Economic Research Service

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Electronic Publications from the Food Assistance & Nutrition Research Program

E-FAN-01-004

October 2000

Summer Feeding Design Study—Final Report

Volume I: Design and Costs for Program Component

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ACKNOWLEDGMENTS

In addition to the authors, many people contributed to this complex design project. We thank the project's expert panel for their many contributions in identifying and recommending program issues and research objectives for the study. The panel members were David Carson of the Missouri Department of Health, Deena Kolbert of the Community Food Resource Center of New York City, Dianne Radigan of the Ohio Hunger Task Force, and Linda Miller of the Maryland Department of Education. The expert panel participated in a meeting held at the beginning of the project to identify Summer Food Service Program (SFSP) research issues and factors that affect program operations at the state, sponsor, and site levels. The panel members also reviewed and provided comments on the draft instruments and draft reports.

Lynn Parker and Michele Tingling-Clemmons of the Food Research and Action Center attended the expert panel meeting and provided expertise about local program operations and suggestions for research priorities related to studying participation levels. Tom Slomba of the U.S. General Accounting Office (GAO) participated in the expert panel meeting and provided useful information and survey instruments from GAO's 1998 study of the effects of changes in SFSP reimbursement rates. We also received valuable input from the Educational Information Advisory Committee's Food and Nutrition Subcommittee, particularly Kathy Kuser and Charles Kirby.

The ERS project officers, Mark Jekanowski and Jane Allshouse, provided assistance and useful feedback throughout this study. Additional feedback from Betsy Frazao and David Smallwood of ERS was much appreciated. FNS staff, including Linda Jupin of the Child Nutrition Division and Anita Singh, Boyd Kowal, John Endahl, and Jay Hirschman of the Office of Analysis, Nutrition, and Evaluation, also contributed to the discussion of research issues, provided guidance and information about specific SFSP regulations and practices, and commented on the instruments and draft reports.

Our pretest of the data collection instruments would have been impossible without the cooperation of many SFSP staff from the FNS regional office level down to the site level. In particular, we would like to acknowledge the assistance of key administrators in the three states--Pennsylvania, New Jersey, and New York--in which most pretest activity was concentrated: Susan Still, Supervisor of the SFSP in Pennsylvania; Emma Davis-Kovacs, Coordinator, Bureau of Child Nutrition Programs, New Jersey Department of Agriculture; Frances O'Donnell, Coordinator, Child Nutrition Program Administration, New York State Department of Education (administers SFSP school sponsors); and Patricia Dombroski, Operations Chief, Food and Nutrition, USDA Northeast Regional Office (administers other New York sponsors).

Many people at MPR contributed to this study. Jim Ohls and John Homrighausen, who conducted the previous national study of the SFSP, provided invaluable advice and input on all aspects of this design project. Dr. Ohls also served as the quality assurance reviewer for all project reports, and Mr. Homrighausen reviewed the draft instruments. Frank Potter and Steve Williams provided technical expertise and review of the sample design. Sally Waltman helped develop the instruments, and Tamika Love produced them. Rhoda Cohen provided pretest training in coding meals and plate waste. Paul Myatovich, an experienced field interviewer, visited many of the pretest

sites and contributed to improving the instruments. Tim Novak developed the cost estimates, and Joey Cerf and Jocelyn Stroub updated them. The reports were edited by Daryl Hall, Walt Brower, Laura Berenson, and Patricia Ciaccio and produced by Melanie Lynch and Cathy Harper.

We gratefully acknowledge these contributions and accept full responsibility for any errors that remain.

CONTENTS

CONTENTS *(continued)*

CONTENTS *(continued)*

CONTENTS *(continued)*

TABLES

TABLES *(continued)*

FIGURES

I. INTRODUCTION

The Summer Food Service Program (SFSP) was created to provide children from low-income families with nutritious meals when school is not in session. Although the program has undergone many changes in eligibility criteria, administrative procedures, and funding levels since its authorization in 1975, it still serves many fewer children than the National School Lunch Program (NSLP), which aims to prevent hunger among children from low-income families by providing them with nutritious meals in school. The difference between the number of children who participate in each program has always been large. In 1999, 15 million children from low-income households participated in the NSLP, while only 2.2 million received meals through the SFSP (Food Research and Action Center [FRAC] 2000).

The Economic Research Service (ERS) of the U.S. Department of Agriculture (USDA) is interested in learning more about the factors contributing to the large gap in participation levels between the NSLP and the SFSP and in obtaining detailed information on SFSP operations and administration. Such knowledge will help the USDA's Food and Nutrition Service (FNS) to determine whether future changes in SFSP policy are warranted.

A. PURPOSE OF THE DESIGN STUDY

ERS contracted with Mathematica Policy Research, Inc. (MPR) to design a study to collect detailed information on SFSP state agencies, sponsors, sites, child participants, and eligible nonparticipants and to estimate the cost of such a study. Two of ERS's primary goals are to use the data to assess whether the program is efficiently meeting its goal of hunger prevention and to identify possible barriers to program participation among low-income children. ERS asked MPR to design an evaluation that can be completed prior to the next reauthorization period (FY 2003) and to assess

the feasibility and costs of conducting such an evaluation. The design study included the following components:

- Consulting with ERS and FNS staff and a panel of four experts to identify and prioritize key research issues
- Proposing an appropriate sampling frame and methodology for selecting a representative sample of program providers
- Developing methods of collecting and analyzing data from states, SFSP sponsors, former sponsors, and SFSP sites
- Identifying and developing feasible methods for collecting household and individual data on SFSP participants and eligible nonparticipants
- Developing an instrument for collecting data on participants and nonparticipants
- Pretesting data collection instruments
- Recommending final instruments based on pretest results
- Determining the costs associated with a study using these methods under different requirements for statistical precision

Volume I of this report focuses on program operations of SFSP providers. Volume II covers recommendations for a study of child participants and eligible nonparticipants. Volume III provides the survey instruments. The rest of this chapter provides an overview of the SFSP, discusses the program's history along with pertinent findings from other studies conducted on the SFSP, and outlines the structure of the report.

B. OVERVIEW OF THE SFSP

The SFSP is a federal program that operates in 54 jurisdictions (all 50 states, the District of Columbia, Guam, the Virgin Islands, and Puerto Rico). FNS administers the SFSP, providing funds to states to administer the program. In most states, a state government agency--typically, the state

education agency that administers the school meals program--also administers the SFSP. In states that choose not to administer the SFSP directly, FNS regional offices assume responsibility for the management of the program.

In 1999, SFSP participation taken as a percentage of participation in the free and reduced-price components of the NSLP was only 14.4 percent (FRAC 2000). State participation rates ranged from 2.9 percent in Alaska to 67.6 percent in Washington, DC (FRAC 2000).[1]

Local program sponsors, which are approved and monitored by the states, carry out the daily operations of the program. Eligible sponsors include public or nonprofit private school food authorities; public or nonprofit private residential summer camps; local, municipal, county, or state government units; public or private nonprofit colleges or universities participating in the National Youth Sports Program (NYSP); and private nonprofit organizations. In FY 1997, about 45 percent of sponsors were schools, about 19 percent were camps, 17 percent were government agencies, 16 percent were private nonprofit organizations, and 3 percent were NYSP programs (U.S. General Accounting Office [GAO] 1998b). Sponsors are responsible for applying for SFSP funds, providing meals or contracting with vendors to provide meals, and monitoring meal service.

Each sponsor operates one or more sites where meals are served free to children. In 1986, 63 percent of sponsors administered a single site; by 1997, however, this figure had decreased to 51 percent (Ohls et al. 1988; and GAO 1998b). Sponsors may operate multiple sites, and many do so. In 1997, six percent operated 25 or more sites (GAO 1998b).

[1]The SFSP participation figure includes *all* children who participate in the program, whereas the NSLP participation figure only includes those who are considered low-income and are eligible for free or reduced-price meals. It is possible that some higher-income children participate at SFSP sites, but this is expected to be a small percentage of all participants.

There are two types of eligible program sites: open sites and enrolled sites.[2] Open sites are located in neighborhoods where at least 50 percent of the children come from families with incomes at or below 185 percent of the federal poverty level. In enrolled sites, at least 50 percent of the children *attending* the program must live in households with incomes at or below 185 percent of poverty. According to data collected in 1986 (the last year for which relevant data are available), a large majority of sites (79 percent) were open sites.

Sponsors may receive reimbursement for meals served to all children (regardless of their families' income level) at an open site. Similarly, at enrolled sites, sponsors may receive reimbursement for meals served to all children who are enrolled in site activities, such as day camp. Residential summer camps may also qualify as SFSP sites. However, they differ from open and enrolled sites in that they only receive reimbursement for meals served to children who meet the income eligibility requirements. Thus, to qualify as an SFSP site, residential summer camps need only furnish income statements for children to whom they intend to serve SFSP meals that prove that the children are eligible for free or reduced-price school meals.

Currently, sponsors may be reimbursed by the USDA through the state for two meals per child per day (except for residential camps and sites serving migrant children, which can receive reimbursement for up to three meals). These meals may be prepared on-site, by a central kitchen, or purchased from a vendor and delivered to the site. The meals and snacks served at SFSP sites must meet the program's meal pattern guidelines, which specify the minimum amounts of several types of foods to be served at each meal. In 1986, more than 99 percent of the sites served lunch,

[2] Recent regulations include new definitions for sites: *closed enrolled site* (open only to enrolled children in which at least 50 percent of the enrolled children at the site are eligible for free or reduced-price NSLP); *open site* (meals are made available to all children in an area in which at least 50 percent of the children are from households that would be eligible for free or reduced-price school meals); and *restricted open site* (initially open to broad community participation, but at which the sponsor restricts or limits attendance for security, safety, or control reasons).

and one-third (33.8 percent) served breakfast (Ohls et al. 1988). Supper was served at 16.4 percent of the sites, whereas morning and afternoon snacks were provided at almost one-quarter of the sites (24.5 percent).

Reimbursement for each meal covers two types of costs: (1) operational costs, including the purchase, preparation, and delivery of meals, transportation (in rural sites), and program and staff time for supervision; and (2) administrative costs, including program management, office expenses, administrative salaries, insurance, and some financial management costs. Reimbursement rates for administrative costs vary by type of site, with higher rates paid for meals served at rural sites and self-preparation sites.[3]

C. LEGISLATIVE CHANGES AND PREVIOUS RESEARCH ON THE SFSP

The SFSP began more than 30 years ago as a pilot program that helped to provide meals to children--particularly those from low-income families--when school was not in session and NSLP meals were not available. In 1975, it was authorized as a permanent program that provided funding to sites in areas where at least one-third of the children came from families with an income at or below 185 percent of the poverty level. In 1977, the GAO documented evidence of excessive food waste, poor-quality food, spoilage, inadequate storage, failure to meet meal-pattern guidelines, and other abuses. In an effort to address these issues, Congress restricted the use of private food service companies and vendors, enacted more stringent reimbursement rules, limited the size of some nonprofit organization sponsors, and reformed monitoring and administrative practices (GAO 1990, 1991a, and 1991b). These program changes contributed to a decline in the number of children who

[3]Reimbursement rates for all meals are also higher in Alaska and Hawaii.

reported receiving meals through the SFSP. After reaching a peak of 2.8 million children in 1977, participation levels fell between 1977 and 1981 to approximately 1.9 million (FNS Web site 2000).

In response to continuing reports of problems with the program, Congress, in the Omnibus Budget Reconciliation Act of 1981, reduced funding for the SFSP by $400 million, barred private nonprofit sponsors other than schools and residential camps from participating in the SFSP, and increased the percentage of low-income children required in an area for sites to be deemed eligible for the program from 33 percent to 50 percent (FNS Web site 2000). As a result of these legislative changes, the number of low-income children participating in the SFSP dropped even further: the program served only 1.4 million children in 1982, compared to 1.9 million in 1981 (FNS Web Site 2000).

FNS contracted with MPR to evaluate the 1986 SFSP. The study was designed to serve two broad purposes: (1) to describe the current operating, administrative, and meal-service characteristics of SFSP sponsors and sites; and (2) to describe the costs incurred by states and sponsors participating in the program. Study findings include the following:

- In 1986, the SFSP served 1.5 million children.
- The ratio of SFSP participation to NSLP participation varied from .06 in the Southwest and Mountain Plains regions to .28 in the Northeast.
- Ninety-four percent of child participants attending sampled sites were served meals that fully met USDA meal pattern requirements.
- Between 60 and 70 percent of the food served to SFSP participants was actually eaten. On average, 80 percent of the milk served was actually consumed.
- On average, 68 percent of sites in state-administered programs were reviewed annually. The corresponding figure for sites in programs administered by the FNS regional office was 30 percent.
- More than half of the interviewed sponsors reported operating costs and administrative costs that exceeded the maximum reimbursement levels.

- States that administered their own SFSP devoted significantly more resources to the program than states whose SFSP was administered by an FNS regional office. The median cost per participant for the state-administered programs was $2.75, while the corresponding figure for FNS-administered programs was $1.20.

- Camp sponsors reported higher costs per meal than other sponsors. School sponsors had higher costs than government sponsors.

Although the program appeared to have improved in operational integrity, the low levels of participation heightened concerns that the program was not adequately serving children from low-income families, leading to program changes designed to increase participation. These changes included (1) in 1986, extending automatic eligibility to children in families receiving Aid to Families with Dependent Children (AFDC) or food stamps; (2) in 1988, making private colleges and universities participating in the NYSP eligible to sponsor SFSP sites; and (3) in 1989, reversing the earlier changes making private nonprofit organizations other than schools ineligible to be sponsors. Between 1989 and 1994, the number of children participating in the SFSP rose steadily, from 1.7 million to 2.2 million (FRAC 1999).

