient and does not present information on the estimated amount of the FSP impact. Because one cannot assume that increased food expenditures automatically translate into increased availability of any particular nutrient, the first and most important question is whether any significant effect exists. In addition, the variety of ways in which individual study authors analyzed and reported nutrient impacts makes finding a common metric for characterizing results difficult.

Table 13 is divided into four sections: food energy and macronutrients, vitamins, minerals, and summary measures. The text follows this general organization, but discusses findings for vitamins and minerals in one section.

In the interest of providing a comprehensive picture of the body of research, both significant and nonsignificant results are reported in table 13 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, the greatest weight is given to the study by Devaney and Moffitt (1991) (shown in the table, as with all the studies, by primary author's name (Devaney, 1991). This is the only non-cashout study that is based on data collected after the elimination of the purchase requirement. In addition, the study used a dose-response model to assess FSP impacts, an approach less prone to problems of selection bias than participant vs. nonparticipant comparisons. The authors included tests of selection-bias adjustment models and found that these had little effect on their results.

Substantial weight is also given to *significant* findings from the San Diego cashout study (Ohls et al., 1992). Nonsignificant findings from this study are not given the same weight because, as previously noted, the cashout studies assessed the impact of the form of the FSP benefit rather than of the overall program. Thus, the absence of a significant effect in the cashout studies does not provide convincing evidence than an effect does not exist.

Food Energy and Macronutrients

Findings from the strongest available research suggest that FSP participation increases the amount of food energy available at the household level. The San Diego cashout study found a significant effect of food stamp coupons on the availability of food energy, whether measured as mean percentage of the Recommended Energy Allowance (REA) or as the percentage of households that had less than 100 percent of the REA for energy available in the household food supply (Ohls et al., 1992). Devaney and Moffitt (1991) reported similar results.

Overall findings for the availability of protein (in absolute terms, not as a percentage of total food energy) were quite similar. Both Devaney and Moffitt (1991) and Ohls et al. (1992) found that the FSP significantly increased protein availability. Three of the four other studies that assessed protein availability reported similar results. The only exception was the Alabama cashout study in which implementation was weak (Fraker et al., 1992).

Allen and Gadson (1983) conducted the only study to examine availability of carbohydrates and fat, and they did so in absolute terms rather than as a percentage of total food energy. They found that the FSP significantly increased the availability of both nutrients at the household level.

Given the age of most of the available studies, the paucity of information about the impact of the FSP on the relative availability of carbohydrates and fat is not surprising. Until the 1990s, almost all empirical research on FANPs focused on nutritional adequacy. Since that time, studies have begun to focus on nutritional concerns related to overconsumption of fat, saturated, fat, cholesterol, and sodium, and/or on food consumption patterns (for example, consumption of

Table 13—Findings from studies that examined the impact of the Food Stamp Program on household availability of food energy and nutrients

	Significant impact	No significant impact		Significant impact
Outcome	More energy/nutrients available	More energy/nutrients available	Less energy/nutrients available	Less energy/nutrients available
Food energy and macronutrients				
Food energy	***All households*** Cohen (1993) [1 State; CO] Ohls (1992) [1 city; CO] Devaney (1991) [national; D-R] Basiotis (1983) [national; D-R] Allen (1983) [national; P-N] Johnson (1981) [national; D-R] ***Elderly*** Hama (1988) [national; P-N]	***All households*** Bishop (2000) [Alabama; CO] Fraker (1992) [1 State; CO] Beebout (1985) [Puerto Rico; CO] Scearce (1979) [national; P-N]	***All households*** Bishop (2000) [San Diego; CO]	
Protein	***All households*** Cohen (1993) [1 State; CO] Ohls (1992) [1 city; CO] Devaney (1991) [national; D-R] Allen (1983) [national; P-N] Scearce (1979) [national; P-N]	***All households*** Fraker (1992) [1 State; CO]		
Carbohydrates	***All households*** Allen (1983) [national; P-N]			
Fat	***All households*** Allen (1983) [national; P-N]			
Vitamins				
Vitamin A	***All households*** Devaney (1991) [national; D-R] Allen (1983) [national; P-N]	***All households*** Cohen (1993) [1 State; CO] Fraker (1992) [1 State; CO] Ohls (1992) [1 city; CO] Beebout (1985) [Puerto Rico; CO] Basiotis (1983) [national; P-N] Scearce (1979) [national; P-N]		

See notes at end of table.

Continued—

Table 13—Findings from studies that examined the impact of the Food Stamp Program on household availability of food energy and nutrients—Continued

	Significant impact	No significant impact		Significant impact
Outcome	More energy/nutrients available	More energy/nutrients available	Less energy/nutrients available	Less energy/nutrients available
Vitamin B_6	***All households*** Bishop (2000) [Alabama; CO] Devaney (1991) [national; D-R] Allen (1983) [national; P-N] ***Elderly*** Hama (1988) [national; P-N]	***All households*** Bishop (2000) [San Diego; CO] Cohen (1993) [1 State; CO] Ohls (1992) [1 city; CO] Beebout (1985) [Puerto Rico; CO]	***All households*** Fraker (1992) [1 State; CO]	
Vitamin B_{12}	***All households*** Allen (1983) [national; P-N]	***All households*** Beebout (1985) [Puerto Rico; CO]		
Vitamin C	***All households*** Cohen (1993) [1 State; CO] Devaney (1991) [national; D-R] Allen (1983) [national; P-N] Basiotis (1983) [national; P-N]	***All households*** Ohls (1992) [1 city; CO] Fraker (1992) [1 State; CO] Scearce (1979) [national; P-N]		
Vitamin E	***All households*** Bishop (2000) [Alabama; CO]			
Folate		***All households*** Cohen (1993) [1 State; CO] Ohls (1992) [1 city; CO]	***All households*** Fraker (1992) [1 State; CO]	
Niacin	***All households*** Allen (1983) [national; P-N]	***All households*** Scearce (1979) [national; P-N]		
Riboflavin	***All households*** Devaney (1991) [national; D-R] Allen (1983) [national; P-N]	***All households*** Scearce (1979) [national; P-N]	***All households*** Basiotis (1983) [national; P-N]	
Thiamin	***All households*** Devaney (1991)[national; D-R] Basiotis (1983) [national; P-N] Allen (1983) [national; P-N] Scearce (1979) [national; P-N]			

See notes at end of table.

Continued—

Table 13—Findings from studies that examined the impact of the Food Stamp Program on household availability of food energy and nutrients—Continued

	Significant impact	No significant impact		Significant impact
Outcome	More energy/nutrients available	More energy/nutrients available	Less energy/nutrients available	Less energy/nutrients available
Minerals				
Calcium	***All households*** Cohen (1993) [1 State; CO] Devaney (1991) [national; D-R] Allen (1983) [national; P-N] Scearce (1979) [national; P-N] ***Elderly*** Hama (1988) [national; P-N]	***All households*** Ohls (1992) [1 city; CO] Beebout (1985) [Puerto Rico; CO] Basiotis (1987) [national; D-R]	***All households*** Fraker (1992) [1 State; CO] Basiotis (1983) [national; P-N]	
Iron	***All households*** Cohen (1993) [1 State; CO] Devaney (1991) [national; D-R] Allen (1983) [national; P-N] Scearce (1979) [national; P-N] ***Elderly*** Hama (1988) [national; P-N]	***All households*** Basiotis (1987) [national; D-R] Beebout (1985) [Puerto Rico; CO] Basiotis (1983) [national; P-N]	***All households*** Fraker (1992) [1 State; CO] Ohls (1992) [1 city; CO]	
Magnesium	***All households*** Devaney (1991) [national; D-R] Allen (1983) [national; P-N] ***Elderly*** Hama (1988) [national; P-N]	***All households*** Beebout (1985) [Puerto Rico; CO]		
Phosphorus	***All households*** Devaney (1991) [national; D-R] Allen (1983) [national; P-N]	***All households*** Bishop (2000) [San Diego; CO]		
Zinc	***All households*** Cohen (1993) [1 State; CO]	***All households*** Fraker (1992) [1 State; CO] Ohls (1992) [1 city; CO]		

See notes at end of table.

Continued—

Table 13—Findings from studies that examined the impact of the Food Stamp Program on household availability of food energy and nutrients—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants scored higher	Participants scored higher/same	Participants scored lower	Participants scored lower
Summary measures				
Modified diet score[1]	***All households*** Johnson (1981) [national; D-R]			
Minimum nutrient diet ratio[2]			***All households*** Johnson (1981) [national; D-R]	
100+ % RDA for energy and 10 nutrients[3]	***All households*** Kisker (1988) [national; P-N]			
80+ % RDA for energy and 10 nutrients[3]	***All households*** Kisker (1988) [national; P-N]			

Notes: Cell entries show the senior author's name, the publication date, the scope of the study (for example, national vs. one city or one State), and the research approach (P-N = participant vs. nonparticipant study, D-R = dose response study, and CO = cashout study).

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.

Data for Lane (1978) not included because study used 24-hour recall rather than 7-day record/recall.

Data for Basiotis et al. (1987) not reported because the estimate was constructed out of a combination of parameter estimates and the statistical significance of the final estimate is not clear.

Bishop et al. (2000) also examined availability of protein, vitamin B_{12}, vitamin C, niacin, thiamin, calcium, magnesium, and iron. They found no significant differences between cash and coupon recipients. However, point estimates were not provided. In addition, while the availability of vitamin E and phosphorus was examined for both Alabama and San Diego samples, point estimates for the former were reported only for Alabama and point estimates for the latter were reported only for San Diego.

[1] Modified diet score is defined as the sum of ratios of actual nutrient values to RDA standards for seven nutrients (protein, vitamin A, vitamin C, riboflavin, thiamin, calcium, and iron).

[2] Lowest nutrient ratio (nutrient per 1,000 calories).

[3] Assessed the proportion of households with household nutrient availability that was above the standard indicated.

fruits and vegetables and whole grains). All of this research, however, has focused on the dietary intakes of individual FSP participants rather than availability at the household level.