In 1995, participation levels decreased slightly as a result of sponsor cutbacks in anticipation of major changes in the child nutrition programs. The number of children participating in the SFSP increased slightly in 1996 and has been relatively stable at about 2.1 million from 1996 through 1999 (FRAC 2000). Thus, the focus of program change has once again shifted to improving administrative procedures and reducing program operating costs. In particular, the most recent comprehensive welfare reform legislation, the 1996 Personal Responsibility and Work Opportunity Reconciliation Act, lowered reimbursement rates and the number of reimbursable meals per day. It also eliminated start-up and expansion grants and streamlined administrative requirements.

According to a recently published GAO study, as of summer 1997, the reductions in reimbursements had had little impact on the number and characteristics of sponsors participating in

the SFSP or on the number of children served. Some sponsors reported, however, that they substituted less expensive foods for those previously served, reduced staff wages, and reduced the number of sites (GAO 1998a and 1998b).

The share of sponsors that participated in the program in FY 1996 but did not return in FY 1997 was 9.9 percent, and the dropout rate from FY 1997 to FY 1998 was 7.9 percent (GAO 1998b). According to state officials interviewed by GAO (1998b), only 5.5 percent of the sponsors that left the program in 1997 and 1998 did so because of cuts in the reimbursement rate. However, fully 27 percent dropped out for unknown reasons (GAO 1998b). In general, small sponsors and private nonprofit sponsors were more likely to leave the program, but they were also the groups more likely to drop out as a result of reimbursement reductions (GAO 1998b).

Some USDA officials speculated that major changes as a result of reduced reimbursements would likely be seen only in 1998 after sponsors had adequately assessed their ability to operate sites with a decreased reserve of financial resources. Advocacy groups suggest that the rate of increase in the number of program sponsors between 1997 and 1998 was much slower than in the early 1990s as a result of the reimbursement rate cuts (FRAC 1999). However, the data they cite does not definitively show a link between reimbursement rates and program sponsorship.

In order to improve program access for low-income children, Congress relaxed many of the restrictions on private nonprofit sponsors when it passed the Child Nutrition Reauthorization Act on October 31, 1998. The law expanded the number of sites that nonprofit sponsors could operate to 25 and eliminated prohibitions on contracting with commercial vendors. The effect on program participation remains to be seen.

D. ORGANIZATION OF VOLUME I

Volume I of this report details MPR's proposed sampling frame for collecting information about SFSP states, sponsors, former sponsors, and sites, and it outlines recommended methods of selecting providers for the sample. It also describes the data collection and analysis plans, as well as their costs. Chapter II discusses the research questions and the key variables and measures needed to address these questions. Chapter III describes the sample design for states, sponsors, and sites. The chapter also discusses the various design options considered by the project team; explains the impact of sample sizes, statistical precision, and power on the ability to obtain sound estimates; and describes the construction of sampling weights. Chapter IV covers the proposed data collection plan and the issues considered by the design team in making recommendations for the design and content of the data collection instruments and in selecting appropriate respondents. Chapter V describes the analytical techniques and plans for using the state, sponsor, former sponsor, and site data. Finally, Chapter VI discusses cost estimates for the proposed design at two levels of precision for the various data collection components for the program operations study.

II. RESEARCH QUESTIONS AND METHODOLOGICAL ISSUES

The SFSP Design Study is intended to help ERS determine the appropriate sample and data collection design, analytic methods, and estimated costs of a national study of the SFSP. The study has two primary components: (1) an evaluation of program operations, and (2) a study of participants and eligible nonparticipants. The program operations component of the study involves collecting data on state, sponsor, and site operations. MPR developed a sample design and data collection methods that ensure that information gathered on states, sponsors, and sites is nationally representative. We recommend a sampling strategy that will provide representative samples of sponsors and sites of various types, sizes, and locations.

A. CURRENT RESEARCH AND POLICY ISSUES

While many of the research issues today are similar to those addressed in the 1986 study, recent changes in SFSP legislation and continued low participation rates have spawned new issues involving the effectiveness of the SFSP in reaching eligible low-income children. Issues similar to those in the 1986 study include the need for a basic description of how the program operates at its various administrative levels, since the SFSP is very decentralized and little information on operations is collected as part of regular administrative reporting mechanisms. In addition, there have historically been concerns about program management and integrity, also related to the decentralized and relatively informal nature of the program.

New issues include concerns about the effects of recent federal actions that reduced SFSP reimbursements. How have these changes affected the ability of sponsors to manage administrative and operating costs or the ability of states to attract, train, and monitor new sponsors? While there are efforts by states and sponsors to expand the program, staffing levels and reimbursement for

administrative costs may not be keeping pace with expansion efforts and growth in the program. Successful sponsors build partnerships and are resourceful about securing supplemental funds, in-kind assistance, and volunteers. What strategies do sponsors use to build these partnerships?

Recent regulatory changes are aimed at (1) streamlining application procedures for experienced sponsors;[1] and (2) targeting state monitoring requirements to new and large sponsors, as well as to sponsors who have operational deficiencies or frequent staff turnover (*Federal Register,* Vol. 64, December 29, 1999). Another research issue involves the assessment of administrative costs, of approval and notification procedures, and of interactions between the state and the sponsor. Whether the state provides training on fiscal management is also of research interest. Insight into states' and sponsors' perceptions of program management and administrative issues could very well guide future improvements to the SFSP.

Factors that contribute to the participation (or lack of participation) of low-income children in the SFSP are a central research and policy concern. A number of factors may contribute to low participation rates among eligible children. These factors include the absence of the SFSP in areas where eligible children live, the lack of awareness of parents and children that a site exists in their area, and access issues such as safety concerns and transportation problems. Although these factors are expected to be a central focus of the participant/nonparticipant study, they can also be explored in the program operations study. For example, information on sponsors' outreach activities to the community is key to the relative importance of parents' knowledge of the program in determining their children's participation. Also of interest is whether site activities other than food service attract children and their parents to the program.

[1]Defined as sponsors who have successfully participated in the program in the prior year.

The quality of meals served in the SFSP is of utmost importance to the integrity of the program, to the children who participate in the program, and to the sponsors' success in having children return to their sites during the summer. The use of vendors as meal providers has increased, but the effect of vendor-provided meals on meal quality and acceptability has not been studied in recent years. The sponsors' procedures for working with and monitoring vendors and the characteristics of vendors are likely to be key determinants of whether the sites serve high-quality, safe foods that meet SFSP standards. The issue of whether SFSP meals meet nutritional standards is equally important for assessing sites that prepare meals or secure meals from central kitchens. Also important is the extent of plate waste in the program and whether plate waste is less for sites using "offer versus serve" (OVS).

Another research issue is whether and how the type of sponsor (school, government, camp, nonprofit organization, or NYSP) relates to long-term success in securing and monitoring sites that meet the needs of low-income children. Schools remain a major sponsor of the SFSP, but it is unclear why more schools are not participating in the SFSP when they participate in the NSLP. What are the characteristics of schools that sponsor the SFSP compared with schools that take the summer off, and what are the reasons for these decisions? Given past controversies concerning nonprofit sponsors, their role in expanding the program is also of interest to the study. It will be important to assess state efforts to obtain sponsors of different types and to expand the program in rural areas.

B. RESEARCH TOPICS AND QUESTIONS

Table II.1 provides recommendations for the major research topics on which data need to be collected and for who would be the most appropriate respondents to provide information on these

TABLE II.1

DATA COLLECTION SURVEY INSTRUMENTS AND RESEARCH TOPICS

Data Collection Target Group/ Survey Instrument	Research topics									
	Sponsor Participation	Administrative Costs	Training/ Monitoring	Outreach Activities	Site Activities	Children's Participation	Parents' Attitudes	Transportation/ Access Issues	Meal Quality/ Food Safety	Plate Waste
Administrative Data										
Previous Year's Program Data (from FNS)	U					U				
Review of Application Forms	U									
Review of Claim Forms	U	U				U				
States										
State Administrator Survey	U	U	U	U						
Sponsors										
Sponsor Survey	U	U	U	U	U	U		U	U	
Former Sponsor Survey	U	U	U	U	U	U		U		
Sites										
Site Director Survey		U	U	U	U	U	U	U	U	U
Site Observation					U	U		U	U	
Observation of Meals									U	U
Plate Waste Survey										U
Participants/Nonparticipants										
Parent Survey				U	U	U	U	U	U	

topics. Information on several broad research topics is required to evaluate how program operations contribute to participation levels and the nutritional benefits of such participation. These topics are:

- Administrative procedures at the state level (for example, sponsor application process)
- Factors affecting participation of sponsors
- Program management and operations at the sponsor level (for example, training, monitoring, and outreach)
- Financial management (for example, procedures for vendor contracting, how other funding sources are used to help meet administrative and food costs)
- Site operations, including activities offered, availability in urban and rural locations, transportation, and staffing
- Participation of children and the number of meals served
- Quality and safety of meals offered/served and the extent of plate waste
- Factors affecting participation of eligible children in the program

We developed the list of research topics on the basis of a thorough review of the literature, the areas of interest to USDA outlined in the RFP, and SFSP findings from the 1986 MPR study and the 1997 GAO study. Our discussions with ERS and FNS staff were critical to further delineating the current policy issues of interest to USDA. Additional discussions with GAO staff who conducted the 1997 study provided practical information about program operations and feasible data collection strategies. In particular, the 1997 study provided information on the reasons that sponsors left the program and on the relationship of dropping out to recent federal policy changes. Discussions with senior nutrition policy staff at FRAC also provided important insight into local community and advocacy issues regarding the need to expand the program to better meet the nutritional needs of low-income children. Finally, the meeting of our expert panel on December 10, 1999, provided

abundant insight into program operations and related issues. Appendix A includes a summary of the expert panel meeting, the meeting agenda, and the list of meeting participants.

Table II.2 highlights the major research questions that the program operations study will address. The table includes research questions compiled by the design team and modified based on input from ERS, FNS, and the expert panel. Further modifications to the list were made to be consistent with revised instrument topics and the pretest experience.

C. KEY VARIABLES

To assess these primary topics of interest, information on key variables must be collected at various administrative and operational levels of the program. Table II.3 provides a selected list of key variables needed to study program operations across states, sponsors, former sponsors, and sites. The key variables denote the type of information needed to (1) construct the sample frame at each stage of sample selection;[2] (2) study the program characteristics and practices at the state, sponsor, and site levels; and (3) analyze the factors that contribute to children's participation or lack of participation in the program. As Table II.1 indicates, asking for information on common topics across operational levels of the program provides an opportunity to evaluate different perspectives and to assess positive and negative effects of program operations on participation levels.

1. States

States will be able to provide key information on whether they or the FNS regional office administers the program. States will also provide information on recent and current sponsors and

[2]For example, FNS administrative data on the number of children and meals served in the previous year will be used as a measure of size for sampling sponsors.

TABLE II.2

EVALUATION DESIGN: KEY RESEARCH TOPICS AND QUESTIONS

Research Topics	Research Questions
STATE ADMINISTRATION AND PROGRAM MANAGEMENT	
State Administration	To what extent does the state provide training and technical assistance to new sponsors?
	To what extent does the state provide ongoing assistance and training to current sponsors?
	What role does the state play in training site personnel?
	Are site reviews more likely to be announced or unannounced by the state?
Eligibility Requirements	How often does the state have to turn away a party interested in sponsoring the program because the proposed site does not meet the 50 percent cutoff?
Administrative Costs	Are administrative costs covered, or are supplemental funds needed to cover administrative costs?
	What are the sources of supplemental funds?
Staffing	Is state staffing adequate to find, train, and monitor sponsors?
	What are the primary reasons for recent changes in staffing?
Approval Process	What is the state's deadline for applications from new sponsors? From experienced sponsors?
	What are the primary reasons for a state not approving a sponsor?
Outreach Efforts to Increase Participation	What strategies does the state use to inform potential sponsors about the program? To retain sponsors?
	Does the state partner with other organizations to attract new sponsors?
	What do states report to be the reasons for low participation rates among eligible children?
SPONSOR PARTICIPATION AND PROGRAM MANAGEMENT	
Sponsors' Views of the Program	How do sponsors view the program?
	How do sponsors view technical assistance provided by the state?

TABLE II.2 *(continued)*

Research Topics	Research Questions
Factors Affecting Sponsor Participation	What factors lead sponsors to leave the program?
	How have the number of meals served by sponsors changed? The number of sites operated?
	What are sponsor's perceptions about barriers to participation by eligible children?
	Are sponsors interested in increasing participation, and does this vary by sponsor type?
	Have sponsors forged partnerships with other organizations (for example, faith, advocacy, public service)?
Application and Approval Process	How long does it take to complete an application?
	Can the form be filled out on-line?
	How and when are applicants informed of decisions regarding their application to be sponsors?
Costs	What types of sponsors incur lower costs?
	What is the ratio of paid to volunteer staff in the program?
	What are the sources of supplemental funds or in-kind assistance?
SITE OPERATIONS	
Site Characteristics	What are the typical site hours of operation?
	What is the age distribution of participants?
	What proportion of sites are urban, suburban, or rural area?
	What proportion of sites are open or enrolled?
	What is the average ratio of sites to sponsors? What proportion of sponsors have only one site?
Other Activities at Site	What proportion of sites offer other activities aside from meal service?
	What activities are associated with higher participation?
QUALITY OF MEALS	
Meals Offered	Which meals are served at most sites?
	What is the nutrient content of meals served?
	Do meals meet program standards?

TABLE II.2 *(continued)*

Research Topics	Research Questions
	Do meals meet the *Dietary Guidelines for Americans*?
	Do sites normally have enough meals to feed all children?
	How much advance notice do sites need to adjust meal orders?
	Is the amount of food served sufficient for children of various age groups?
Meal Service Characteristics	How does the timing of the meal service affect participation?
	Does the number of meals served at a site relate to participation levels?
	Are appropriate food safety/storage practices followed?
	What proportion of sites use OVS?
USE OF VENDORS BY SPONSORS AT NON-SELF-PREPARATION SITES	
Selecting a Vendor	What proportion of states have dropped registration for commercial vendors?
	What is the usual procedure for dealing with school vendors?
	What criteria are most important to sponsors in selecting a vendor?
	What effect has dropping registration for commercial vendors had on vendor interest, the quality of food, and sponsor staff time to monitor vendors?
Characteristics of Vendors	Do most sites use a primary vendor that is a school or a private entity?
	What is the average length of time that a vendor has served the same sponsor?
	How much notice do vendors require to adjust the quantity of meals?
	How many sites does a vendor typically serve?
	How do sponsors transport meals to sites? Or children to sites?
Monitoring of Vendors	How do sponsors monitor vendors?
	How much time do sponsors spend on monitoring vendors?

TABLE II.2 *(continued)*

Research Topics	Research Questions
On-Site Meal Preparation	What are the advantages and disadvantages of on-site meal preparation?
	How are site staff who prepare meals trained and monitored?
Training	What types of training do states offer to sponsors? To sites?
	Do states provide sponsors with fiscal management training?
	To what degree are site employees trained in food safety, meal counts, and other aspects of food service?
EXTENT OF PLATE WASTE	
Food Characteristics	How prevalent is plate waste for hot foods? For cold foods? For each required meal component?
	Are there differences in the degree of plate waste between self-preparation sites and vended sites?
	Which foods are most popular among children? Which are least popular?
PARTICIPATION OF CHILDREN	
Parental Awareness of the SFSP	How is the program marketed to potential participants and their families?
	What strategies are used to inform parents and children about the program?
Transportation and Safety	Where is the site located (for example, in a school, in a park)?
	Has the site implemented strategies to rectify any transportation issues?
	What proportion of sites have security guards?

OVS = offer versus serve.

TABLE II.3

KEY VARIABLES FOR SURVEYS OF STATES, SPONSORS, FORMER SPONSORS, AND SITES

Key Variables	Target Group			
	States	Sponsors	Former Sponsors	Sites
SFSP Participation				
Number of eligible children	X			
Number of children served	X	X	X	X
Number of meals served	X	X	X	X
Mean daily participation rate	X	X	X	X
FNS region	X			
Geographic location		X	X	X
Sponsorship				
Number of sponsors	X			
Type of sponsors	X	X	X	X
Number of years as a sponsor		X	X	
Number of sites (sponsored)	X	X	X	
Program Operations				
Number of staff	X	X	X	X
Administrative costs	X	X	X	X
Operating costs	X	X	X	X
Food costs		X	X	X
Need for supplemental funds/sources		X	X	X
In-kind contributions/volunteers		X	X	X
Training (type, duration, frequency)	X	X	X	X
Monitoring (type, duration, frequency)	X	X	X	X
Outreach activities	X	X	X	X
Site Operations				
Number of weeks of operation per year		X		X
Number of hours of daily operation		X		X
Attendance				
In the past day		X		X
In the past week		X		X
Over the summer		X		X
Usual		X	X	X
Open or enrolled sites		X	X	X
Activities provided		X	X	X
Urban/rural location		X	X	X
Meals Offered				
Vended, on-site, or central kitchen food preparation		X	X	X
Types of meals (breakfast/lunch/dinner/snack; hot/cold)		X	X	X
Use of OVS meal option		X		X
Quality of meals		X		X
Meal waste/shortages		X		X
Food safety		X		X
Plate Waste				X

on the number of sites in the state. Key information on participation, such as the number of children and meals served, is useful for defining the sampling frames and for describing program participation across states and sponsors. Information on FNS administrative regions can be used to describe program practices and participation across the geographic regions of the country. Information on FNS regions may also be useful for characterizing administrative procedures that may account for differences in program practices and effectiveness across states.

2. Sponsors and Former Sponsors

Years of sponsorship experience and number of sites (and children) sponsored are important variables in understanding the differences in program operations and successful outreach efforts by sponsor type. It is anticipated that former sponsors and current sponsors will be asked many of the same questions to assess reasons that contribute to sponsors leaving the program or not being approved.

It is also important to assess program operations such as staffing, training, monitoring, and outreach activities across the state, sponsor, and site levels. The adequacy of reimbursement for administrative and food costs at the sponsor level is of interest in documenting (1) the changes sponsors make if costs exceed reimbursement, and (2) the sources and use of supplemental funds to cover the program when reimbursements are inadequate.

3. Sites

Variables to assess site operations include the type of site (open, restricted open, or closed enrolled); the number of weeks, days, and hours of site operation; and activities offered to participants. Characterization of sites as urban, suburban, or rural will allow comparisons of program availability and participation rates in urban and rural locations.

Finally, a full evaluation of program operations will include an assessment of the types and quality of SFSP meals provided to children and an assessment of plate waste. Information on whether meals are provided by a vendor or are prepared by a central kitchen or on-site will be used in combination with information on meal quality and safety and on overall satisfaction with meals by parents and children. Sample menu and meals information will be used to quantify the contribution of SFSP meals to food and nutrient intakes. Information on plate waste will be used to assess the amount of nutrients wasted from meals offered to children and program cost implications.

D. METHODOLOGICAL ISSUES RELATED TO SFSP OPERATIONS

ERS specified an ambitious set of research objectives for the planned SFSP study, and the expert panel raised additional issues about program operations and the participation of low-income children. Designing a study to meet all of the goals poses significant methodological challenges. This section describes the measurement issues pertinent to collecting the information needed to meet the study's research objectives in light of feasibility and cost constraints.

The nature of the SFSP poses a number of significant challenges for assessing program coverage and participation. First, in most areas of the country, the program operates for only two months of the year, at most, greatly complicating the logistics of planning data collection operations.[3] Second, since the program is administered through states and some FNS regional offices, there is no national list of sponsors. Sponsor lists must be built from the state or regional office level each year. Third, sponsors vary in size and can sponsor from one to hundreds of sites within a state or geographic area.

[3]At some locations where there are year-round schools, the program may be offered during breaks and vacations throughout the school year.

Designing a study that meets these methodological challenges requires a careful, innovative effort to develop several different, complementary approaches to data collection and analysis. Among the major components for the design of the program operations study are:

- Systematic interviews of program staff at the different levels of program operations, together with site visits to observe operations at the site level, where program services are directly provided
- Systematic interviews with sponsors who have recently left the program or who have been dropped from the program by states
- Approaches for recording the content of SFSP meals and amounts of plate waste that also take into account the unique characteristics of meal service operations in the program

Further information about the timing of data collection and recommended data collection procedures is presented in detail in Chapter IV.

III. SAMPLE DESIGN

This chapter presents MPR's recommended sample design for collecting data on national samples of SFSP state administrators, sponsors, and sites. We developed a design that is optimal for the sponsor and site data collection, and appropriate if a study of participants and nonparticipants is also conducted. A participant/nonparticipant study affects the timing of the data collection efforts for the program component.

The recommended sample design for the program operations component reflects the careful consideration of the data properties, cost factors, and timing issues associated with each of the four separate, but related data collection levels: (1) states, (2) sponsors, (3) former sponsors, and (4) sites. Several factors were considered in developing this design:

- ***Precision Options.*** The choice of precision standards for alternative sample sizes, so that ERS is able to evaluate the cost of the study at several levels of precision. For reasons discussed in Section III.A, we present sample sizes to achieve a 5 and 10 percent coefficient of variation (CV), with the 5 percent level indicating greater precision.

- ***Clustering.*** The possible use of geographic clustering to minimize the costs of achieving a desired level of precision

- ***Data Linkages.*** The desirability of linking data obtained at different administrative levels (such as sponsors and sites)

- ***Oversampling.*** The likely need to oversample particular subgroups of sponsors and sites, such as those located in rural areas, so that we can describe them with adequate precision

- ***Time Constraints.*** The constraints of the limited data collection period and the short time between the availability of some of the sample frame information and the period during which data collection must occur

- ***Unit of Analysis.*** Whether the analysis should be at the level of children served by the various administrative entities or at the level of the administrative entities themselves

These issues, and how we assessed them, are presented briefly in Section A of this chapter. The rest of this chapter presents the derivation of our recommended sample design, for two levels of precision. Briefly, the recommended sample design is as follows:

- Interviews with state administrators will be a census of the 54 state and territory administrative offices.

- A stratified, three-phase selection procedure will be used to select sponsors:

  - Sponsors stratified into 35 strata consisting of seven region/ADA groups[1] by three sponsor types--continuing, new, and former sponsors--plus, for continuing and former sponsors, stratification by urban/rural states.

  - Sponsors will be selected with probability proportional to size from a stratified national list, without a prior state-level stage of selection. Continuing sponsors will be selected from the previous year's lists, and new sponsors will be selected from a list of new sponsor training attendees. Some former sponsors will be identified from the prior-year lists, with a supplemental sample selected from the current lists when they become available.

  - Two sponsor sample size options are recommended for continuing and new sponsors[2] combined:

    - A sample of 480 sponsors at a 5 percent CV, based on a binary variable with a 50 percent mean

    - A sample of 120 sponsors at a 10 percent CV, based on a binary variable with a 50 percent mean

  - A former sponsor sample size of 200, which is estimated to achieve a 5 percent CV, or a sample size of 100 to achieve a 10 percent CV.

[1]Regional stratification ensures that the sponsor sample encompasses geographical diversity in factors such as population characteristics, administrative procedures, and economic conditions.

[2]We assumed that 90 percent will be continuing sponsors and 10 percent will be new sponsors, based on the GAO study (GAO 1998b).

- For the site observations, which must be completed in person, we recommend a two-stage design with two sponsor/site sample size options:

  - A sample of 350 sites to yield a 5 percent average CV for variables similar to those studied in the 1986 survey. This design option consists of selecting about 240 sponsors and selecting an average of about 1.5 sites from each sponsor. The sponsors from which sites are selected will be a random subsample of the full sponsor sample, taking into consideration measures of size, type of sponsor, and other sponsor characteristics such as urban/rural location that were included in the initial sponsor selection.

  - A sample of 150 sites to yield a 10 percent average CV. This design option consists of selecting about 100 sponsors from a national list and selecting an average of 1.5 sites from each sponsor.

Figure III.1 presents a summary of the sample design.

A. KEY FACTORS AFFECTING DEVELOPMENT OF THE SAMPLE DESIGN

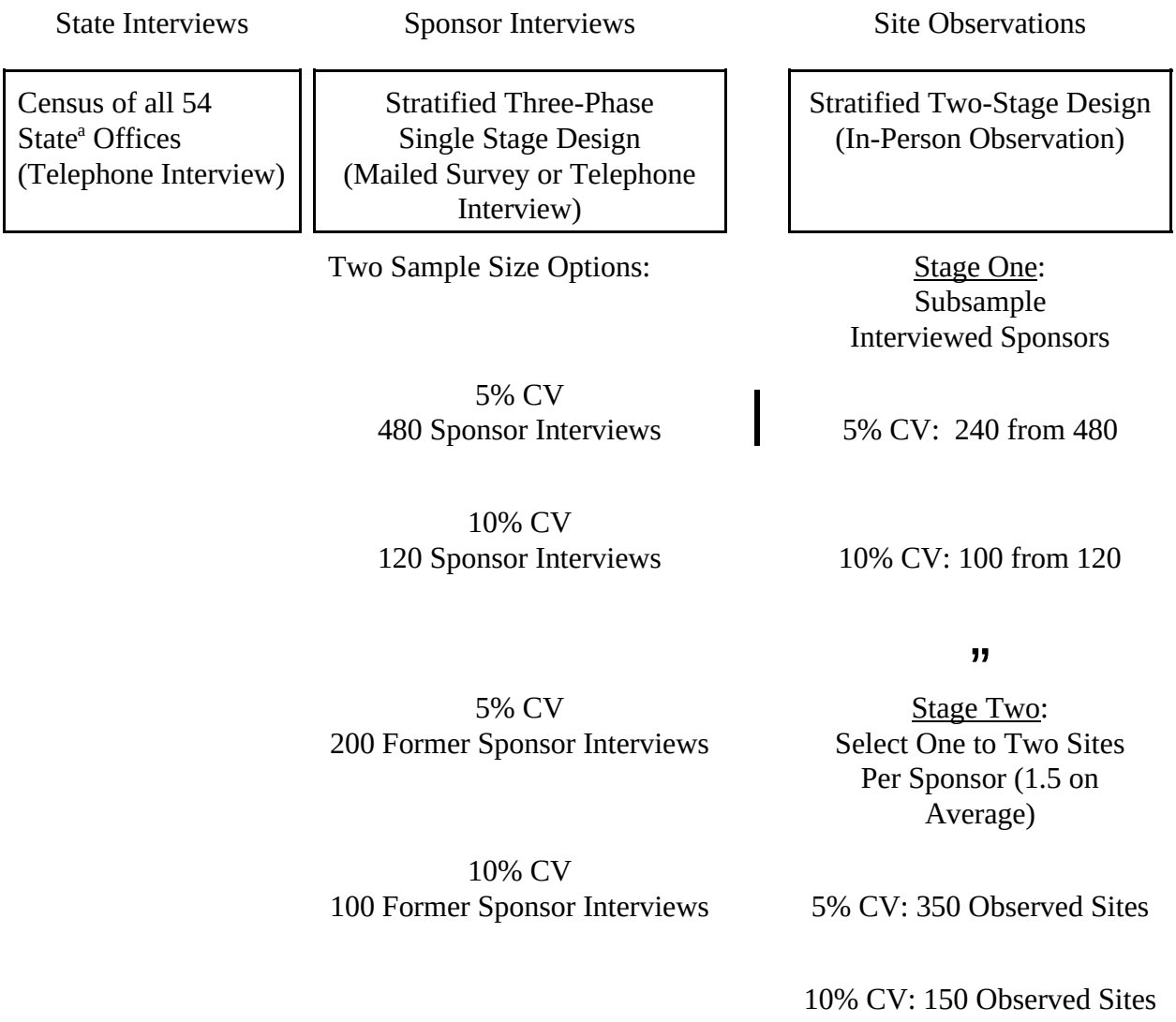
This section discusses in detail the six key factors that shaped the sample design.