Vitamins and Minerals

Evidence of an FSP effect on the availability of vitamins and minerals is weaker than it is for food energy and protein. Some nutrients were not assessed by Devaney and Moffitt (1991) or Ohls et al. (1992), and for the nutrients that were assessed in both studies, significant results were divergent. Devaney and Moffitt reported several significant impacts, while Ohls et al. reported none. As noted, lack of a significant effect in the cashout study (Ohls et al., 1992) is not definitive evidence that an FSP effect does not exist. Therefore, findings from Devaney and Moffitt (1991) provide the strongest available evidence about the impact of the FSP on household availability of vitamins and minerals.

Devaney and Moffit (1991) found that the FSP significantly increased household availability of a broad array of vitamins and minerals: vitamins A, B_6, C, riboflavin, thiamin, calcium, iron, magnesium, and phosphorus. The authors estimated that the FSP increased the amount of these nutrients available to the household by between about 20 and 40 percent of the RDA. The estimated MPS out of food stamp benefits was substantially higher than the MPS out of other income—that is, a dollar of food stamp benefits had a greater impact on nutrient availability than a dollar of cash income.

Using participant vs. nonparticipant comparisons, Allen and Gadson (1983) estimated comparable effects across roughly the same range of nutrients, adding vitamin B_{12} and niacin to the list. The remaining studies in all three groups found a mix of results.

Summary Measures

Three studies used composite indices to assess the overall effect of the FSP on household nutrient availability. The results are inconclusive but generally consistent with the pattern of findings for individual nutrients.

Kisker and Devaney (1988) examined the percentage of households whose at-home food use provided 100 percent of the REA as well as the RDAs for each of 10 nutrients. A comparable summary statistic was computed using a cutoff of 80 percent rather than 100 percent. The authors report a favorable and significant FSP impact for both summary measures. The analysis was limited to bivariate comparisons of participants vs. nonparticipants, however, so the results must be considered suggestive only.

Johnson et al. (1981) constructed two summary measures. The first was a Modified Diet Score (MDS) that aggregated individual RDA "scores" (percentage RDA) for food energy and seven nutrients. Values for each nutrient were truncated at 1.2 to avoid the possibility of large excesses in one nutrient compensating for shortages in another. The authors also assessed the nutrient density of the foods used from the home food supply (nutrients per 1,000 calories), using a measure called the Minimum Nutrient Diet Ratio (MNDR). The first measure showed a statistically significant positive effect in their dose-response analysis, but the effect for the second measure was nonsignificant.

Finally, Basiotis et al. (1987), also using a dose-response approach, found a positive effect on household nutrient availability as measured by an index that was the first principal component of 11 individual nutrients.[38]

Individual Dietary Intake

The food eaten by individuals is primarily determined by the food available in the households to which they belong. However, the relationship between nutrient availability at the household level and nutrient intake at the individual level is weakened by several considerations:

- Household members may unequally consume nutrients from the food supplies, relative to their needs, depending on their tastes and appetites.
- Some household food supplies are consumed by guests or are wasted.
- Some household members may consume food from other sources, including restaurants, school cafeterias, and other nonhome sources.

Moreover, increased availability of food energy and selected nutrients at the household level does not necessarily translate into *better* diets at the individual level—for example, to lower intakes of dietary components overconsumed by many Americans (fat, saturated fat, cholesterol, and sodium) or to healthier patterns

[38]Because the estimate is constructed out of a combination of parameter estimates, the statistical significance of the final estimate is not clear and is therefore not reported in table 13.

of *food* intake (for example, eating more fruits and vegetables or whole grains).[39] For these reasons, one must examine the dietary intakes of individual household members to adequately assess nutrition-related impacts of the FSP.

Research Overview

The literature search identified 26 relevant studies (table 14). Only four of these studies (Kramer-Le Blanc et al., 1997; Fraker et al., 1990; Basiotis et al., 1987; West et al., 1978) were included in the previous sections on impacts on food expenditures and/or household nutrient availability. Most of the identified studies focused on impacts within subgroups of the population, most often children or the elderly.

Sixteen of the identified studies used a participant vs. nonparticipant design (Group I). Of these, 10 involved secondary analysis of data from national surveys. The other six participant vs. nonparticipant studies used State or local samples. Two of these studies used data from the FNS/SSI Elderly Cashout Demonstration (1980-81), but not in the context of a cashout study, per se. The researchers who used these data (Posner et al., 1987; Butler et al., 1985) combined data across cash and coupon sites because no significant differences were detected between the two groups. They defined participants as those receiving FSP benefits, whether in the form of cash or coupons, and nonparticipants as individuals who were income-eligible but not participating in the FSP.

Ten studies used a dose-response approach to estimate FSP impacts (Group II). Seven of these studies used national survey data and the remaining three used State or local data. None of the cashout studies (Group III in the preceding two sections) examined impacts on individual dietary intake.

The data used in studies that assessed impacts of the FSP on individual dietary intake are generally more recent than the data used in studies of impacts on food expenditures and household nutrient availability. For example, all eight studies that used national survey data to estimate impacts of the FSP on household nutrient availability used data collected mainly in the 1970s, with data collection periods ranging from 1972-73 through 1979-80 (table 12). The same is true of 18 of the 20 studies that used national survey data to investigate impacts on food expenditures (data collection periods from 1968-72 through 1979-80) (table 8), although, as noted, temporal considerations are less important for this outcome.

In contrast, 11 of the 17 studies that used national survey data to assess FSP impacts on individual dietary intake used data collected in the mid-1980s through the mid-1990s (data collection periods from 1985 through 1994-96) (table 14). Indeed, the studies by Dixon (2002) and Bhattacharya and Currie (2000), as well as those by Gleason et al. (2000) and Wilde et al. (1999) used national survey data that were the most recent available at the time the literature search was completed (NHANES-III for the Dixon and Bhattacharya and Currie studies and CSFII 1994-96 for the study by Wilde et al.).[40]

In addition, research on the impacts of the FSP on dietary intake addresses, albeit to a limited extent, nutrition-related concerns that were not addressed in the research on household nutrient availability. These concerns include consumption of fat, saturated fat, cholesterol, fiber, and sodium, as well as dietary intake patterns, or the extent to which *food* consumption behaviors conform with recommendations made in USDA's Food Guide Pyramid.

Nonetheless, the majority of research on FSP impacts on dietary intake is subject to the limitations discussed in chapter 2. Ten studies used intake data for a single day and therefore provide weak estimates of individuals' usual dietary intake. Seventeen studies used multiple days of data or food frequency instruments to better capture usual dietary intake behaviors; however, none used the approach to estimating usual intake that was recently recommended by the Institute of Medicine (IOM, 2001).[41] (Some studies used more than one method to assess dietary intake.)

Similarly, in assessing intakes of food energy, vitamins, and minerals, researchers generally compared mean intakes of participants and nonparticipants relative to the RDAs, or compared the proportion of individuals in each group with intakes below a defined cutoff and

[39]At the time most of these data were collected, the FSP offered little to no nutrition education to program participants to encourage such dietary patterns. However, whether providing nutrition education would have led to different results is not clear. For example, Gleason et al. (2000) demonstrated that the dietary knowledge and attitudes of low-income individuals did not mediate the relationship between FSP participation and dietary intake.

[40]In June 2002 and February 2003, data files for NHANES-IV 1999-2000, including the first 2 years of data from the 6-year NHANES data collection cycle, were released by the National Center for Health Statistics.

[41]Gleason et al. (2000) used these methods to describe dietary intakes of low-income populations. However, in assessing differences in the dietary intakes of FSP participants and nonparticipants, they compared regression-adjusted mean intakes rather than usual intakes.

Table 14—Studies that examined the impact of the Food Stamp Program on dietary intakes of individuals

Study	Data source[1]	Data collection method	Population (sample size)	Design	Measure of participation	Analysis method
Group IA: Participant vs. nonparticipant comparisons—Secondary analysis of national surveys						
Dixon (2002)	1988-94 NHANES-III	24-hour recall	Adults ages 20 and older (n=10,545)	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Bhattacharya and Currie (2000)	1988-94 NHANES-III	24-hour recall and nonquantified food frequency	Youth ages 12-16 (n=1,358)	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Wilde et al. (1999)	1994-96 CSFII	2 nonconsecutive 24-hour recalls	Low-income individuals (n=1,901)	Participant vs. nonparticipant	Participation dummy	Maximum likelihood estimation
Weimer (1998)	1989-91 CSFII	24-hour recall followed by 2 days of food records	Elderly individuals (n=1,566)	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Cook et al. (1995)	1986 CSFII-LI	24-hour recall followed by 2 days of food records	Children ages 1-5 in households under 125% of poverty[2]	Participant vs. nonparticipant	Participation dummy	Bivariate chi-squared tests
Rose et al. (1995)	1989-91 CSFII	24-hour recall followed by 2 days of food records	Children ages 1-5 (n=800)	Participant vs. nonparticipant	Participation dummy	Multivariate regression (weights not used)
Bishop et al. (1992)	1977-78 NFCS-LI	24-hour recall followed by 2 days of food records	FSP-eligible individuals (n=2,590)	Participant vs. nonparticipant	Participation dummy	Stochastic dominance methods
Fraker et al. (1990)	1985 CSFII	4 nonconsecutive 24-hour recalls	WIC-eligible women ages 19-50 (n=381) and their children ages 1-5 (n=818)	Participant vs. nonparticipant	Participation dummy	Multivariate regression and bivariate selection model
Gregorio and Marshall (1984)	1971-73 NHANES-I	24-hour recall	Preschool children (n=2,774), School-aged children (n=3,509)	Participant vs. nonparticipant	Participation dummy; participation interacted with poverty index ratio	Bivariate and multivariate regression
Lopez and Habicht (1987a, 1987b)	1971-73 NHANES-I and 1976-80 NHANES-II	24-hour recall	Low-income elderly (n=1,684 and n=1,388)	Participant vs. nonparticipant	Participation dummy	Multivariate analysis of variance

See notes at end of table.

Continued—

Table 14—Studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

Study	Data source[1]	Data collection method	Population (sample size)	Design	Measure of participation	Analysis method
Group IB: Participant vs. nonparticipant comparisons—State and local studies						
Fey-Yensan et al. (2003)	Low-income areas in Connecticut (1996-97)	Food frequency questionnaire	Low-income elderly living in subsidized housing (82% female) (n=200)	Participant vs. nonparticipant	Participation dummy	Chi-square tests and analysis of variance
Perez-Escamilla et al. (2000)	2 pediatric clinics in low-income areas of Hartford, CT (1999)	24-hour recall and 2 food frequency questionnaires	Children ages 8 months to 5 years who were participating in WIC or who had participated in past year (n=99)	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Perkin et al. (1988)	1 urban family practice center in Florida (dates for data collection not reported)	24-hour recall	Women ages 18-45 (n=102)	Participant vs. nonparticipant	Participation dummy	Bivariate t-tests
Posner et al. (1987)	1980-81 FNS SSI/ECD	24-hour recall via telephone	Elderly (n=1,900)	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Butler et al. (1985)	1980-81 FNS SSI/ECD	24-hour recall via telephone	Low-income elderly individuals (n=1,684)	Participant vs. nonparticipant	Participation dummy	Multivariate regression with selection-bias technique
Futrell et al. (1975)	1 county in Mississippi (1971)	4-day record	Black children ages 4-5 (n=96)	Participant vs. nonparticipant	Participation dummy	Bivariate t-tests
Group IIA: Dose-response estimates—Secondary analysis of national surveys						
Gleason et al. (2000)	1994-96 CSFII/DHKS	2 nonconsecutive 24-hour recalls	Low-income individuals (n=3,935)	Dose-response	Benefit amount	Comparison of regression-adjusted means
Basiotis et al. (1998)	1989-91 CSFII	24-hour recall followed by 2 days of food records	Low-income households (n=1,379)	Dose-response	Participation dummy; benefit amount	Multivariate regression

See notes at end of table.

Continued—

Table 14—Studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

Study	Data source[1]	Data collection method	Population (sample size)	Design	Measure of participation	Analysis method
Rose et al. (1998a)	1989-91 CSFII	24-hour recall followed by 2 days of food records	Nonbreastfeeding preschoolers (n=499)	Dose-response	Benefit amount	Multivariate regression; investigated selection bias
Kramer-LeBlanc et al. (1997)	1989-91 CSFII	24-hour recall followed by 2 days of food records	FSP-eligible individuals (n=793)	Dose-response	Benefit amount	Multivariate regression
Akin et al. (1987)	1977-78 NFCS elderly supplement	24-hour recall followed by 2 days of food records	Elderly individuals (n=5,615)	Dose-response	Participation dummy; bonus value; participation interacted with social security income	Multivariate regression
Basiotis et al. (1987)	1977-78 NFCS-LI	24-hour recall followed by 2 days of food records	FSP-eligible individuals (n=3,000)	Dose-response	Participation dummy; bonus value	Simultaneous equations for food cost/nutrient availability/ nutrient intake relationship
Akin et al. (1985)	1977-78 NFCS elderly supplement	24-hour recall followed by 2 days of food records	Elderly individuals (n=1,315)	Dose-response	Participation dummy; bonus value	Multivariate switching regression model
Group IIB: Dose-response estimates—State and local studies						
Butler and Raymond (1996)	1980-81 FNS SSI/ECD and 1969-73 RIME	24-hour recall via telephone and in-person	Low-income elderly individuals (n=1,542) Low-income individuals in rural areas (n=1,093)	Dose-response	Participation dummy; bonus value	Multivariate endogenous switching model with selection-bias adjustment

See notes at end of table.

Continued—

Table 14—Studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

Study	Data source[1]	Data collection method	Population (sample size)	Design	Measure of participation	Analysis method
Whitfield (1982)	Tulsa, OK (1978)	24-hour recall	FSP-eligible individuals (n=195)	Dose-response	Participation dummy; bonus value	Multivariate regression
West et al. (1978)	Washington State (1972-73)	Unspecified	Children ages 8-12 (n=728)	Dose-response	Bonus value	Multivariate regression

[1]Data sources:
CSFII = Continuing Survey of Food Intakes by Individuals.
DHKS = Diet and Health Knowledge Survey.
FNS SSI/ECD = Food and Nutrition Service Supplementary Security Income/Elderly Cashout Demonstration.
NFCS = Nationwide Food Consumption Survey.
NFCS-LI = Nationwide Food Consumption Survey - Low Income Supplement.
NHANES = National Health and Nutrition Examination Survey.
RIME = Rural Income Maintenance Experiment.
[2]Sample size not stated.

used a "more is better" approach in interpreting findings. None of the identified studies used the approach recently recommended by the IOM, which calls for use of data on usual intake in conjunction with defined Estimated Average Requirements (EARs) (IOM, 2001).[42]

Consequently, the available research provides an imperfect picture of the substantive significance of observed differences in the dietary intakes of FSP participants and nonparticipants. The available research provides information on whether FSP participants consumed more or less energy and nutrients than nonparticipants. However, this information cannot be used to draw conclusions about whether FSP participants were more or less likely than nonparticipants to have *adequate* intakes.

Finally, previous caveats about measurement error also apply. The estimation of food and nutrient intake is an elaborate process that is subject to significant measurement error. This error may make it difficult to detect differences between participant and nonparticipant groups.

Research Results

Table 15 summarizes findings from available research on impacts of the FSP on dietary intake. Two studies have been omitted from this tabulation because the papers did not present detailed impact estimates (Akin et al., 1987; Akin et al., 1985).

Overall, the literature strongly suggests that the FSP has little to no impact on individuals' dietary intake. In the discussion that follows, no single study is emphasized because of the general consistency of results across studies. Where results are inconsistent, findings from the study by Gleason et al. (2000), which examined impacts on preschool children, school-age children, and adults, are given the most weight. This study is based on the most recent CSFII data and used a dose-response approach. The authors elected not to estimate selection-correction models because they believed that neither the CSFII nor the companion Diet and Health Knowledge Survey (DHKS), which was also used in the analysis, included good candidates for identifying variables. Instead, the authors included in their model a wide variety of variables that may affect dietary intake and/or may be correlated with FSP participation or benefits. This included a number of variables not used in other research, including measures of dietary knowledge and attitudes, self-assessed general health status, indicators of self-reported health problems, and indicators for exercise frequency, smoking status, and use of vitamin and mineral supplements.

The authors tested the robustness of their results by estimating effects separately for subgroups of the population defined by age, gender, race/ethnicity, health status, income, and (for adults) dietary attitudes. In addition, they estimated several alternative models, including a model that used a quadratic specification of FSP benefit amounts, a model that used a single binary variable to represent FSP participation, and quantile regression models that examined the effects of FSP participation on different parts of the nutrient intake distribution (5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, and 90^{th} percentiles). Results of all of these alternative analyses were qualitatively similar to results of the main analysis.

Food Energy and Macronutrients

Seventeen different studies assessed the impact of the FSP on the intake of food energy in one or more subgroups of the population. Only 2 of the 17 studies found a significant difference between FSP participants and nonparticipants (Fraker et al., 1990, for preschool children; Butler and Raymond, 1996, for the elderly), and the direction of the effect was not consistent.

A similar pattern was noted for protein. Seventeen different studies assessed the impact of FSP participation on protein intake. Only four studies (Fraker et al., 1990, for preschool children; Bishop et al., 1992, for all FSP households; Butler and Raymond, 1996, for the elderly; Perkin et al., 1988 for women) reported a significant FSP impact, and the direction of the effect was not consistent across studies.[43]

Only a few studies looked at the impact of FSP participation on the intake of carbohydrates, fat, or saturated fat. None of these studies, which assessed intake based on contribution to total energy intake rather than in absolute terms, reported significant differences in mean intakes of FSP participants and nonparticipants. Gleason et al. (2000) found, however, that preschool FSP participants were significantly less likely than comparably aged nonparticipants to meet the *Dietary Guidelines* recommendation of less than 10 percent of total energy from saturated fat.

[42]Gleason et al. (2000) used these methods to describe dietary intakes of low-income populations. However, in assessing differences in intakes of FSP participants and nonparticipants, they compared regression-adjusted percentages of individuals with intakes above specific RDA cutoffs rather than the percentage of individuals with usual intakes below the EAR.

[43]Gleason et al. (2000) found no significant differences in mean intakes of protein, expressed as a percentage of the RDA, for any of the three populations studied (preschool children, school-age children, and adults). For preschool children, however, they found that FSP participants consumed significantly less protein than nonparticipants, as a percentage of total energy intake.

Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals

	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	***Children*** Fraker (1990) [national; P-N]	***Children*** Gleason (2000) [national; D-R] {preschool} Perez-Escamilla (2000) [2 sites; P-N] Rose (1998a) [national; D-R] Cook (1995) [national; P-N] Gregorio (1984) [national; P-N] ***Elderly*** Fey-Yensan (2003) [1 State; P-N] Weimer (1998) [national; P-N] Posner (1987) [6 sites; P-N] Lopez (1987a) [national; P-N][1] Butler (1985) [6 sites; P-N] ***Adults*** Gleason (2000) [national; D-R] ***All households*** Whitfield (1982) [1 city; D-R] Bishop (1992) [national; P-N]	***Children*** Gleason (2000) [national; D-R] {school-age} West (1978) [1 State; D-R] Futrell (1971) [1 county; P-N] ***Elderly*** Lopez (1987a) [national; P-N][2] ***Women*** Fraker (1990) [national; P-N] Perkin (1988) [1 site; P-N]	***Elderly*** Butler (1996) [6 sites; D-R]

See notes at end of table.