1. Precision Standard

For the sponsor and site sample designs, we provide two sample size options (in all cases stated in terms of completed interviews or observations) that correspond to more precise and less precise estimates. The sample size options are designed to yield either a relative sampling precision in the estimate (referred to as the CV) of 5 or 10 percent. The CV is defined as the standard error of the estimate divided by the mean. Based on the 1986 study, we expect that the data items collected in this study will include both categorical variables and continuous variables, with wide differences in the means. The use of the CV to define the precision standard provides a convenient and equivalent basis for evaluating the precision in the survey estimates across different variables. A CV of 10 percent in a 50 percent characteristic (that is, a binary yes/no variable with a mean of 50 percent) is equivalent to the statement that the 50 percent characteristic has a 95 percent confidence interval

FIGURE III.1

OVERVIEW OF RECOMMENDED DESIGN



[a]50 States, District of Columbia, Guam, Puerto Rico, and Virgin Islands.

between 40.2 percent and 59.8 percent (plus or minus 9.8 percentage points) or a 90 percent confidence interval of 41.7 percent to 58.3 percent (plus or minus 8.3 percentage points).

The recommended sample sizes for the site observations and sponsor interviews are based on the same precision levels of a 5 and 10 percent CV, but the standards were applied differently at the sponsor and site levels. For the site sample design, we considered the precision of several data items from the 1986 study. The design options had a greater effect on some variables than on others, and the variables differed considerably in their distributional properties. For some of the variables with a large level of variability in the responses, the sample sizes required to meet the stated precision levels were unrealistic.[3] As a result, we decided to consider the average precision of the variables, rather than require that the precision standard be met for each variable individually. The site sample requirements are expressed in terms of the sizes required to yield an average CV of 5 percent or 10 percent across the 10 variables considered. Selection of these variables is described in more detail in Section B.2 of this chapter.

For the sponsor sample design, we used a standard technique to compute the required number of completed interviews, which was not based on analysis of the 1986 survey data. We designed the sample sizes to yield the stated CV for a 50 percent population characteristic. This decision was based on two factors: (1) we realized that, as for the site analysis, the survey information was dated; and (2) this approach recommended a sample size for a 5 percent CV that was larger than the sample size recommended for the site observations, suggesting it was a more conservative approach. Because the sponsor interviews can be conducted at a fraction of the cost of the site observations, we decided to recommend the larger, more conservative sample size.

[3]For example, some variables required in excess of 1,300 site observations to reach a relative precision level of 5 percent.

2. Geographical Clustering

Given the in-person nature of the site observations, the sampling methodology selected has a substantial impact on the cost of the study. In particular, the in-person field survey costs are a function of the distance the interviewer has to travel to a site. Hence, in-person interview studies typically attempt to geographically cluster the interviewing sites to reduce cost. Because this process tends to reduce the sampling precision in the estimates, one must strike the appropriate balance between the two competing factors. (In contrast, the state and sponsor interviews are conducted by telephone [or mail option for the sponsor], so most of the survey costs are a function only of the sample size.)

In Sections B and C of this chapter, we present the results of a study to examine the sampling precision and cost trade-offs associated with different levels of geographic clustering of the sites. In Section B, we use the 1986 survey data to evaluate the expected precision in the estimates as a function of the design methodology and completed sample sizes. In Section C, we present a budgetary analysis of two hypothetical studies, the first of which uses a state-clustered design, and the second of which does not.

3. Linkages Between Interviews at Different Levels

The hierarchical nature of the three groups in this study (states, sponsors, and sites) argues for a similarly structured design strategy. The state administrative offices are the source of lists of sponsors, and they also maintain some information on the approved sponsor sites, but they do not consistently maintain detailed site information. Information on the average daily attendance (ADA) of sites and on the number of days that sites are expected to operate during the summer typically is available only from the sponsors. Thus, it is not possible to obtain a national list of the sites with size information for the selection process from the state offices. As a result, we recommend

conducting a two-stage sampling process. Under this approach, a sample of sponsors from the state information is selected, and then, from the selected sponsors, a list of their member sites is obtained.[4] A final sample of sites for observation is selected from the selected sponsor lists.

Even if complete site information were available at the state level, we still recommend a two-stage sampling process to allow data from sponsors and sites to be linked in the analysis. Hypothetically, if national lists of both sites and sponsors were available, one could select the site sample independently from the sponsor sample. Under this approach, however, it would not be possible to fully link the data, as many of the site observations would not have corresponding data from their sponsors. The two-stage approach, which is potentially necessary for development of the site sampling frame, also ensures that a sponsor interview is attempted for each of the selected sites. Furthermore, as discussed in Section III.D, analysis of the 1986 data shows that a two-stage selection process does little to decrease the sampling precision in the site estimates relative to a single-stage process. Hence, even if a national list of sites is available when this study is conducted, a two-stage approach appears to be preferable to preserve the linkable nature of the survey information.

4. Oversampling of Subgroups

ERS has expressed interest in having sufficient sample to describe the characteristics of particular subgroups of sponsors and sites. For example, rural sites may be of particular interest, as program officials have focused in recent years on expanding the SFSP in rural areas. Our sample design allows for the likely need to oversample rural areas.

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[4]Some of the states will be able to provide site lists. If a sponsor does not provide the list in a timely manner, and the contractor has a list of the sites from the state, we recommend using the state list to select the sample. Since the sponsor should be the best source for current information, the sponsors' lists are the preferred sample source.

5. Timing Issues

We designed the sponsor and site data collection procedures to account for constraints that the limited operational period for the SFSP places on the data collection. To increase the efficiency of the data collection process, we planned the design to take advantage of differences in timing of sponsor application deadlines and site operation periods across states. Some states have application deadlines in early May, whereas those of others are as late as the middle of June. To expedite the data collection process, we recommend using a three-phase sampling process for sponsors and an ongoing sampling process for sites.

In particular, the contractor will obtain a list of the previous year's sponsors from all states in mid-winter. States will then also be asked in May or June to provide a list of sponsors who attended new sponsor training.[5] Some former sponsors will be identified from the prior-year lists. To supplement these, we propose that the contractor ask all states and sponsors as needed to provide final sponsor and site lists in early fall (September) to identify additional former sponsors. The contractor will select a sample from each of these three sources, and the selected sponsors will be notified.

The new and continuing sponsors will be asked for lists of their sites. As each selected sponsor's list of sites is obtained, a sample of sites will be selected and arrangements made to conduct the site observations. This process will allow the study to begin collecting data on some sponsors' sites before receiving the lists from others. In addition, an ongoing site selection process

[5]We assume that this list will fully cover the new sponsors in the current year. We will identify the intentional new sponsors who fail to participate during the sponsor interviews. While this results in some inefficiency in the design, we feel that we cannot wait for the current lists to become available, as any short-term programs would be missed. Furthermore, the pretest experience indicated that current lists may not be available until late July.

helps to ensure that sites that are open only for one or two weeks during the first part of the summer have a chance to be observed.

6. Unit of Analysis

In designing the sample, we considered the final unit of analysis. The focus of the program operations component of the study is to measure the operations of the program as experienced by participants. For example, rather than considering the percentage of sites that serve hot meals, the focus is on the percentage of participants who attend sites that serve hot meals. Furthermore, in quantifying measures of program operations, consideration must be given to site differences in whether more than one meal a day is served, and in length of operation during the summer. Participation levels also may vary from day to day. Consequently, we recommend defining the final analytic unit as a meal and the population of all such units as the total number of lunches (or main meals of the day) served during the summer by all sites.[6]

We recommend selecting sites, from a list of the sponsor's sites, with selection probabilities based on the total estimated lunches served during the summer (or, if lunch is not served, the appropriate main meal of the day). Under this approach, the site probabilities of selection and, as a result, the site survey weights are highly correlated with many of the reported site quantities, which improves the precision in these estimates. We anticipate that the sponsors can provide site-level information on the average number of lunches served per day and on the total number of days that the site operates. The product of these two quantities will provide an estimate, for selection purposes, of the total number of meals the site serves during the summer.[7]

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[6]Ideally, we want to focus on meals served as firsts. However, we believe total meals are what is likely to be available.

[7]We do not expect that the states will have an estimate of the total number of meals that (continued...)

B. IS STATE-LEVEL CLUSTERING NECESSARY? MODELING HOW THIS CLUSTERING AFFECTS PRECISION

The key issue in designing the site sample is whether to cluster the sample geographically. To evaluate different site-level clustering options, we developed a model to provide an estimate of the precision in the survey data that would result from various levels of clustering by state for different sample sizes. In this section, we first describe the general model. We then discuss our application of the model to the 1986 survey data to obtain information on the required data properties. From the final model developed, we present two sample design options that have varying levels of geographic clustering of the sites, by state.

1. A General Model

The 1986 study consisted of a three-stage sample selection methodology. For the first stage, the study selected a stratified sample of 17 states with the probabilities of selection based on each state's ADA (more generally, with probability proportional to size [PPS]). Within the selected states, the study selected an average of 7.2 sponsors per state, also using PPS sampling procedures based on the sponsor's ADA, to yield a total of 123 sponsors from which sites were selected for observation. (An additional 83 sponsors were interviewed, but their sites were not sampled.) Finally, an average of 1.7 sites were selected from each of the selected sponsors to yield 206 completed site observations.

In multistage sample designs such as the 1986 study, the sampling precision in the study estimates can be approximated by expressing the overall precision in the estimates as a sum of components, one for each stage of the selection process. The components are developed so that each

[7](...continued)
sponsors serve during the summer. Therefore, the selection probabilities for sponsors will need to be based on the sponsors' ADAs.

is a function of the variability in the data and of the sample sizes selected for a given design stage. Such an approximation of the sampling variation for an arbitrary survey mean (denoted by $\bar{y}$ in a three-stage design is given by Cochran (1977) in equation (1):

$$(1) \qquad Var(\bar{y}) \approx \left(1-\frac{\bar{n}_1}{\bar{N}_1}\right)\frac{S_1^2}{\bar{n}_1} + \left(1-\frac{\bar{n}_2}{\bar{N}_2}\right)\frac{S_2^2}{\bar{n}_1\times\bar{n}_2} + \left(1-\frac{\bar{n}_3}{\bar{N}_3}\right)\frac{S_3^2}{\bar{n}_1\times\bar{n}_2\times\bar{n}_3}$$

In this equation, in context of the 1986 study:

- S^2_r denotes the estimated population variance among the site-level values at the *r*-stage of selection. Specifically for $r = 1$, this term is the variation between the state mean values for a specified site variable, *y*. For $r = 2$, this term is the variation between the sponsor mean values for *y*, within each of the selected states, averaged over the states. Finally, for $r = 3$, this term is the variation in the site values, within the selected sponsors, averaged over the selected sponsors and states.

- $\bar{N}_r$ denotes the average number of *r* stage units in the population within each $r-1$ stage selected units. For $r = 1$, this is equal to the number of states in the population. For $r = 2$ this is equal to the average number of sponsors in the population in each of the selected states. Likewise, for $r = 3$, this equals the average number of sites that the selected sponsors had.

- $\bar{n}_r$ denotes the corresponding average number of *r* stage units selected from each $r-1$ selected unit. The product of these three terms equals the total site completed sample size.

We can also rewrite equation (1) in terms of the desired squared relative sampling precision (the squared CV) for the estimated mean of *y*, so that the function becomes the sum of four components given in equation (2). This revised expression has the benefit that the second, third, and fourth components directly relate to the sample size selected at each stage of the design.

(2) $$CV(\bar{y})^2 = \frac{Var(\bar{y})}{\bar{y}^2} = \left(\frac{S_1^2}{\bar{N}_1 \times \bar{y}^2}\right) + \frac{S_1^2 - \frac{S_2^2}{\bar{N}_2}}{\bar{y}^2 \times \bar{n}_1} + \frac{S_2^2 - \frac{S_3^2}{\bar{N}_3}}{\bar{y}^2 \times \bar{n}_1 \times \bar{n}_2} + \frac{S_3^2}{\bar{y}^2 \times \bar{n}_1 \times \bar{n}_2 \times \bar{n}_3}$$

$$= \left(\frac{V_0^2}{\bar{y}^2}\right) + \frac{V_1^2}{\bar{y}^2 \times \bar{n}_1} + \frac{V_2^2}{\bar{y}^2 \times \bar{n}_1 \times \bar{n}_2} + \frac{V_3^2}{\bar{y}^2 \times \bar{n}_1 \times \bar{n}_2 \times \bar{n}_3} .$$

From equation (2), and given some information on the values of V_r^2, for r = 0,..,3, we can estimate how the sampling precision in the estimate would change with different options for the average number of units selected at each stage in the design.