Continued—

Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Protein	***Children*** Fraker (1990) [national; P-N] ***All households*** Bishop (1992) [national; P-N]	***Children*** Rose (1998a) [national; D-R] Cook (1995 [national; P-N] Gregorio (1984) [national; P-N] ***Elderly*** Lopez (1987a) [national; P-N][1] Posner (1987) [6 sites; P-N] Butler (1985) [6 sites; P-N] ***Adults*** Gleason (2000) [national; D-R] ***Women*** Fraker (1990) [national; P-N] Perkin (1988) [1 site; P-N] {Blacks} ***Rural*** Butler (1996) [2 sites; D-R] ***All households*** Whitfield (1982) [1 city; D-R]	***Children*** Gleason (2000) [national; D-R][3] Perez-Escamilla (2000) [2 sites; P-N] West (1978) [1 State; D-R] ***Elderly*** Fey-Yensan (2003) [1 State; P-N] Weimer (1998) [national; P-N] Lopez (1987a) [national; P-N][2] ***Adults*** Dixon (2002) [national; P-N]	***Elderly*** Butler (1996) [6 sites; D-R] ***Women*** Perkin (1988) [1 site; P-N] {Whites}
Carbohydrates		***Children*** Gleason (2000) [national; D-R] Gregorio (1984) [national; P-N] {preschool}	***Children*** Gregorio (1984) [national; P-N] {school-age} ***Elderly*** Fey-Yensan (2003) [1 State; P-N] ***Adults*** Gleason (2000) [national; D-R] ***Women*** Perkin (1988) [1 site; P-N]	

See notes at end of table.

Continued—

Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Fat		***Children*** Gleason (2000) [national; D-R] {school-age} Rose (1998a) [national; D-R] Gregorio (1984) [national; P-N] ***Elderly*** Fey-Yensan (2003) [1 State; P-N] Weimer (1998) [national; P-N] ***Adults*** Gleason (2000) [national; D-R] ***All households*** Basiotis (1998) [national; D-R][5]	***Children*** Gleason (2000) [national; D-R] {preschool} Perez-Escamilla (2000) [2 sites; P-N] ***Women*** Perkin (1988) [1 site; P-N]	
Saturated fat		***Children*** Gleason (2000) [national; D-R] {school-age} Rose (1998a) [national; D-R] ***Adults*** Gleason (2000) [national; D-R] ***Women*** Perkin (1988) [1 site; P-N] {Whites} ***All households*** Basiotis (1998) [national; D-R][5]	***Children*** Gleason (2000) [national; D-R] {preschool}[4]	***Women*** Perkin (1988) [1 site; P-N] {Blacks}

See notes at end of table.

Continued—

Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

Outcome	Significant impact	No significant impact		Significant impact
	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Vitamins				
Vitamin A	***Children*** Rose (1998a) [national; D-R]	***Children*** Perez-Escamilla (2000) [2 sites; P-N] Cook (1995) [national; P-N] Gregorio (1984) [national; P-N] West (1978) [1 State; D-R] ***Elderly*** Posner (1987) [6 sites; P-N] Butler (1985) [6 sites; P-N] ***All households*** Basiotis (1987) [national; D-R][6]	***Children*** Gleason (2000) [national; D-R] Fraker (1990) [national; P-N] Futrell (1971) [1 county; P-N] ***Adults*** Gleason (2000) [national; D-R] ***Women*** Perkin (1988) [1 site; P-N]	***Children*** Whitfield (1982) [1 city; D-R] ***Women*** Fraker (1990) [national; P-N]
Vitamin B_6	***Children*** Perez-Escamilla (2000) [2 sites; P-N]	***Children*** Gleason (2000) [national; D-R] {school-age} Rose (1998a) [national; D-R] Cook (1995) [national; P-N] ***Elderly*** Weimer (1998) [national; P-N] ***Women*** Fraker (1990) [national; P-N] ***All households*** Basiotis (1987) [national; D-R][6]	***Children*** Gleason (2000) [national; D-R] {preschool} ***Adults*** Dixon (2002) [national; P-N] Gleason (2000) [national; D-R]	
Vitamin B_{12}	***Children*** Cook (1995) [national; P-N]	***All households*** Basiotis (1987) [national; D-R][6]	***Children*** Gleason (2000) [national; D-R] Perez-Escamilla (2000) [2 sites; P-N] ***Adults*** Gleason (2000) [national; D-R]	

See notes at end of table.

Continued—

Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Vitamin C		***Children*** Gleason (2000) [national; D-R] Rose (1998a) [national; D-R] Cook (1995) [national; P-N] Fraker (1990) [national; P-N] Gregorio (1984) [national; P-N] {preschool} West (1978) [1 State; D-R] ***Elderly*** Posner (1987) [6 sites; P-N] Butler (1985) [6 sites; P-N] ***Adults*** Gleason (2000) [national; D-R] ***All households*** Basiotis (1987) [national; D-R][6]	***Children*** Perez-Escamilla (2000) [2 sites; P-N] Gregorio (1984) [national; P-N] {preschool} ***Elderly*** Weimer (1998) [national; P-N] ***Women*** Fraker (1990) [national; P-N] Perkin (1988) [1 site; P-N] ***Adults*** Dixon (2002) [national; P-N]	***All households*** Whitfield (1982) [1 city; D-R]
Vitamin E		***Children*** Gleason (2000) [national; D-R] {school-age}[1] Rose (1998a) [national; D-R] Cook (1995) [national; P-N] ***Elderly*** Weimer (1998) [national; P-N] ***Women*** Fraker (1990) [national; P-N]	***Children*** Gleason (2000) [national; D-R] {preschool} ***Adults*** Dixon (2002) [national; P-N] Gleason (2000) [national; D-R]	***Children*** Fraker (1990) [national; P-N]

See notes at end of table.

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Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Folate	***Children*** Gleason (2000) [national; D-R] {school-age} Perez-Escamilla (2000) [2 sites; P-N] Cook (1995) [national; P-N]	***Children*** Rose (1998a) [national; D-R]	***Children*** Gleason (2000) [national; D-R] {preschool} ***Adults*** Dixon (2002) [national; P-N] Gleason (2000) [national; D-R] ***Women*** Fraker (1990) [national; P-N]	
Niacin	***Children*** Rose (1998a) [national; D-R]	***Children*** Perez-Escamilla (2000) [2 sites; P-N] Cook (1995) [national; P-N] West (1978) [1 State; D-R] ***Elderly*** Weimer (1998) [national; P-N] Posner (1987) [6 sites; P-N] Butler (1985) [6 sites; P-N] ***Adults*** Gleason (2000) [national; D-R] ***Women*** Perkin (1988) [1 site; P-N] {Blacks} ***All households*** Basiotis (1987) [national; D-R][6]	***Children*** Gleason (2000) [national; D-R] ***Adults*** Gleason (2000) [national; D-R] ***Women*** Perkin (1988) [1 site; P-N] {Whites}	***Elderly*** Butler (1996) [6 sites; D-R]
Pantothenic acid		***Children*** Perez-Escamilla (2000) [2 sites; P-N]		

See notes at end of table.

Continued—

Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Riboflavin		***Children*** Gleason (2000) [national; D-R] {school-age} Perez-Escamilla (2000) [2 sites; P-N] Rose (1998a) [national; D-R] Cook (1995) [national; P-N] West (1978) [1 State; D-R] ***Elderly*** Posner (1987) [6 sites; P-N] Butler (1985) [6 sites; P-N] ***Adults*** Gleason (2000) [national; D-R] ***All households*** Basiotis (1987) [national; D-R][6]	***Children*** Gleason (2000) [national; D-R] {preschool} ***Women*** Perkin (1988) [1 site; P-N]	***Elderly*** Butler (1996) [6 sites; D-R]
Thiamin	***Children*** Rose (1998a) [national; D-R] Futrell (1971) [1 county; P-N]	***Children*** Gleason (2000) [national; D-R] {school-age} Perez-Escamilla (2000) [2 sites; P-N] Cook (1995) [national; P-N] West (1978) [1 State; D-R] ***Elderly*** Butler (1985) [6 sites; P-N] Posner (1987) [6 sites; P-N] ***Adults*** Gleason (2000) [national; D-R] ***All households*** Basiotis (1987) [national; D-R][6]	***Children*** Gleason (2000) [national; D-R] {preschool} ***Women*** Perkin (1988) [1 site; P-N] {Blacks}	***Women*** Perkin (1988) [1 site; P-N] {Whites}

See notes at end of table.

Continued—

Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

Outcome	Significant impact: Participants consumed more	No significant impact: Participants consumed more/same	No significant impact: Participants consumed less	Significant impact: Participants consumed less
Minerals				
Calcium	***Children*** Cook (1995) [national; P-N] ***Elderly*** Posner (1987) [6 sites; P-N] Butler (1985) [6 sites; P-N]	***Children*** Gleason (2000) [national; D-R] {school-age} Rose (1998a) [national; D-R] Gregorio (1984) [national; P-N] Fraker (1990) [national; P-N] West (1978) [1 State; D-R] ***Elderly*** Weimer (1998) [national; P-N] ***Adults*** Gleason (2000) [national; D-R] ***All households*** Basiotis (1987) [national; D-R][6]	***Children*** Gleason (2000) [national; D-R] {preschool} Perez-Escamilla (2000) [2 sites; P-N] Futrell (1971) [1 county; P-N] ***Elderly*** Butler (1996) [6 sites; D-R] Whitfield (1982) [1 city; D-R] ***Women*** Fraker (1990) [national; P-N] Perkin (1988) [1 site; P-N] ***Adults*** Dixon (2002) [national; P-N]	
Iron	***Children*** Perez-Escamilla (2000) [2 sites; P-N] Rose (1998a) [national; D-R] Rose (1995) [national; D-R] ***Elderly*** Lopez (1987a) [national; P-N][1] ***All households*** Whitfield (1982) [1 city; D-R][6]	***Children*** Gregorio (1984) [national; P-N] Cook (1995) [national; P-N] Fraker (1990) [national; P-N] West (1978) [1 State; D-R] ***Elderly*** Weimer (1998) [national; P-N] Posner (1987) [6 sites; P-N] Butler (1985) [6 sites; P-N] ***All households*** Basiotis (1987) [national; D-R][6]	***Children*** Gleason (2000) [national; D-R] {school-age} ***Adults*** Gleason (2000) [national; D-R] ***Women*** Fraker (1990) [national; P-N] Perkin (1988) [1 site; P-N] ***Rural*** Butler (1996) [6 sites; D-R]	***Children*** Gleason (2000) [national; D-R] {preschool} ***Elderly*** Butler (1996) [6 sites; D-R] Lopez (1987a) [national; P-N][2] ***Adults*** Dixon (2002) [national; P-N]

See notes at end of table.