Before applying this model to the 1986 data, it is important to realize that the value of V_1, which reflects the variation in the estimates due to the clustering of the units by state, has a substantial impact on the precision in the estimates, because this component is influenced only by the state sample size. In contrast, the next component, V_2, is divided by both the number of states selected and the average number of sponsors selected from each state. If the value of the variable *y* varies substantially within a state, but the state means do not vary greatly across the states, the V_1 term will be small relative to V_2 and V_3. In this case, clustering the sample by state does not have much of an effect. Conversely, if the values of *y* are homogenous within a state, and the mean values differ by state, clustering by state will reduce precision substantially.

The variance model presented in equations (1) and (2) is somewhat oversimplified for the design under study but provides a basic framework for how these models are structured for multistage designs. In developing the final model for this study, we used a slightly more complex methodology, which is outlined in equation (B.2) in Appendix B. This model accounts for the potential

identification of certainty selections at each stage of the design process and for a disproportionate allocation of the sample by rural status. (Certainty cases are included in the sample on the basis of a nonrandom, subjective, or analytic decision process.)

2. Application of the Model to the 1986 Survey Data

The 1986 survey data provide the best source of information to estimate the distributional properties of the data that will be collected in the SFIS for use in the model we have described. Because the 1986 data are old, we anticipate that the mean values of the questionnaire items will change in 2001. However, we assume that the underlying relationships in the data among the state, sponsor, and site levels of aggregation will remain stable. Under this assumption, we can use the analysis of the 1986 data to provide reasonable estimates of the expected design effects that would be associated with a similar sampling strategy for the 2001 study.

To reduce the computational burden, we limited the analysis to 10 of the 1986 survey items. In selecting these items, we attempted to include some 1986 survey items that still would be of interest and that had different types of response patterns (including dichotomous [yes or no], categorical, and continuous responses). A list of the selected variables is presented in Table III.1. For each variable, Table III.1 presents the estimated precision in the site estimates using the final approximation model given in equation (B.2) and approximate values for each of the variance components, V_r^2, r = 1, 2, and 3, as defined in equation (2). The estimates in Table III.1 are based on participant-weighted survey data from the 1986 observed site sample.[8]

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[8]The estimated square roots of the design effects presented in Table III.1 were computed by estimating the CV for each variable using equation (B.2), and by comparing that value with an estimate of the CV that assumes the data resulted from an unweighted simple random sample of sites. In the 1986 study, the sampling precision for some of the reported values was estimated using a Balance Repeated Replication (BRR) estimation process. These results are presented in Tables B.4 and B.5 of the final report (Ohls et al. 1988). For two of the 10 variables presented in Table III.1, (continued...)

The state component of the variation in the survey estimates, V_1, shown in Table III.1 is relatively large: on average, it is about the same size as the sponsor component, V_2. The large V_1 indicates that the precision in the estimates from a design that clusters the sites by state will be greatly influenced by the number of states selected. The results in Table III.1 also show that the variation resulting from the state selection process, although large on average, differs considerably from item to item. For example, the estimated percentage of vended sites, estimated ADA, and percentage of participants who are Hispanic have very large values for V_1 and, therefore, large design effects. In contrast, the percentage of participants living within one-fourth of a mile from the site, percentages of meat and milk waste, and caloric value of the meal have lower values for the V_1s relative to the other components of variance, and, therefore, small design effects. These results indicate that the demographic profile of the participants, site vending rates, and attendance levels are somewhat homogenous within states and very heterogeneous across states. The meal characteristics and the distance children travel to the sites are more variable within the states, but not across states.

Using the model, we prepared two examples to illustrate the effects of state clustering on site sample size requirements (Table III.2). Both designs yield a projected average precision level of five percent across the 10 variables studied, but the sample sizes required to reach this precision level are quite different. In the first example, 30 states are selected, from which 8 sponsors are selected per state. In the second example, the number of states is reduced to 24, but a much larger sample of 16

[8](...continued)
we have corresponding estimates of the square root of the design effects (referred to as a net correction factor) from the final report. For the variable, "presence of site activities," the reported square root of the design effect was 1.2, and for the variable indicating whether the site was vended, the reported square root of the design effect was 1.5. The corresponding estimates using our approximation procedures are very similar, with values of 1.22 and 1.60, respectively. Hence, the methodology in equation (B.2) appears to be sufficiently accurate.

TABLE III.1

VARIABLES SELECTED FROM 1986 STUDY AND RELATED SAMPLE INFORMATION
(Participant-Weighted Survey Data Limited to Observed Sites)

Variable/Statistic	Total Number of Sites Observed	Estimate	Estimated CV for Estimate	Estimated Square Root of Design Effect[a]	Number of States in Population	Number of States Selected	Estimated Total Number of Sponsors	Estimated Total Number of Sites	Average Number of Sponsors Selected Per State	Average Number of Sponsors Per Selected States	Average Number of Sites Per Selected Sponsor	Average Number of Sites Per Selected Sponsor	V_1[b] Term States	V_2[b] Term Sponsors	V_3[b] Tterm Sites
Percent Participants Receiving Regular Activities	206	79.2	4.6%	1.22	55	17	2,269	18,030	7.23	70.05	1.67	37.97	0.0438	0.0823	0.1057
Average Daily Attendance for Lunch		191.3	7.8%	1.35									0.1750	0.0802	0.3137
Percent Hispanic Participants		20.0	15.6%	1.44									0.7788	0.3545	0.8802
Percent Participants within 1/4 Mile of Site		51.1	5.6%	1.12									0.0505	0.1226	0.2354
Percent of Participants Served Meals Outdoors		22.8	15.7%	1.19									0.5212	0.7712	1.5756
Percent of Participants Served by Vended Site		66.9	7.6%	1.60									0.1851	0.1404	0.1368
Percent of Meat Serving Wasted		33.6	4.1%	0.89									0.0039	0.0689	0.2280
Percent of Milk Serving Wasted		20.7	6.6%	1.08									0.0730	0.1061	0.4062
Percent RDA of Iron in Meal Served		36.3	2.5%	0.99									0.0003	0.0360	0.0764
Total Kilocalories in Meal		685.2	1.8%	1.02									0.0006	0.0235	0.0292
Average			**7.2%**	**1.20**									**0.1832**	**0.1786**	**0.3987**

[a] Presented to correspond to the net correction factors presented in the 1986 survey report. The design effect is computed using the ratio of the sampling variance in the estimate based on the design implemented relative to the corresponding value that would result from a simple random sampling methodology. The design effect provides a factor that can be multiplied by the sample size selected to obtain the "effective" sample size given the design methodology. In the remaining tables in this report, we will present the estimated design effects rather than the net correction factor.

[b] V_1, V_2, V_3, as defined in equation (2).

sponsors per state must be selected to reach the same precision requirement. In both examples, we have assumed that an average of 1.5 sites are selected from each selected sponsor. We believe this value is reasonable, given that an estimated 51 percent of sponsors have only one site (GAO 1998b). Overall, the results indicated that, to obtain an average five percent CV, even a moderately more state-clustered approach (24 states instead of 30) requires a considerably larger sample (576 sites instead of 360). We also found that increasing the number of states from 30 to 36 decreases the completed site sample requirement to only about 325 (not shown). This finding suggests that, after the state sample size reaches about 30, the design becomes basically equivalent to a completely non-state-clustered approach (see the discussion in Section III.D). Conversely, if the number of states selected drops to 20 or fewer, the sample size required to obtain a five percent CV becomes unrealistic (for example, 800 or more sites).

The estimates prepared in Table III.2 were computed using the final approximation model presented in equation (B.2). In this model, we modified some of the 1986 model parameters to better reflect our current knowledge of the population based on 1998 FNS data. As indicated, we also assumed that some oversampling of the rural sites is required, which could inflate the variance components by a factor of 1.2 (this factor is discussed in Section III.D). Furthermore, in developing these models, we conducted a limited simulated state selection procedure to estimate the number of states that would be selected with certainty under the two scenarios, and the portion of the total daily meals served that would be attributable to these certainty states. This simulation was based on 1998 participation data received from FNS.

Our simulated state sampling procedure indicated that the number of states selected with certainty is quite sensitive to small variations in the total number of states selected. In conjunction, the decrease in the state variance component that results from certainty selections is highly

TABLE III.2

TWO SAMPLE DESIGN SCENARIOS WITH DIFFERENT
LEVELS OF SITE CLUSTERING BY STATE
(Participant-Weighted Data; Variance Components Increased by Factor of 1.2)

Variable/Statistic	Total Observed Sites	Estimate	Estimated CV for Estimate	Estimated Design Effect	Number of States in Population	Estimated Number of Total Sponsors	Estimated Number of Total Sites	Average Number of Sponsors Per Selected State	Average Number of Sites Per Selected Sponsor	Number of States Selected with Certainty	Percentage of ADA Represented by Certainty Selected States
Example 1: 360 Total Sites Selected, Based on Design with 30 States Selected, with Average of 8 Sponsors Selected from Each State, 1.5 Sites Selected from Each Sponsor											
Percent Participants Receiving Regular Activities	**360**	79.2	3.1%	1.23	51	3,612	29,781	120.3	39.4	14	72
Average Daily Attendance (ADA) for Lunch		191.3	5.0%	1.32							
Percent Hispanic Participants		20.0	9.7%	1.39							
Percent Participants within 1/4 Mile of Site		51.1	4.0%	1.13							
Percent of Participants Served Outdoors		22.8	10.8%	1.18							
Percent of Participants Served by Vended Site		66.9	4.7%	1.69							
Percent of Meat Serving Wasted		33.6	3.3%	0.90							
Percent of Milk Serving Wasted		20.7	4.7%	1.05							
Percent RDA of Iron in Meal Served		36.3	2.0%	1.14							
Total Kilocalories in Meal		685.2	1.4%	1.15							
Average			**4.9%**	**1.22**							
Maximum			**10.8%**	**1.69**							

TABLE III.2 *(continued)*

Variable/Statistic	Total Observed Sites	Estimate	Estimated CV for Estimate	Estimated Design Effect	Number of States in Population	Estimated Number of Total Sponsors	Estimated Number of Total Sites	Average Number of Sponsors Per Selected State	Average Number of Sites Per Selected Sponsor	Number of States Selected with Certainty	Percentage of ADA Represented by Certainty Selected States
Example 2: 576 Total Sites Selected, Based on Design with 24 States Selected, with Average o f 16 Sponsors Selected from Each State, 1.5 Sites Selected from Each Sponsor											
Percent Participants Receiving Regular Activities	**576**	79.2	3.1%	1.97	51	3,612	29,781	120.3	39.40	9	61
ADA for Lunch		191.3	5.5%	2.58							
Percent Participants Hispanic		20.0	11.2%	2.97							
Percent Participants within 1/4 mile of Site		51.1	3.8%	1.61							
Percent of Participants Served Outdoors		22.8	10.8%	1.88							
Percent of Participants Served by Vended Site		66.9	5.4%	3.62							
Percent of Meat Serving Wasted		33.6	2.6%	0.93							
Percent of Milk Serving Wasted		20.7	4.5%	1.51							
Percent RDA of Iron in Meal Served		36.3	1.6%	1.12							
Total Kilocalories in Meal		685.2	1.1%	1.18							
Average			**5.0%**	**1.94**							
Maximum			**11.2%**	**3.62**							

dependent on the number of states selected. Based on FNS administrative data for 1998, the states vary considerably in their 1998 ADA, with about 56 percent of the total ADA accounted for by the top 7 states, and 80 percent accounted for by the top 20 states. With 24 state selections, 9 states would be selected with certainty, which contain 61 percent of the 1998 total ADA.[9] In contrast, in the 30 state example, 14 states would be selected with certainty, representing about 72 percent of the 1998 total ADA.

In summary, our analysis of the 1986 data suggests that, with a three-stage design similar to the one used in 1986, the sampling precision in the estimates is highly influenced by the number of states selected. As we have shown, this finding is supported by the fact that a large portion of the sampling variance for many of the 1986 variables is due to the differences in the state mean values. In the next section, we evaluate whether the additional travel costs associated with a less-state-clustered design outweigh the savings from the smaller number of site observations required.

C. IS STATE-LEVEL CLUSTERING NECESSARY? A COST ANALYSIS

To evaluate the different cost structures associated with different levels of clustering of the sites by state, we prepared a preliminary field budget for 350 site samples under two design options. The budgetary analysis was conducted before the completion of the 1986 data analysis discussed in the last section. Therefore, the two budgeted examples presented in this section are not exactly comparable to the two design options presented in Table III.2. Nonetheless, the combined results from these two studies provide a convincing argument for the use of a non-state-clustered approach.

In the first budget option, we assumed that the site observations could be conducted in any of the 51 states and territories (excluding Puerto Rico, Guam, and the Virgin Islands). In the second

[9]Based on the fact, that with a trial PPS selection of states within the proposed stratification of the states/sponsors presented in Appendix Table C.1 and using the ADA as the size measure, the probabilities of selection would exceed one for nine states. Similarly, for a 30-state selection, 14 states would be selected with certainty.

option, we assumed that we would select 22 of the 51 states in the first stage of selection, so that the samples would be confined to these states. Given that both options involve the same number of site observations, the 51-state version implies extra costs from having to hire and train additional interviewers to handle the increased geographic scope of the survey or from increasing the travel costs and labor time required to reach the sites.