Continued—

Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Magnesium	***Children*** Cook (1995) [national; P-N]	***Children*** Gleason (2000) [national; D-R] {school-age} Rose (1998a) [national; D-R] ***Elderly*** Weimer (1998) [national; P-N] ***All households*** Basiotis (1987) [national; D-R][6]	***Children*** Gleason (2000) [national; D-R] {preschool} ***Adults*** Dixon (2002) [national; P-N] Gleason (2000) [national; D-R] ***Women*** Fraker (1990) [national; P-N]	
Phosphorus		***Children*** Gleason (2000) [national; D-R] {school-age} Rose (1998a) [national; D-R] Cook (1995) [national; P-N] ***Women*** Perkin (1988) [1 site; P-N] {Blacks} ***All households*** Basiotis (1987) [national; D-R][6]	***Children*** Gleason (2000) [national; D-R] {preschool} West (1978) [1 State; D-R] ***Adults*** Gleason (2000) [national; D-R] ***Women*** Perkin (1988) [1 site; P-N] {Whites} ***Elderly*** Weimer (1998) [national; P-N]	
Zinc	***Children*** Rose (1998a) [national; D-R] Cook (1995) [national; P-N] Fraker (1990) [national; P-N]	***Children*** Perez-Escamilla (2000) [2 sites; P-N] ***Adults*** Gleason (2000) [national; D-R] ***Women*** Fraker (1990) [national; P-N]	***Children*** Gleason (2000) [national; D-R] ***Elderly*** Weimer (1998) [national; P-N] ***Adults*** Dixon (2002) [national; P-N]	

See notes at end of table.

Continued—

Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Other dietary components				
Cholesterol		***Children*** Rose (1998a) [national; D-R] ***Adults*** Gleason (2000) [national; D-R] ***All households*** Basiotis (1998) [national; D-R][5]	***Children*** Gleason (2000) [national; D-R] ***Elderly*** Posner (1987) [6 sites; P-N]	
Fiber			***Children*** Gleason (2000) [national; D-R]	***Adults*** Gleason (2000) [national; D-R]
Sodium		***Adults*** Gleason (2000) [national; D-R]	***Children*** Gleason (2000) [national; D-R]	***All households*** Basiotis (1998) [national; D-R][5]
Food Intake				
Fruits and fruit juices		***Children*** Gleason (2000) [national; D-R] ***Elderly*** Fey-Yensan (2003) [1 State; P-N] ***Adults*** Gleason (2000) [national; D-R]	***Children*** Perez-Escamilla (2000) [2 sites; P-N] ***Adults*** Dixon (2002) [national; P-N][7] ***All individuals*** Wilde (1999) [national; P-N] ***All households*** Basiotis (1998) [national; D-R]	
Grain products		***Children*** Perez-Escamilla (2000) [2 sites; P-N] ***Elderly*** Fey-Yensan (2003) [1 State; P-N] ***All households*** Basiotis (1998) [national; D-R][5]	***Children*** Gleason (2000) [national; D-R] {school-age} ***Adults*** Dixon (2002) [national; P-N] Gleason (2000) [national; D-R] ***All individuals*** Wilde (1999) [national; P-N]	***Children*** Gleason (2000) [national; D-R] {preschool}

See notes at end of table.

Continued—

Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants consumed more	Participants consumed more/same	Participants consumed less	Participants consumed less
Meat, poultry, fish, and meat substitutes	***All individuals*** Wilde (1999) [national; P-N] ***All households*** Basiotis (1998) [national; D-R][5]	***Children*** Perez-Escamilla (2000) [2 sites; P-N] {eggs} ***Elderly*** Fey-Yensan (2003) [1 State; P-N] ***Adults*** Dixon (2002) [national; P-N] Gleason (2000) [national; D-R]	***Children*** Gleason (2000) [national; D-R] Perez-Escamilla (2000) [2 sites; P-N] {fish and meats}	
Milk and milk products	***All households*** Basiotis (1998) [national; D-R]	***Children*** Gleason (2000) [national; D-R] {school-age} Perez-Escamilla (2000) [2 sites; P-N] ***Adults*** Dixon (2002) [national; P-N] Gleason (2000) [national; D-R] ***All individuals*** Wilde (1999) [national; P-N]	***Children*** Gleason (2000) [national; D-R] {preschool} ***Elderly*** Fey-Yensan (2003) [1 State; P-N]	
Vegetables	***All households*** Basiotis (1998) [national; D-R][5]	***Children*** Gleason (2000) [national; D-R] {preschool} Perez-Escamilla (2000) [2 sites; P-N] {all others} ***All individuals*** Wilde (1999) [national; P-N]	***Children*** Gleason (2000) [national; D-R] {school-age} Perez-Escamilla (2000) [2 sites; P-N] {starchy} ***Elderly*** Fey-Yensan (2003) [1 State; P-N] ***Adults*** Dixon (2002) [national; P-N]	***Adults*** Gleason (2000) [national; D-R]
Added sugars	***All individuals*** Wilde (1999) [national; P-N]	***Children*** Gleason (2000) [national; D-R] {preschool} ***Adults*** Gleason (2000) [national; D-R]	***Children*** Gleason (2000) [national; D-R] {school-age}	

See notes at end of table.

Continued—

Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

Outcome	Significant impact: Participants consumed more	No significant impact: Participants consumed more/same	No significant impact: Participants consumed less	Significant impact: Participants consumed less
Added fats	***All individuals*** Wilde (1999) [national; P-N]		***Children*** Gleason (2000) [national; D-R] ***Elderly*** Fey-Yensan (2003) [1 State; P-N][8] ***Adults*** Gleason (2000) [national; D-R]	
Alcoholic beverages			***Adults*** Gleason (2000) [national; D-R]	
Sweets and desserts		***Children*** Perez-Escamilla (2000) [2 sites; P-N]	***Children*** Bhattacharya (2000) [national; P-N] ***Elderly*** Fey-Yensan (2003) [1 State; P-N][8]	
High-fat snack foods		***Children*** Perez-Escamilla (2000) [2 sites; P-N]		

Outcome	Significant impact: Participants scored higher	No significant impact: Participants scored higher/same	No significant impact: Participants scored lower	Significant impact: Participants scored lower
Summary measures				
Healthy Eating Index (HEI)	***All households*** Basiotis (1998) [national; D-R][9] ***Able-bodied adults without dependents (ABAWDS)*** Kramer-LeBlanc (1997) [national; D-R]		***Children*** Bhattacharya (2000) [national; P-N][10] Gleason (2000) [national; D-R] ***Adults*** Gleason (2000) [national; D-R]	***Adults*** Dixon (2002) [national; P-N]

See notes at end of table.

Continued—

Table 15—Findings from studies that examined the impact of the Food Stamp Program on dietary intakes of individuals—Continued

	Significant impact	No significant impact		Significant impact
Outcome	Participants scored higher	Participants scored higher/same	Participants scored lower	Participants scored lower
Diet Quality Index[11]		***Children*** Gleason (2000) [national; D-R] {preschool} ***Adults*** Gleason (2000) [national; D-R]	***Children*** Gleason (2000) [national; D-R] {school-age}	

Notes: Cell entries show the senior author's name, the publication date, the scope of the study (for example, national vs. 1 city or 1 State), and the research approach (P-N = participant vs. nonparticipant study, D-R = dose response study). Where study findings pertain only to a specific subgroup, 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.

Results for Akin (1985) and Akin (1987) not reported because detailed impact estimates were not provided.

Findings reported for Basiotis et al. (1998) are for effect of weekly FSP benefits. Model also included FSP participation dummy. Unless otherwise noted, direction and significance of coefficient for FSP participation was comparable.

Butler and Raymond (1996) reported detailed results only for energy and selected nutrients (protein and iron for the rural sample and protein, calcium, iron, and riboflavin for the elderly sample). The study also assessed vitamin A, thiamin, vitamin C, and phosphorus (rural sample only), and the authors reported that results for these other nutrients "were not qualitatively different" from results that were reported.

Fraker (1990) refers to Fraker, Long, and Post (1990). Findings reported for children are based on a bivariate model that controls for selection bias, one of three models used in the analysis and deemed by the authors to be the preferred model. Findings reported for women are based on OLS model, which was preferred by authors because small sample sizes compromised function of the bivariate selection-adjustment model.

[1] Results for analysis of NHANES-II data.

[2] Results for analysis of NHANES-I data.

[3] For preschool children, difference was not significant for mean protein intake as a percentage of the RDA, but was significant for the percentage of energy provided by protein.

[4] Difference was not significant for mean intake as a percentage of total energy, but was significant for the percentage of individuals who satisfied the *Dietary Guidelines* recommendation of less than 10 percent of total energy, with FSP participants being less likely to meet this goal.

[5] The coefficient for FSP participation was negative but not statistically significant.

[6] Authors reported statistically significant findings but no statistical tests were presented.

[7] Difference was not significant for HEI (24-hour recall) measure of food consumption but was significant for measure based on nonquantified food frequency.

[8] Authors used one measure for fats, oils, and sweets.

[9] The coefficient for FSP participation was negative and significant ($p < 0.05$), but the coefficient for weekly food stamp benefits was positive and significant ($p < 0.001$).

[10] Authors used an adapted HEI measure in which the food-based component scores were based on data from a nonquantified food frequency rather than a 24-hour recall.

[11] The Dietary Quality Index (DQI) is similar to the HEI in that it scores individuals' diets on the basis of how well they meet eight standards: percentage of calories from fat and saturated fat, intake of protein, cholesterol, sodium, and calcium, and intake of fruits and vegetables, grains, and legumes. The lower the score, the higher the quality of the diet.

Vitamins and Minerals

Few studies found that FSP participation was significantly related to intake of vitamins and minerals. Moreover, in keeping with the results observed for energy and protein, the direction of the FSP effect was not consistent across studies that did report significant results.

The largest number of significant effects were reported by authors who focused on preschool children. Three studies (Perez-Escamilla et al., 2000; Rose, et al., 1998a; Cook et al., 1995) reported that FSP participation increased children's intakes of several vitamins and minerals.

The Perez-Escamilla study, based on a small local sample, found that FSP participation was associated with increased energy-adjusted intakes of vitamin B_6, folate, and iron.

Rose and his colleagues analyzed data from the 1989-91 CSFII and found that FSP participation was associated with increased intakes of vitamin A, niacin, thiamin, iron, and zinc. The authors reported that they investigated the possibility of selection bias in their results and found "no evidence" of it. No information is provided, however, on how the issue was investigated and how the authors reached this conclusion.

Cook et al. (1995) analyzed data from the 1986 CSFII low-income supplement and compared the percentage of FSP children and nonparticipating children with average intakes below 70 percent of the RDA. This study did not use multivariate techniques to control for differences between the two groups; however, limitation of the sample to children in households under 125 percent of poverty provides at least some statistical control. The authors reported significant and positive FSP effects for a number of nutrients (vitamin B_{12}, folate, calcium, magnesium, and zinc).

Confidence in the findings from these studies is diminished by the small overlap in the significant effects reported. All three studies examined intakes of vitamin A, vitamin B_6, vitamin C, folate, niacin, riboflavin, thiamin, calcium, iron, and zinc. Of these, conclusions about the impact of the FSP were consistent across all three studies only for vitamin C and riboflavin. In both cases, the conclusion was that the FSP had no effect. For all of the other vitamins and minerals, one or two of the studies—but never all three—reported a significant FSP effect. The only nutrients for which there was any overlap in significant effects were folate (Perez-Escamilla et al., 2000; Cook et al., 1995), iron (Perez-Escamilla et al., 2000; Rose et al., 1998a), and zinc (Rose et al., 1998a; Cook et al., 1995). Rose and colleagues reported the same result for iron in an earlier paper (1995); that paper only looked at iron intake.

Findings from the more recent and methodologically rigorous study by Gleason et al. (2000) also raise doubts about FSP effects on preschool children. The only significant effect reported for preschool children in the Gleason et al. study was that FSP participants had a significantly lower intake of iron.[44,45]

Other Dietary Components

A handful of studies examined impacts of FSP participation on the intake of cholesterol, fiber, and/or sodium. Gleason et al. (2000) found that FSP adults consumed significantly less dietary fiber than nonparticipant adults. Basiotis and his colleagues found that sodium intake was significantly higher in FSP households than in nonparticipant households.

Food Intake

Six studies assessed the impact of FSP participation on food intake patterns on one or more population subgroups. Findings from the available studies are mixed but provide little indication that the FSP has a positive influence on food intake patterns. Using data from the most recent CSFII 1994-96, Gleason and his colleagues (2000) found that receiving FSP benefits was associated with significantly lower consumption of vegetables among adults and of grains among preschoolers.

Wilde and his colleagues (1999) used the same data as Gleason et al. but estimated impacts for all individuals in FSP households rather than for specific subgroups. They found that FSP participation was associated with significantly greater consumption of meat (considered a beneficial effect) as well as significantly greater intakes of added sugar and added fat (not considered beneficial).

Using data from an earlier wave of the CSFII (1989-91), Basiotis et al. (1998) found that the weekly value of FSP benefits was significantly and positively related to consumption of vegetables, milk and milk products, and meat. Other studies that examined FSP impacts on intake of specific types of food found no significant effects.

[44]However, the percentage of FSP and non-FSP preschool children with iron intakes equivalent to 70 percent of the RDA was not significantly different.

[45]Gleason et al. (2000) reported a significant FSP effect for folate intake among school-age children, but intakes among preschool children were not significantly different.

Summary Measures

Several authors examined impact of the FSP on overall diet quality, using the Healthy Eating Index (HEI). The HEI, developed by USDA's Center for Nutrition Policy and Promotion (CNPP), is a summary measure of overall diet quality (Kennedy et al., 1995). The index is comprised of 10 component scores that are weighted equally in the total score. Five of the component scores are food-based and evaluate food consumption compared with the Food Guide Pyramid recommendations. Four component scores are nutrient-based and assess compliance with recommendations for maximum daily intake of fat, saturated fat, cholesterol, and sodium. The 10th component score assesses the level of variety in the diet.[46] Gleason et al. (2000) also examined FSP impacts on an HEI-like summary measure known as the Dietary Quality Index (DQI).

Findings from the available studies are mixed and, giving precedence to the Gleason et al. (2000) study, provide little evidence that FSP participation influences overall dietary quality. Dixon (2002) found that HEI scores for FSP adults were significantly lower than HEI scores for nonparticipant adults. Dixon did not limit her sample to low-income individuals, however, and her model controlled for relatively few measured characteristics.

Other Nutrition and Health Outcomes

The literature search identified a relatively limited number of studies that investigated the impact of the FSP on other nutrition- and health-related outcomes. (Note that studies that examined shopping patterns—such as, types of stores used and food expenditure shares—have been excluded from this review because of their tenuous relationship to nutritional status.) Characteristics of these studies are summarized in table 16.

Outcomes examined in this research include food security (14 studies), birthweight (2 studies), weight and/or height (6 studies), nutritional biochemistries (3 studies), and general measures of nutrition and/or health status (2 studies). (Some studies looked at multiple outcomes). The research on food security includes participant vs. nonparticipant, dose-response, and cashout studies. Research on all of the other outcomes is limited to participant vs. nonparticipant comparisons, although some of these studies included longitudinal as well as cross-sectional data.

The following sections summarize findings for each outcome. Drawing firm conclusions about FSP impacts, with the possible exception of the impact on food security, is not possible. The number of studies available for any given outcome and population subgroup is limited, and each study has important limitations.

Food Security

The relationship between FSP participation and food security is a complex one. Food insecurity is likely to lead households to seek food assistance, and receipt of food stamp benefits may subsequently improve the household's food security. This situation makes estimates of FSP impacts on food security particularly vulnerable to problems of selection bias and reverse causality.

This difficulty is apparent in conflicting findings reported in the literature. Most participant vs. nonparticipant studies found that FSP participants were more likely to be food insecure than nonparticipants. (Jensen, 2002; Cohen et al., 1999; Alaimo et al., 1998; Hamilton et al., 1997; Cristofar and Basiotis, 1992; Kisker and Devaney, 1988).

On the other hand, Rose et al. (1998b), using a dose-response approach, found that food insufficiency was inversely related to the size of the food stamp benefit and the relationship was stronger than the relationship between food insufficiency and other incomes. A comparable pattern was reported by Cristofar and Basiotis (1992) in a model that included all households. (Food stamp benefits did not have a significant effect in a separate model that was limited to households with preschool children).

Three of the cashout studies (Alabama "pure," Alabama ASSETS, and San Diego) also considered food security. In the Alabama ASSETS demonstration, members of the cashout group were significantly more likely to have skipped a meal due to lack of food or money to buy food (Davis and Werner, 1993).

Two recent studies that used sophisticated techniques to control for selection bias help clarify the relationship between FSP participation and food security. Both found that, once one controlled for selection bias, there was no evidence of significantly greater levels of food insecurity (or insufficiency) among FSP participants. The analysis completed by Gundersen and Oliveira

[46]Results for component scores, when reported, have been summarized in preceding sections of table 15.

Table 16—Studies that examined the impact of the Food Stamp Program on other nutrition and health outcomes

Study	Data source[1]	Population sample (sample size)	Design	Measure of participation	Analysis method
Food security: Participant vs. nonparticipant comparisons					
Huffman and Jensen (2003)	1997 longitudinal SPD and 1998 experimental SPD	Low-income households (n=3,733)	Participant vs. nonparticipant	Participation dummy	Simultaneous equation model with 3 probits
Jensen (2002)	2000 April FSS-CPS	FSP and FSP-eligible households (n=6,300)	Participant vs. nonparticipant	Participation dummy	Bivariate ordered probit model
Gunderson and Oliveria (2001)	1991 and 1992 SIPP	Low-income households (n=3,452)	Participant vs. nonparticipant	Participation dummy	Simultaneous equation model with 2 probits
Bhattacharya and Currie (2000)	1988-94 NHANES-III	Youth ages 12-16 (n=1,358)	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Perez-Escamilla et al. (2000)	2 pediatric clinics in low-income areas of Hartford, CT (1999)	Children ages 8 months to 5 years who were participating in WIC or had participated in past year (n=99)	Participant vs. nonparticipant	Participation dummy	Chi-square analysis
Cohen et al. (1999)	1996-97 NFSPS	Low-income households (n=3,228)	Participant vs. nonparticipant	Participation dummy	Comparisons of proportions
Alaimo et al. (1998)	1988-94 NHANES-III	Low-income households (n=5,285)	Participant vs. nonparticipant	Participation dummy	Logistic regression (survey weights)
Hamilton et al. (1997)	1995 CPS	Low-income households (n=21,810)	Participant vs. nonparticipant	Participation dummy	Comparison of proportions
Cristofar and Basiotis (1992)	1985-86 CSFII-LI	Low-income women (n=3,398) and low-income children ages 1-5 years (n=1,930)	Participants vs. nonparticipant	Participation dummy; benefit amount	Multivariate regression
Kisker and Devaney (1988)	1979-80 NFCS-LI	Low-income (n~2,900)	Participant vs. nonparticipant	Participation dummy	Bivariate t-tests

See notes at end of table.