Table III.3 presents the results of the budgetary analysis. The budgets were based on some tentative and simplified assumptions, so we present the per site costs for each option in relative terms. That is, the estimated per site costs have been rescaled so that the cost per site observation is equal to 1 in the 22-state option. The results indicate that a fully non-state-clustered approach increases the

per site cost by about 26 percent. Using this information and the results in Table III.2, we then examined the total costs associated with two hypothetical designs.

Our combined findings in Tables III.2 and III.3 indicate that the differences in the total data collection costs between a state-clustered or non-state-clustered design are small. The additional travel costs associated with a non-clustered approach appear to be offset by the smaller sample size requirements. Table III.2 indicates that about 200 (576 ! 360 = 216) more site observations would be required to obtain a five percent precision level if the sites were clustered in about 22 to 24 states. To be conservative, suppose the non-state-clustered approach required 350 site observations and the 22- to 24-state clustered design required 500. The results in Table III.4 indicate that a nonclustered design is less expensive than the state-clustered approach used in 1986.

TABLE III.3

RELATIVE COSTS PER SITE FOR TWO DESIGN OPTIONS

Option	Relative Estimated Cost Per Site Observation
350 Observations Conducted in 51 States	1.26
350 Observations Conducted in 22 States	1.00

TABLE III.4

COMPARISON OF COSTS OF TWO DESIGN OPTIONS
TO ACHIEVE THE SAME PRECISION LEVEL

Scenario	Number of Observations	Cost Per Unit	Total Cost
No Clustering	350	1.26	441.00
Clustering of Sites in 24 States	500	1.00	500.00

In summary, our analysis of the 1986 data and our assessment of the cost savings associated with clustering the sites by state indicates that a less-clustered sample design, without a state level of selection, is preferable. In the next section, we present our recommendations for the sample sizes required to meet the stated precision levels for the site observations based on a two-stage (sponsor, then site) design.

D. RECOMMENDED SITE SAMPLE DESIGN

On the basis of both the discussion in Sections III.B and III.C and additional considerations described here, we recommend the following sample design for the site observations:

- A two-stage design in which sponsors are selected, then a sample of sites served by each of the sponsors is selected. We recommend two sponsor and site sample size options:
  - First, 350 sites to yield a 5 percent average CV for variables similar to those studied in the 1986 survey. This design option consists of selecting about 240 sponsors, and selecting an average of about 1.5 sites from each sponsor for observation.
  - Second, 150 sites to yield a 10 percent average CV or less.[10] This design option consists of selecting about 100 sponsors, and selecting an average of 1.5 sites from each sponsor for observation.

1. Modeling Sample Size Requirements for a Two-Stage Design

The 1986 data analysis model presented in Section III.B provided a good indication of the sample size requirements for the proposed two-stage design if the number of states was set to 30 or higher. A second analysis confirmed these findings. In the second analysis, we analyzed the 1986 data as if the 1986 survey had been conducted using a two-stage design. As expected, the results of this study indicated a size requirement similar to those obtained from the three-stage design model (with 30 or more state selections). In this section, we present the site sample size requirements based on the two-stage model.

To examine the proposed two-stage design, we modify the model examined in Section III.B by removing the component associated with the third stage of selection. The sponsor selection now becomes the first stage. A revised version of equation (2) for a two-stage design is given in

[10]As we discuss, the model predicts that a smaller sample could actually be selected to yield a 10 percent CV. However, we believe that the sample size generated from the model is too small for practical consideration.

equation (3):

$$(3) \qquad CV(\bar{y})^2 = \frac{Var(\bar{y})}{\bar{y}^2} = \frac{S_1^2}{\bar{N}_1 \times \bar{y}^2} + \frac{S_1^2 - \frac{S_2^2}{\bar{N}_2}}{\bar{y}^2 \times \bar{n}_1} + \frac{S_2^2}{\bar{y}^2 \times \bar{n}_1 \times \bar{n}_2}$$

$$= \frac{V_0^2}{\bar{y}^2} + \frac{V_1^2}{\bar{y}^2 \times \bar{n}_1} + \frac{V_2^2}{\bar{y}^2 \times \bar{n}_1 \times \bar{n}_2} .$$

In this equation, the components are defined as in Section III.B, by defining $r = 1$ to correspond to the sponsor selections and $r = 2$ to correspond to the site selections within the selected sponsors.

To predict the sampling precision as a function of the sample sizes at each of the two selection stages, we used the 1986 survey data (treating the data as if the state selection step had not occurred) to compute the two variance components, V_1^2 and V_2^2. In the final approximation as outlined in Appendix B, we also accounted for the selection of some sponsors with certainty, such as the New York City public school system. Finally, as in Section III.B, we adjusted the variance components by a factor of 1.2 to inflate the values for the potential oversampling of rural sponsors, which would decrease the sampling precision in the estimates.

2. Adjusting for Oversampling of a Key Subgroup

We incorporated the factor 1.2 to approximate for the effects of oversampling of rural sites (or some other key subgroup) in the final design strategy. At this time, we do not have current information from FNS on the percentage of sites that operate in a rural setting. Therefore, we cannot predict precisely how much oversampling might be required to obtain a minimal number of rural site observations and how much the variance components would be inflated with this procedure. Table

III.5 provides an example to illustrate the level of oversampling that might be possible with a design effect of 1.2. For this example, we assumed that about one-third of the sites are in rural areas and that these sites serve 25 percent of the lunches served during the summer. Without any oversampling of rural sites, the proposed PPS sampling procedures should yield sample sizes that are proportional to the number of lunches represented. In this example, we can increase the number of rural sites by 79 to yield relatively equal rural and urban sample sizes with no more than a 1.2 estimated design effect. Because an equal allocation of the sample sizes is best for comparative purposes, a design effect of 1.2 should be more than sufficient in similar situations.

TABLE III.5

ILLUSTRATION OF EFFECTS OF OVERSAMPLING RURAL SITES

Site Group	Percentage of Sites	Percentage of Participants	Expected Sample Size PPS Selection	Option with Oversampling	Difference	Design Effect
Rural	33.3	25.0	88	166	79	1.2
Urban	66.7	75.0	263	184	!79	
Total	**100.0**	**100.0**	**350**	**350**		

3. Recommended Site Sample Sizes

The results of our analysis indicate that a sample of approximately 350 sites selected from 240 sponsors should be sufficient to yield a CV of five percent across the 10 studied variables from the 1986 data. Table III.6 presents predicted CVs for each of these variables with a sample of 350 observed sites. Our analysis also indicates that a sample of 100 observed sites from 60 sponsors should be sufficient to obtain a CV of 10 percent. Given that our analysis is based on dated survey results using approximate methods, we are hesitant to recommend a minimal sample of fewer than

TABLE III.6

PROJECTED PRECISION LEVELS FOR RECOMMENDED SAMPLE SIZES FOR COMPLETED INTERVIEWS
(Based on Participant-Weighted 1986 Survey Data with Added Design Effect of 1.2)

Variable/Statistic	Total Observed Sites	Estimate	Estimated CV for Estimate	Estimated Design Effect (Final Design)	Design Effect Without Oversampling of Rural Sites	Number of Sponsors Selected	Average Number of Sites Selected from Each Selected Sponsor	Proportion of Site Lunches Accounted for by Certainty Sponsor Selections	Added Assumed Impact of Oversampling Rural Sites
Percent Participants Receiving Regular Activities	350	79.2	3.3%	1.29	1.07	230	1.5	5	1.2
Average Daily Attendance for Lunch		191.3	5.0%	1.28	1.07				
Percent Hispanic Participants		20.0	9.5%	1.29	1.08				
Percent Participants within 1/4 Mile of Site		51.1	4.3%	1.24	1.03				
Percent of Participants Served Outdoors		22.8	11.4%	1.24	1.03				
Percent of Participants Served by Vended Site		66.9	4.6%	1.58	1.32				
Percent of Meat Serving Wasted		33.6	3.6%	1.04	0.87				
Percent of Milk Serving Wasted		20.7	5.0%	1.11	0.92				
Percent RDA of Iron in Meal Served		36.3	2.2%	1.26	1.05				
Total Kilocalories in Meal		685.2	1.6%	1.35	1.12				
Average			**5.0%**	**1.27**	**1.06**				
Maximum			**11.4%**	**1.58**	**1.32**				
Percent Participants Receiving Regular Activities	100	79.2	6.5%	1.33	1.11	60	1.5	5	1.2
Average Daily Attendance for Lunch		191.3	10.0%	1.32	1.10				
Percent Hispanic Participants		20.0	19.0%	1.34	1.11				
Percent Participants with 1/4 Mile of Site		51.1	8.5%	1.28	1.06				
Percent of Participants Served Outdoors		22.8	22.6%	1.28	1.06				
Percent of Participants Served by Vended Site		66.9	9.3%	1.64	1.37				
Percent of Meat Serving Wasted		33.6	7.1%	1.07	0.89				
Percent of Milk Serving Wasted		20.7	9.8%	1.13	0.94				
Percent RDA of Iron in Meal Served		36.3	4.3%	1.29	1.07				
Total Kilocalories in Meal		685.2	3.1%	1.39	1.15				
Average			**10.0%**	**1.31**	**1.09**				
Maximum			**22.6%**	**1.64**	**1.37**				

150 site observations. Furthermore, we anticipate that, as the completed sample sizes become smaller than 150, the cost efficiency of the design decreases, because the fixed setup costs begin to dominate the overall cost. Thus, we recommend setting the completed sample size to a minimum of 150 observed sites. This sample size would ensure that the staffing requirements are sufficiently large to maintain some level of efficiency in training and recruiting procedures.

4. Why Not Use a Single-Stage Approach?

Our analysis also indicates that the impact of the two-stage design process (selecting sponsors and then sites of those sponsors) has only a small effect on the precision of the estimates relative to what could be obtained with a single-stage approach (selecting sites from a national list without regard to their sponsors). As discussed in Section III.A, a single-stage process would be feasible if a national list of sites could be developed from the state offices. However, a single-stage procedure would remove the option of linking the sponsor and site data in the analysis, as the sponsor's information would not be available for all sites. Given this drawback, and the small differences in the precision level between the two methods, a two-stage approach appears to be preferable, even if a single-stage procedure could be conducted.

E. SAMPLE DESIGN FOR THE STATE ADMINISTRATOR SURVEY

For the state administrator interviews,[11] we recommend conducting a census of the 54 state and territory offices (including Puerto Rico, the Virgin Islands, and Guam). A sampling process is unnecessary because these interviews are relatively inexpensive and there are only 54 in the universe. Therefore, in our evaluation of various sponsor and site sample designs, we assumed that

[11]FNS regional office staff will be interviewed in the states administered by FNS regional offices.

all the states will be interviewed and that a national list of sponsors will also be compiled by obtaining lists from all the states.

Each state will be contacted by telephone no later than March to provide the contractor with a list of its prior-year sponsors. After the state's deadline for sponsor applications has passed, the state office staff will be asked to provide a list of sponsors who attended new sponsor training, from which new and former sponsors can be identified. Finally, states will be interviewed in the fall (September) and also asked to provide final sponsor and site lists. We anticipate that all the state administrative offices will be willing to provide the required sponsor lists and to participate in the survey.

F. RECOMMENDED SAMPLE DESIGN AND SAMPLE SIZES FOR THE SPONSOR AND FORMER SPONSOR SURVEYS

The recommended design and sample sizes for the sponsor and former sponsor surveys can be summarized as follows:

- Sponsors will be selected from a national list, using a three-phase selection procedure. In the first phase, a sample of sponsors from the preceding year will be selected. In the second phase, new sponsors will be selected, and, in the third phase, a supplemental sample selection of former sponsors will be selected. This three-phase procedure will enable the contractor to both obtain site lists from continuing sponsors and plan visits earlier than if it waited for the current-year lists. The contractor will therefore be able to more efficiently use the limited time during which SFSP programs are open for data collection.

- Stratification can increase precision and face validity of the sample or allow for oversampling of key subgroups. We recommend that the sponsor lists be divided into seven strata based on region and on the ADA of their states. In addition, the three-phase process inevitably implies a stratification of new, continuing, and former sponsors. Finally, we recommend stratifying the continuing and former sponsors by urban versus rural status, to permit oversampling of rural sponsors and sites, creating a total of 35 sampling strata.

- On the basis of this design, we developed two sample size options for continuing and new sponsors:
  - A sample of 480, to achieve a 5 percent relative precision level (CV) for a 50 percent characteristic
  - A sample of 120, to achieve a 10 percent relative precision level (CV) for a 50 percent characteristic
- We recommend sampling former sponsors in two steps. Some prior-year sponsors selected in phase 1 will be former sponsors and, as such, will be included in the former sponsor sample. When current-year lists are available, it will be possible to identify additional former sponsors and sample from that list. We recommend a final former sponsor sample size of 200, which is estimated to achieve a five percent CV, given the small, finite population being considered.

The rest of this section further describes the design and the rationale for these decisions. Appendix C presents additional instructions for selecting the sponsor samples.

1. Sponsor Selection Procedures (New and Continuing)

We recommend the use of a three-phase stratified design to develop both the former and non-former sponsor samples. As discussed in Section A, the three-phase design helps to expedite the data collection process.

We recommend that an initial state selection stage not be included. We base this recommendation on the arguments presented in Sections B and C. Thus, sponsors will be selected from a national list that will be compiled by obtaining sponsor lists from each state and territory.