Continued—

Table 16—Studies that examined the impact of the Food Stamp Program on other nutrition and health outcomes—Continued

Study	Data source[1]	Population sample (sample size)	Design	Measure of participation	Analysis method
Food security: Dose-response estimates					
Rose et al. (1998b)	1989-91 CSFII and 1992 SIPP	All households (n=6,620 and n=30,303)	Dose-response	Annual dollar amount of food stamps	Logistic regression
Food security: Cashout demonstrations					
Fraker et al. (1992)	Alabama cashout demonstration (1990)	FSP participants (n=2,386)	Random assignment of participants to check or coupon	Group membership dummy and benefit amount	Multivariate regression
Ohls et al. (1992)	San Diego cashout demonstration (1990)	FSP participants (n=1,143)	Random assignment of participants to check or coupon	Group membership dummy and benefit amount	Multivariate regression
Davis and Werner (1993)	Alabama ASSETS demonstration (1990)	ASSETS and FSP participants (n=1,371)	Comparison of treatment and matched comparison counties	Group membership dummy and benefit amount	Multivariate regression
Birthweight: Participant vs. nonparticipant comparisons					
Korenman and Miller (1992)	1979-88 NLSY	Infants born to poor women with 2 births between 1979 and 1988 (n~2,568)	Participant vs. nonparticipant	Participation dummy	Multivariate regression; fixed-effects models
Currie and Cole (1991)	1979-87 NLSY	Infants born to poor, young women (n~4,900)	Participant vs. nonparticipant	Participation dummy	Multivariate 2-stage least squares and fixed-effects model
Weight and/or height: Participant vs. nonparticipant comparisons					
Fey-Yensan et al. (2003)	Low-income areas in Connecticut (1996-97)	Low-income elderly living in subsidized housing (82% female) (n=200)	Participant vs. nonparticipant	Participation dummy	Chi-square tests and analysis of variance
Gibson (2003)	1985-96 NLSY	Low-income women, ages 20-40 (n=13,390)[2]	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Jones et al. (2003)	1997 PSID-CDS	Children ages 5-12 from households with incomes <185% of poverty	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Gibson (2001)	1997 NLSY-child supplement	Youth ages 12-17 (n=7,920)	Participant vs. nonparticipant	Participation dummy	Multivariate regression

See notes at end of table.

Continued—

Table 16—Studies that examined the impact of the Food Stamp Program on other nutrition and health outcomes—Continued

Study	Data source[1]	Population sample (sample size)	Design	Measure of participation	Analysis method
Bhattacharya and Currie (2000)	1988-94 NHANES-III	Youth ages 12-16 (n=1,358)	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Korenman and Miller (1992)	1986 and 1988 NLSY-child supplement	Children ages 0-7 (n=6,598)	Participant vs. nonparticipant	Participation dummy	Multivariate regression
Nutritional biochemistries: Participant vs. nonparticipant comparisons					
Dixon (2002)	1988-94 NHANES-III	Adults ages 20 and older (n=10,545)	Participant vs. nonparticipant (albumin, hemoglobin, serum iron, vitamin C, vitamin E, carotenoids)	Participation dummy	Multivariate regression
Bhattacharya and Currie (2000)	1988-94 NHANES-III	Youth ages 12-16 (n=1,358)	Participant vs. nonparticipant (iron, cholesterol, vitamin A, vitamin C, vitamin E)	Participation dummy	Multivariate regression
Lopez and Habicht (1987b)	1971-73 NHANES-I and 1976-80 NHANES-II	Low-income elderly (n=1,684, NHANES-I) and (n=1,388, NHANES-II)	Participant vs. nonparticipant (iron)	Participation dummy	Multivariate ANOVA
General measures of nutrition or health status: Participant vs. nonparticipant comparisons					
Fey-Yensan et al. (2003)	Low-income areas in Connecticut (1996-97)	Low-income elderly living in subsidized housing (82% female) (n=200)	Participant vs. nonparticipant	Participation dummy	Chi-square tests and analysis of variance
Gibson (2001)	1997 NLSY	Youth ages 12-17 (n=7,920)	Participant vs. nonparticipant	Participation dummy	Multivariate regression

[1] Data sources:
ASSETS = Avenues to Self-Sufficiency through Employment and Training Services.
FSS-CPS = Food Security Supplement of the Current Population Survey.
CPS = Current Population Survey.
CSFII = Continuing Survey of Food Intakes by Individuals.
CSFII-LI = Continuing Survey of Food Intakes by Individuals - Low-Income Samples.
NFCS-LI = Nationwide Food Consumption Survey - Low Income Supplement.
NFSPS = National Food Stamp Program Survey.
NHANES = National Health and Nutrition Examination Survey.
NLSY = National Longitudinal Survey of Youth.
PSID-CDS = Panel Study of Income Dynamics - Child Development Supplement.
SIPP = Survey of Income and Program Participation.
SPD = Survey of Program Dynamics.

[2] Multiple observations for each person, collected annually between 1979 and 1994 and biannually thereafter. Sample size represents person-years.

(2001) used data from the 1991 and 1992 SIPP panels and used a simultaneous equation model with two probits. The analysis examined reported levels of food insufficiency using the so-called "USDA food insufficiency question" that preceded the 18-item Federal food security module, the currently accepted standard for measuring household and individual food security (Price et al., 1997; Bickel et al., 2000). Huffman and Jensen (2003) expanded on the work done by Gundersen and Oliveira, incorporating information on labor force participation decisions and using the more severe outcome of food insecurity with hunger based on the 18-item Federal food security module. These authors also simulated the effects of changes in FSP benefits, unemployment rate, and non-labor income and found that FSP benefits were more effective in reducing levels of food insecurity with hunger than pure cash transfers. Future efforts to understand the impact of FSP participation on food security may benefit from a longitudinal approach that measures changes for households over time.

Birthweight

Two of the identified studies examined the impact of FSP participation on birthweight. Currie and Cole (1991) used data from the National Longitudinal Survey of Youth (NLSY) to investigate effects on infant birthweight of women's participation in the FSP and other means-tested programs during pregnancy. In addition to standard multivariate regressions, the authors estimated fixed-effects models, looking at birthweights of sibling pairs. Using an instrumental variables approach to control for self-selection, they found no significant effect of a mother's FSP participation on the likelihood that her infant would weigh at least 6 pounds.

Korenman and Miller (1992) completed an analysis that used the same data as Currie and Cole and similar analytic techniques. However, they estimated impacts for "very poor" women, those with incomes between zero and 50 percent of the poverty line, and "less poor women," those with incomes between 50 and 100 percent of poverty. In addition, they did not use instrumental variables and they adjusted NLSY income measures to exclude the value of FSP income. Findings from a fixed-effects model indicated that FSP participation was associated with a decreased likelihood of low birthweight (less than 5.5 pounds) among very poor women ($p < 0.10$). The authors reported this as a statistically significant finding, noting that the sample available for the fixed effects logit model of low birthweight (n=153) was small (and therefore had limited statistical power) because the two births in the sibling pair had to differ with respect to the outcome in order to be included in the model.

Weight and/or Height

Six of the identified studies assessed the impact of FSP participation on weight and/or height. Two studies examined linear growth and/or the prevalence of underweight among children. Five studies focused on the prevalence of overweight or obesity among children (1 study), adolescents (2 studies), adults (1 study), and the elderly (1 study). Gibson (2001) examined the prevalence of both underweight and overweight among adolescents.

Children and Adolescents

Korenman and Miller (1992) used NLSY data to examine the prevalence of stunting (defined as height-for-age below the 10th percentile on NCHS growth curves) and wasting (defined as weight-for-height below the 10th percentile) among infants and children up to age 7. The sample included children born between 1981 and 1987 who had height and weight measured in at least one of the NLSY Child Supplements (1986 or 1988).[47] Models, which did not control for selection bias, were estimated to look at both short-term and long-term effects of poverty and FSP participation. In models that controlled only for current income and FSP receipt during the year preceding the measurement, no significant FSP effect was found.

In a model that controlled for long-term poverty (measured by the average income-to-needs ratio of the mother over the 10-year NLSY time span), a modest but significant effect on stunting was found, with FSP participants more likely to be stunted. The authors speculated that the positive relationship between stunting and FSP receipt may reflect aspects of long-term economic deprivation that were not adequately captured in the model. A related analysis lends some credence to this hypothesis: Children who received FSP benefits for a portion of the years they were in poverty were significantly less likely to be wasted than children with a comparable poverty history who never received food stamps.

Bhattacharya and Currie (2000) used data from NHANES-III to examine the relationship between FSP

[47]The researchers pooled data for the 1986 and 1988 supplements, with the result that more than one observation was included for some sample members. They appropriately caution that this feature leads to overstated levels of significance because repeat measures for individual children are likely to be more highly correlated than measurements across children.

participation and obesity among youth between the ages of 12 and 16. They compared the proportion of youth who were obese, based on Body Mass Index (BMI).[48] Cutoffs were adapted from standards defined for adults. No FSP effect was detected.

Gibson (2001) used data from NLSY97 to examine the relationship between FSP participation and the likelihood that youth between the ages of 12 and 18 would be underweight or obese. Like Bhattacharya and Currie, Gibson used BMI to classify subjects and based her cutoffs on standards defined for adults. She estimated models that examined the impact of current FSP receipt and current income as well as models that controlled for long-term poverty. In the models that looked at current FSP participation, FSP participation was associated with a significant decrease in the likelihood that a youth would be obese. In the model that controlled for long-term poverty, this association was no longer significant. The authors did not attempt to control for selection bias because "it is difficult to come up with an appropriate instrument for Food Stamp receipt."

Jones et al. (2003) looked at the relationship between food security, participation in FANPs, including the FSP, and the risk of overweight among children 5-12 in low-income households (<185 percent of poverty). The authors used data from the 1997 Panel Study of Income Dynamics (PSID) Child Development Supplement. Risk of overweight was defined as BMI-for-age at or above the 85th percentile on BMI-for-age charts designed specifically for use with children and adolescents. Weights were reported by primary caregivers, and heights were measured by field interviewers. The authors indicated that approximately 86 percent of the children had been weighed within the preceding month and that 16 percent of caregivers had to estimate weight because they had no recent reference point.

The analysis compared the risk of overweight among children living in food-secure and food-insecure households, while controlling for participation in a number of FANPs as well as other relevant characteristics. Results showed that FSP participation did not affect the likelihood that males would be overweight, regardless of whether they lived in food-secure or food-insecure households. Among females, however, those who participated in the FSP had a significantly reduced odds of being at risk of overweight, compared with those who did not participate in the FSP. This was true for females living in both food-secure and food-insecure households.

All of these results are subject to selection-bias problems, an important consideration in any attempt to link weight status to participation in a food assistance program. In addition, results of both Bhattacharya and Currie (2000) and Gibson (2001) should be interpreted with caution because the BMI cutoffs used in their analyses were adapted from standards developed for adults rather than from the BMI-for-age charts developed specifically for use with children and adolescents (Kuczmarski, 2000). The use of self-reported weights in the Jones et al. (2003) study is a concern. It is doubtful that cross-sectional studies can adequately address questions about program impacts on children's weights and heights. Indeed, researchers who attempted to assess the impact of the WIC program on these outcomes concluded that a longitudinal study with serial measurements was essential (Puma et al., 1991).

Adults

Gibson (2003) used panel data from the 1985-96 waves of the NLSY to assess the relationship between FSP participation and obesity (BMI $\geq$ 30) among adults ages 20-40. Her analysis included measures of both current and long-term FSP participation. The sample was restricted to FSP participants and nonparticipating individuals residing in households that were income-eligible for the FSP.[49] Data on height and weight were self-reported.

Ordinary least squares models were estimated with and without fixed effects. Preliminary results showed that current and long-term FSP participation was significantly related to the prevalence of obesity among women, but not among men. For this reason, the detailed analysis focused exclusively on women. Four different fixed effects models were estimated with slightly different specifications. Results were largely consistent across models and indicated that, among low-income women, current participation in the FSP was associated with an increase in the predicted probability of current obesity of 2 percentage points (a 9-percent increase). Participation in the FSP in each of the previous 5 years, compared with no participation

[48]Body Mass Index (BMI) is the accepted standard for classifying adiposity (or fatness) in adults (Barlow and Dietz, 1998). Since 2000, BMI-for-age has also been recommended as a screening tool for children over the age of 2 (Kuczmarski et al., 2000).

[49]The income cutoff for nonparticipants was defined as a family income-to-needs ratio of no more than 2, relative to defined income eligibility criteria. This cutoff ensured that the panel included individuals who crossed in and out of poverty and FSP eligibility (and perhaps FSP participation), but remained near-poor when ineligible.

over that period, was associated with an increase in the predicted probability of current obesity of 4.5 percentage points, or roughly 21 percent.

To test the sensitivity of her results, Gibson reestimated all of the models using two different samples. She also estimated models that included controls for change in FSP eligibility and marital status in the previous calendar year as well as the timing of recent pregnancies-events that might trigger FSP participation. Finally, she examined the impact of current and long-term participation in AFDC (as an alternative indicator of "social program participation"). No detailed data were presented, but the author reported that estimates for all alternative models were similar to the main analysis in both magnitude and significance.

Although carefully designed and implemented, Gibson's analysis remains open to problems of selection bias and reverse causality. The fact that the analysis did not include information on food security status (because the data are not available in the NLSY) is also a concern. Other research has found a significant and positive association between food insecurity and the prevalence of overweight (see, for example, Townsend et al., 2001). A number of theories have been proposed to explain the apparently paradoxical relationship between food insecurity and overweight (see Gibson, 2003; Townsend et al.), but none has been thoroughly tested.

Elderly

Fey-Yensan et al. (2003) studied a small group of low-income elderly individuals in Connecticut. They reported that a greater percentage of FSP participants than nonparticipants had BMIs ≥27. The analysis was based on simple chi-square comparisons, however, and data on height and weight were self-reported.

Nutritional Biochemistries

Lopez and Habicht (1987b) examined a variety of measures of iron status among low-income elderly individuals in NHANES-I and NHANES-II. Differences between FSP participants and nonparticipants were not statistically significant. Moreover, differences were inconsistent in direction, in some cases suggesting that elderly FSP participants had better iron status than nonparticipants (total iron binding capacity, free erythrocyte protoporphyrin), and in other cases suggesting the opposite effect (hemoglobin, hematocrit, transferrin saturation, and serum iron).

Bhattacharya and Currie (2000) and Dixon (2002) both used data from NHANES-III to assess the impact of the FSP on a number of different nutritional biochemistries. Bhattacharya and Currie focused on youths ages 12-16 and examined the prevalence of anemia (based on low levels of hemoglobin or hematocrit), as well as the prevalence of high serum cholesterol and low serum levels of vitamins A, C, and E, among FSP participants and nonparticipants. No significant differences were detected.

Dixon's analysis focused on adults 20 and older. She compared the percentage of individuals with low serum levels of albumin, hemoglobin, iron, vitamin C, vitamin E, and carotenoids. She reported significant differences between FSP participants and nonparticipants for albumin, vitamin C, and carotenoids. As noted previously, however, Dixon did not limit her sample to low-income individuals and her model controlled for relatively few measured characteristics.

General Measures of Nutrition or Health Status

Two of the identified studies assessed the impact of FSP participation on general measures of nutrition or health status. In her 2001 analysis of NLSY97 data, described in a preceding section, Gibson examined self-reported health status and the prevalence of chronic disease (as reported by parents or other primary caregivers) among youths ages 12-18. Results showed that FSP participation was not significantly related to either outcome.

Fey-Yensan et al. (2003) examined self-reported general health status, self-reported functional status, and nutritional risk in a small group of low-income elderly individuals in Connecticut. Nutritional risk was measured using the Nutrition Screening Initiative (NSI) Checklist.[50] The authors found no significant differences between groups in general health status or functional status. They did find, however, that FSP participants had a significantly greater mean score on the NSI checklist (signifying a greater level of nutritional risk) than either income-eligible or higher income nonparticipants. The authors also reported that FSP participants were more likely than nonparticipants to report having fewer than two meals per day or not having enough money to buy food. As noted above, however, this study used simple chi-square analyses. Therefore, findings are suggestive only.

[50]The NSI is a national collaborative effort of professional organizations committed to identifying and treating nutritional problems among the elderly. Leading sponsors include the American Academy of Family Physicians, the American Dietetic Association, and the National Council on Aging. See www.aafp.org/nsi.xml.

Summary

The FSP provides benefits earmarked for at-home food consumption to low-income households of all types. A substantial body of literature establishes firmly that, while the greater part of food stamp benefits given to households are used to free up resources to spend on things other than food, FSP benefits do cause households to spend more on food than they otherwise would. Moreover, the San Diego cashout demonstration established firmly that the use of earmarked food stamp benefits leads to a greater increase in expenditures for at-home food than would occur if households received the same benefit amount as unconstrained cash supplements.

It seems likely that the FSP increases the availability of food energy and protein at the household level. Both of these effects were documented in a number of different studies, including the San Diego cashout study. The FSP may also increase the availability of a number of vitamins and minerals; however, the evidence in this area is weaker. The strongest study that reported significant effects on household availability of vitamins and minerals used data that were collected in the 1970s, before elimination of the purchase requirement. The San Diego cashout study found that FSP coupon households had greater availability of a number of vitamins and minerals than cash households, but the differences were not statistically significant.

The research shows little evidence that the FSP consistently affects the dietary intakes of individuals. There are scattered indications that FSP participation may improve vitamin and mineral intakes of young children, but these findings were not replicated in the most recent and well-conducted analysis. Moreover, limitations in measurement techniques and nutrition standards used in existing research make it impossible to adequately address the critical research question of whether the prevalence of inadequate nutrient intakes differs for FSP participants and nonparticipants.

Only a few studies looked at the impact of FSP participation on the intake of carbohydrates, fat, saturated fat, cholesterol, sodium, or fiber or on patterns of food intake. For the most part, these studies found little evidence of FSP impacts. Gleason et al. (2000), the strongest study completed to date, found that preschool FSP participants ate significantly fewer servings of grains and grain products than comparably aged nonparticipants and were significantly less likely to meet the *Dietary Guidelines* recommendation of less than 10 percent of total energy from saturated fat. This study also found that FSP adults ate significantly fewer servings of vegetables and less dietary fiber than nonparticipating adults.

Studies that looked at the impact of the FSP on food security have reported conflicting results. Some found that FSP participants were more likely than other low-income households to experience food insecurity. Other studies reported an inverse relationship-that FSP participants were less likely than nonparticipants to be food insecure. The relationship between FANP participation and food security is a complex one and is particularly vulnerable to problems of selection bias and reverse causality. Food insecurity is likely to lead households to seek food assistance, and receipt of food stamp benefits may subsequently improve the household's food security.

Two recent studies that used sophisticated techniques to attempt to control for selection bias suggest that, once selection bias is controlled for, FSP participants are no more likely to suffer from food insecurity (or insufficiency) than nonparticipants. Moreover, one of the studies suggested that FSP benefits are more effective in reducing levels of food insecurity with hunger than pure cash transfers.

Relatively little research has considered FSP impacts on other nutrition- and health-related outcomes. Moreover, the number of studies available for any given outcome and population subgroup is limited, and each study has important limitations.

The pattern of extant research suggests some paths for future research. There seems little need to document further the relationship between food stamp benefits and at-home food expenditures. However, given the increasing role that foods consumed away from home play in the diets of most Americans (Lin et al., 1999), a more detailed examination of the impacts of the FSP on expenditures for away-from-home food may be useful.

In general, the impact of the FSP on nutrient availability at the household level is of less interest than the impact on individual intakes. However, household availability is a more stable measure than individual intake and, therefore, has the potential for providing valuable information about the impact of the FSP. Future inquiries in this area should examine impacts associated with food use both at home and away from home.

Updated and improved studies of FSP impacts on individual dietary intakes are also needed because so many of the previous studies are dated, inconclusive, and

used dietary assessment methods that are not consistent with currently recommended practices (see IOM, 2001). Improved assessment of dietary intakes will increase the likelihood that studies can detect small but meaningful FSP impacts.

Given the increasing problem of overweight and obesity in the United States, additional research on the relationship between FSP participation and patterns of overweight and obesity is desirable. Ideally, height and weight data should be measured rather than self-reported. Such research should include measures of food security as well as other variables that may be associated with weight status and should include careful attempts to control for self-selection.

In addition, ongoing efforts to expand nutrition education in the FSP should be continued and evaluated. If the FSP is to influence dietary intakes of individual participants and, thus associated outcomes, such as bodyweight and other aspects of nutritional status, the program must provide effective nutrition education to participants or find ways to connect FSP participants with nutrition education activities sponsored by other programs and agencies.

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