The final sponsor lists for the data collection year will be available at different times in different states. Given the limited period of SFSP program operations, waiting for current-year sponsor lists makes it difficult to complete site visits with all sampled sites. Thus, we propose selecting the new and continuing sponsor sample in two phases: (1) continuing sponsors will be selected from the prior year's list and will be contacted before the state has made final selections for the current year;

and (2) new sponsors will be identified from the (new) sponsor training list by comparing the new list with last year's list, then sampled and contacted as quickly as possible.

In addition, we propose to stratify the sponsor prior-year and new training lists into 21 sampling strata, as shown here, for the following reasons:

- A primary stratification into seven strata developed on the basis of FNS region and the ADA of the state to which the sponsor belongs to. Preliminary stratum definitions based on 1998 FNS administrative data are presented in Appendix C. This stratification will improve face validity and may also increase sample precision.

- Stratification into new and continuing sponsor groups, for the timing reasons we have described above.

- For continuing sponsors, we plan to divide each of the seven primary strata into rural and nonrural substrata, to ensure rural sponsors and sites are adequately represented in the sample, and to facilitate oversampling of rural sponsors and sites, if appropriate. The population of new sponsors is expected to be too small for stratification on the basis of rural location.

Within each stratum, sponsors will be selected with probability proportional to size (PPS). Some sponsors, such as the New York city public schools, will be large enough to be selected with certainty. The size measure used for continuing sponsors will be their ADA from the previous year; the projected ADA for the current year will be used for new sponsors.

2. Recommended Sponsor Sample Sizes

Given the design described in the previous section, Table III.7 provides the 95 percent confidence half-intervals and the CVs associated with a 50 percent characteristic for various final sample sizes and design effects. The design effect represents the relative increase or decrease in the sampling precision in the estimates that is associated with the proposed design compared with what would be obtained using a simple random sampling methodology. We anticipate that the proposed stratification may improve the sampling precision to some degree, but the oversampling of rural

sponsors will reduce overall precision and increase the design effect. The sample sizes presented in Table III.7 are those needed for sponsors to achieve a CV of 5 or 10 percent for each of four design effects considered. Assuming that the design effect is around 1.2 (as in the site sample), we estimate that a sample of 480 or 120 completed sponsor interviews is required to obtain a CV of 5 percent or 10 percent, respectively.

The existence of certainty sponsors will reduce the level of sampling variability in the sample and will therefore increase the precision of the estimates to some extent. However, we did not take this change into account in the derivation of the recommended sponsor sample sizes, because we do not currently have enough information to estimate the proportion of total meals served by certainty sponsors.

As discussed in Section D of this chapter, it is not necessary to visit the sites of all sponsors to achieve the levels of precision required for sites. To select the subsample of sponsors' sites that will be visited, sponsors in Puerto Rico, Guam, and the Virgin Islands will be dropped from the list. Then, for continuing sponsors, a random subsample will be selected within each of the 14 strata; for new sponsors, a random subsample will be selected within each of the seven strata. These steps will enable the study to obtain the number of sponsors required for selecting the site sample.

3. Former Sponsor Selection and Sample Size

Former sponsors will be selected in two steps during the first and third phases of sampling. The initial sample of prior-year sponsors will include some former sponsors. When these former sponsors are identified, they will receive the former sponsor interview and will be counted in the former sponsor sample. However, it is unlikely that this process will identify a sufficient number of former sponsors. Thus, after the current-year lists become available (at phase 3), they will be

TABLE III.7

PROJECTED PRECISION LEVELS FOR VARIOUS SPONSOR SAMPLE SIZES AND DESIGN EFFECTS

CV Desired	Corresponding 95% Confidence Interval Width (Plus or Minus)	Corresponding 90% Confidence Interval Width (Plus or Minus)	Design Effect	Completed Interview Requirements
5%	4.9%	4.1%	1.0	400
			1.1	440
			1.2	**480**
			1.3	520
			1.4	560
10%	9.8%	8.3%	1.0	100
			1.1	110
			1.2	**120**
			1.3	130
			1.4	140

NOTE: Recommended sample sizes are shown in bold. The completed interview requirements assume an ignorable finite population correction.

compared with the prior year's lists to identify the full list of sponsors who left since the prior year. We expect 350 to 400 sponsors to drop out based on the roughly 10 percent drop-out rate estimated by the GAO (1998b) and on the number of sponsors in recent years. For consistency, we recommend selecting the phase 3 sample of former sponsors using the seven region/ADA strata used in selecting the phase 1 sponsors, including the phase 1 former sponsors. The initial phase 3 sample should be large enough to meet the sample size requirements, and then duplication with former sponsors already selected during phase 1 should be eliminated. We recommend interviewing 200 former sponsors to achieve a 5 percent CV on a 50 percent characteristic, allowing for the finite population correction, or 100 former sponsors to achieve a 10 percent CV.

IV. DATA COLLECTION PLAN

A successful evaluation of the SFSP will require accurate information to be carefully collected on a variety of state, sponsor, and site characteristics and practices. This chapter describes the potential sources of this information, discusses options available for collecting the data, and recommends data collection methodologies for state administrators, sponsors, former sponsors, and sites.

Section A provides a brief overview of the different types of data collection instruments and methodologies that could be included as part of the evaluation. Section B discusses the use of SFSP administrative records. The major issues associated with each type of data collection are discussed in Sections C to F for surveys of state administrators, sponsors, former sponsors, and site directors. Site observations, including an evaluation of meals offered and plate waste, are discussed in Sections G and H. Section I describes the staffing and training requirements for implementing the program operations study.

A. OVERVIEW OF INSTRUMENTS AND METHODS

The SFSP program operations study will involve a wide range of data collection activities at the state, sponsor, and site levels. Table IV.1 indicates the four survey components of the project, the respondents to be interviewed, the mode of data collection, the estimated length of the interview, and the general content covered in each survey instrument. Volume III of this report contains the survey instruments, which were revised following the pretest. The data will be collected through a variety of methods in order to obtain accurate, reliable information on the full spectrum of the SFSP. The general timeline for data collection is shown in Figure IV.1.

TABLE IV.1

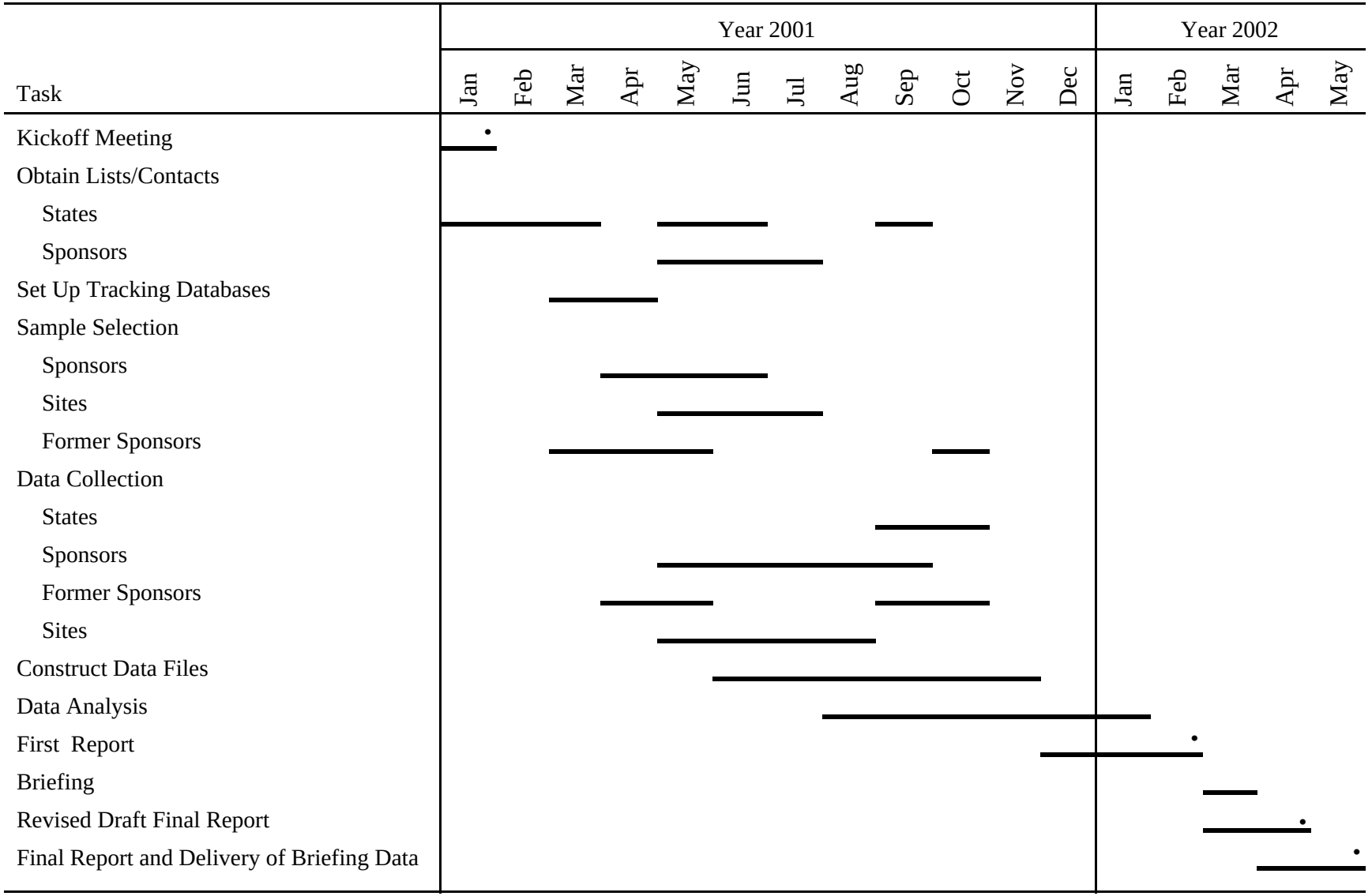
SUMMER FOOD SERVICE PROGRAM OPERATIONS STUDY: DATA COLLECTION PLAN

Instrument Name	Respondent	Mode of Interviewing	Proposed Content
State Administrator Survey	State Administrator of SFSP program or FNS Regional Office Administrator	Telephone	Adequacy of reimbursements; state training and technical assistance; application procedures; record-keeping requirements and adherence; extent of outreach activities; monitoring of sponsor activities.
Sponsor Survey	Current sponsors as of 2001	Mailed survey or telephone interview if mailed survey not received	Adequacy of reimbursements; state monitoring and technical assistance; application procedures; record-keeping requirements and adherence; local demand for program; extent of outreach activities; training and monitoring of site activities; adequacy of staff and facilities; meals offered; other activities provided at sites; hours, days, and weeks of operation.
Former Sponsor Survey	Sponsors who participated in the past, but not in the survey year	Telephone interview	Adequacy of reimbursements; state monitoring and technical assistance; application procedures; record-keeping requirements and adherence; local demand for program; extent of outreach activities; reasons for dropping out.
Site Observation	Site coordinator and other on-site staff	Combination of observation, in-person questions of staff, and measuring and recording of food	Monitoring of site activities; adequacy of staff and facilities; staff training; other activities provided at sites; hours, days, and weeks of operation; meal preparation on-site or vended; quality of meals; timing of meals; variety of food; nutrient content of meals; food storage; food safety; sanitation facilities; use of left-over food; use of OVS plate waste; meal waste or shortages; presence of required meal components.

OVS = offer versus serve.

FIGURE IV.1

SFSP OPERATIONS STUDY TIMELINE



• Deliverable

B. ADMINISTRATIVE RECORDS

Administrative records that are useful for an evaluation of the SFSP include FNS records on SFSP participation by state, contact information for FNS regional offices and state administrators, and application and claim forms submitted to states by sponsors. FNS records provide state-level information on the number of meals and participants served in the most recent year. Information on regional and state administrators will be used to contact and conduct the state administrator survey, which is described in more detail in Section C. Completed site application forms will be used to provide additional information on catchment areas and on area eligibility for sites. For selected sites, and after a site survey is completed, claim forms for that site will be requested from the state and used to assess reported versus observed participation in terms of meals and children.

C. STATE ADMINISTRATOR SURVEY

Although the RFP did not specifically call for a survey of state administrators, interviews with state administrators are recommended for a number of reasons. For instance, the views of state administrators will provide a more complete, comprehensive picture of the entire SFSP. Their responses to questions about training and monitoring activities can be used to address research questions related to program management and how they administered the program in a growth mode, or whether there are barriers to growth. Data from these interviews can also be used to look at the variability in how states obtain and monitor sponsors.

In addition to these substantive advantages of conducting the state-level interviews, we expect there to be other benefits. Given the nested sampling design we have proposed, it is necessary to contact state agencies in order to obtain lists of current and former sponsors (and sites, if available). The additional time needed to ask questions related to program management is relatively short. By conducting the interviews by telephone and notifying administrators ahead of time of the types of

information of interest (the "look-up" list), all state administrators can be interviewed for a relatively low cost. Extending the state survey to all states, as in the 1986 study, will eliminate one stage of weighting and will increase the precision for state-level estimates. Finally, contacting state agencies and soliciting administrators' opinions may motivate them to help with other components of the study. Given the research objectives of this project, coupled with the necessity of contacting state administrators for sponsor and site lists, we recommend a separate state administrator survey.

1. Methods

FNS headquarters and regional offices will be contacted prior to the start of the study with a timeline for state and sponsor contacts. Contacting FNS regional office administrators first is recommended for protocol reasons and for obtaining a list of state agencies with current contact information, including the state administrator's name. The list of state agency contacts should also indicate in which states the SFSP is administered by the FNS regional office rather than the state agency. In the states administered by FNS regional offices, the survey respondents will be FNS regional office staff rather than state-level staff.[1] Data on state-level program operations will also be obtained from FNS as reported on form FNS-418. Information on each state's plan for operating the SFSP each year will be obtained from FNS regional offices.

Our original plan for the state administrator survey was similar to that for the 1986 survey. As in the 1986 survey, we had recommended first notifying state agencies about the study through an advance letter that explains the purpose of the study, describes the information needed from them, and informs them that someone from the study contractor will be calling to gather the information.

[1]In New York, the program is partly administered by the state and partly by the FNS regional office. In this instance, we recommend interviewing staff from both offices, since they essentially run two separate programs, and weighting each interview relative to the number of children served by each.

About a week later, we had planned that senior staff would start calling all state administrators and regional office staff, as appropriate. The interview itself would last approximately 45 minutes and would include questions related to technical assistance to sponsors, the application process, staffing, outreach activities, and the training and monitoring of sponsors. We also recommended asking state agencies to provide lists of last year's sponsors (in mid-winter) and current sponsors who attended training (in May or June). This information would be used to draw the sponsor and former sponsor samples. Follow-up calls would be made in May or June 2001 to confirm the status of sponsors and to obtain current-year lists to identify new sponsors and additional former sponsors.

As discussed in the next section, pretest experiences have led us to propose a number of changes in these plans. In particular, we recommend that the contractor confine early contacts with state agencies to requests for sponsor and site lists, and conduct the interview in the early fall, after most SFSP sites have closed. The interview will remain an approximately 45-minute telephone interview. In addition, we recommend requesting only a list of new sponsors (those who attended new sponsor training) in May or June, as we found it was difficult for states to provide a full sponsor list at this time. The full list for the 2001 survey year would then be requested in September, at the same time as the calls for state interviews are made. At this time, the contractor can also request claims records for sites that were visited.

2. Pretest Experience and Recommendations

We considered design changes based on the state pretest in the following three areas: (1) the timing of the interview, (2) procedures for obtaining sponsor and site lists, and (3) the mode of the interview. Our recommendations for each of these areas are described below.

a. Timing of Interview

We recommend changing the timing of the state administrator interview to early fall, starting in September. We found that state administrators, although willing to do the interview in June, unanimously agreed that the best time for such a survey would be in the fall. They offered two explanations: (1) more complete records for the current year would be available in the fall, and (2) they are extremely busy during May and June approving sponsors and sites and getting the program up and running. Conducting the interview in the fall will eliminate the problem of having to estimate current-year figures, or having to refer to both actual previous year's figures and projections for current-year figures.

b. Obtaining Sponsor and Site Lists

We believe that it would have been feasible to obtain 1999 sponsor lists, and even site lists, from most states if we had contacted the states in mid-winter, before this year's SFSP training and application process was fully under way. We had originally proposed making these contacts no later than March for the full study, and our pretest experiences confirmed that it is important to obtain the lists before states begin gearing up for the summer to come.[2]

In May or June, it would be possible for most states to provide a list of sponsors who had attended new sponsor training, which generally would include all new sponsors, as well as some who decide against becoming sponsors. We recommend that the contractor ask for a list of those who attended new sponsor training at that time.

Finally, we recommend that the contractor ask all states for their final sponsor and site lists early in the fall, when they are recontacted for the state administrator interview. At that point, the lists will

[2]Specifically, these contacts would have to be made as early as possible to obtain school lists for the participant-nonparticipant study. They could occur as late as March if that was not at issue.

not be useful for selecting the sponsor sample, but they will be used to identify former sponsors not already identified by contacts with last year's sponsors. In addition, they will be of use in adjusting the sample weights.

In sum, we believe it will be necessary to contact states three times: twice to request lists, and a third time to obtain the final list and to complete the state administrator interview. In many instances, each request will involve multiple follow-up calls.[3] As in the 1997 GAO study, there will be no restrictions on the number of calls to state administrators. GAO (1998b) was able to contact and complete telephone interviews with all 50 states and the District of Columbia.

In general, it is more difficult to obtain site lists than sponsor lists from state administrators. Some states keep site information only in hard-copy form, as attachments to the original application, or on monitoring forms. It will be necessary to obtain last year's site lists from the states if the full study includes a participant-nonparticipant study; most state administrators confirmed that these lists can be obtained for the previous year. If states can provide current-year site lists early enough to be used for sampling, we recommend that these lists be used. However, we have always assumed that some states would not be able to provide site lists, and our pretest experience suggests that our assumption is correct. Our cost estimates include the cost of the contractor requesting current-year site lists from the sponsors directly.

We found that state lists were not as automated as we were led to expect from our expert panel. Our pretest experiences have led us to change our cost assumptions to assume that only 25 percent of states will provide electronic lists. All others will have to be data-entered. We also now estimate that providing these lists may impose more burden on the state agency staff than we had originally

[3] It took an average of 4.5 calls to the state administrator's office to complete the state interviews in the pretest.

envisioned. However, the lists are critical to this study, and we believe the burden is likely to be reasonable, given their importance.

c. Mode of Interview

FNS previously had raised the issue of whether we should offer the state administrators the option of completing a self-administered version of the survey (with telephone followup), or whether we should use the approach we pretested--a telephone interview, with a "look-up" list of key variables sent in advance. We considered a mixed-mode approach for states as proposed and tested for the sponsor interviews. In such an approach, a self-administered instrument and a return envelope would be mailed to the state respondent. A telephone interview would be conducted with those who do not complete and mail back the self-administered state survey.

Based on our pretest experience, we recommend maintaining the state administrator interview as a telephone interview. Two state respondents commented that a self-administered form would be better, but they admitted that they were not sure they would ever have completed it. Contractor staff will have already established a relationship with the state agencies, as they will need to be in close touch with them during the mid-winter to early spring and early summer to obtain sponsor and site lists. In addition, if the interview is conducted by telephone, an interviewer can record comments the respondent makes to give more "color" and examples. Because the states comprise a relatively small universe, the comments can be analyzed individually.

It is important to provide the "look-up" list with the advance letter. Most respondents commented favorably on it, as they liked knowing the kinds of questions they would be asked and when they would have to reference records. We have added several more items to the "look-up" list, based on comments made during the pretest. The items include: number of staff; staff available for training and technical assistance to sponsors; number of applications received, approved, and

disapproved; number of administrative reviews of sponsors conducted this year; number of sites operating this year and last year; number of returning sponsors who expanded number of sites; and number of sponsors by type of organization.

D. SPONSOR SURVEY

Interviews with current SFSP sponsors will be needed to obtain information on management practices, activities and meals offered, and related programmatic factors that may affect participation levels. For example, the survey will ask about local demand for the program, the extent of outreach and training activities, and the adequacy of reimbursements.

1. Methods

In the 1986 SFSP evaluation, sponsors were first sent an advance letter describing the project, then called and asked to complete a telephone interview. Most sponsors requested that a questionnaire be sent to them prior to completing the phone interview. It took many calls to most sponsors to complete the interview. This was due in part to the extensive questioning on financial information, much of which sponsors were unable to estimate or unwilling to provide. In some cases, interviews were not completed until after summer programs were closed and all financial records were complete.

Based on MPR's previous experience, discussions with staff who conducted the 1997 GAO study, and our pretest experience for the current study, we recommend a mixed-mode methodology. The process will begin when the contractor sends sampled sponsors an advance letter explaining the purpose of the study, describing the information needed from them, and asking them to send back lists of their current sites. Sponsors will be prompted by telephone calls to send site lists in as soon as possible. A second packet will be sent two weeks after the sponsor's site(s) open. The packet will

contain a self-administered questionnaire that can be filled out and mailed back. Within two weeks after the questionnaire mailing, research staff will start calling selected sponsors. At this time, interviewers will determine if the sponsor received the packet, had any questions about the survey, and whether they prefer to answer the questions by telephone or to complete the self-administered paper questionnaire. If the respondent chooses to complete the interview over the telephone, an interview of approximately 45-60 minutes is feasible. Telephone respondents who chose not to complete the mailed survey will also find the survey useful since it will familiarize them with the questions. Follow-up calls will focus on prompting respondents to complete and return the mail survey or on conducting the survey by telephone.

If sponsors choose to complete the mail survey, the time needed to talk with them will be less, and the follow-up call will focus on data cleaning and checking for completeness. In addition, sponsors would be instructed to have the most appropriate and knowledgeable person within their organization respond, thereby decreasing the number of calls to multiple staff members in order to complete the survey. We recommend that interviews be conducted by both professional survey staff and executive interviewers. To ensure that the data are comparable, the self-administered survey instrument will be appropriately adapted for telephone use. The completed surveys will be tracked, reviewed, and edited prior to data entry.

a. Mixed-Mode Approach

One issue introduced by a mixed-mode approach to data collection is the possible lack of standardization between the two modes, in which case, the data obtained by telephone may not be comparable with the data obtained from the paper instrument. We propose a number of steps to minimize the effects of this problem. To begin with, we designed the self-administered survey instrument bearing in mind that some people will be responding by telephone rather than on paper.

Therefore, questions that do not work well on the telephone, such as those asking respondents to rank order or prioritize items, are not included in the instrument.

b. Telephone Survey Using Hard-Copy Instrument

In addition to the above design issues, we recommend that telephone interviewers use a hard-copy instrument very similar to the self-administered instrument rather than doing a computer-assisted telephone interview (CATI). The interviewers will begin the interview by asking respondents if they have the self-administered version in order to follow along. This will minimize one of the largest differences in mode--being able to see a question in context of what comes next. Even if respondents no longer have the survey instrument, they will have some idea of the context if they reviewed it prior to being called. The instrument can also be faxed at the time of the interview to those who cannot find their copy.

2. Pretest Experience

Since this mixed-mode approach differs from the design used in 1986, we used the pretest to assess the effectiveness of this approach. As part of the pretest effort, we asked respondents if they preferred the self-administered approach and/or if it made the telephone interview easier. About 20 percent of sponsors returned the self-administered survey, and another 10 to 20 percent had at least partly completed it and referred to it during the telephone interview. We also found that the advance letter and instrument were helpful to sponsors in completing the telephone interview.

The pretest interviews took about an hour. After the recommended revisions to the instrument are made, we believe the survey may still take about an hour, on average. Although we had assumed the survey would take only 45 minutes to complete, we do not believe any major parts of the survey are clearly less important than any other parts. We also found that respondents were willing to talk

for up to an hour once they were on the phone. Thus, we recommended keeping the survey at this length.

a. Timing of Survey

In the pretest, we mailed all the sponsor interviews in late June, generally during the first week of sponsor operations. In the design report, in contrast, we had recommended waiting until two weeks after program operations had begun. We believe the sponsor interviews would have gone more smoothly if we had waited the full two weeks, as is planned for the full study.[4] Thus, we propose maintaining the current design of contacting sponsors two weeks after they have been in operation for the sponsor interview. We also recommend informing sponsors one to two weeks prior to a site visit that one or more of their sites have been selected for the study.

During the pretest, the earlier we administered the survey, the more difficult it was for sponsors to answer certain questions. We confirmed this observation by holding short debriefing sessions at the end of most of the sponsor interviews and asking the sponsors to suggest the best time to conduct the interview. Most said that the best time would be late summer or early fall, when the program was ending or had just ended. This schedule would give sponsors more time to participate and would make it easier for them to answer some of the questions.

Nevertheless, for several reasons, we do not recommend postponing the sponsor interviews until after the program ends. First, some sponsor staff will not be available late in the summer or in the fall. Some move to other jobs in the fall and would be difficult to locate. Second, we are recommending moving the state interviews and many former sponsor interviews to the fall. Managing additional telephone interviews late in the field period would be difficult.

[4]We sent the interviews early during the pretest because the time frame for the pretest was tighter than the time frame of the full study is expected to be.

b. Cooperation of Sponsors

Due to the busy start-up schedules of sponsors, we had difficulty gaining cooperation and completing interviews with sponsors in the pretest. Although the majority of sponsors cooperated and completed an interview, it took more time to contact them and complete the interview than anticipated. Most of the sponsors were very busy and had trouble scheduling and keeping interview appointments. This problem may have been due to the timing of our survey, as we have discussed. However, we also believe that we would have had more cooperation if sponsors had heard about the study from the state agency, had been aware of its importance, and had been encouraged to cooperate. Thus, we recommend that FNS and the study contractor engage in a publicity effort with the states and at state training sessions for sponsors early in the study to increase awareness and participation of sponsors.

c. Site Lists

Another issue for the sponsor survey is the need to gather lists of their current sites as early as possible in order to draw the sample for site data collection efforts. We recommend asking sponsors for site information in May or June and, once this is received, not contacting them again until their sites are open.

E. FORMER SPONSOR SURVEY

In order to answer the research questions about what factors contribute to a lack of sponsors or to sponsor dropout, we recommend a separate instrument for contacting sponsors who have recently left the SFSP. This instrument will complement questions asked of state administrators and current sponsors about sponsorship. The former sponsor survey will gather information on the characteristics of sponsors who no longer participate in the program and will ask specifically about

what factors led them to withdraw or to be dropped from the SFSP and what it would take to bring them back. By comparing state administrator perceptions with those of former sponsors and current sponsors, the study can determine if there is a disjoint in how administrators and sponsors view the program. Characteristics and perceptions of current sponsors can be compared with those of sponsors who have left the SFSP.

1. Method

We recommend telephone interviews (approximately 30 minutes long) with former sponsors who have been sent an advance letter. The greatest challenge posed by the former sponsor population involves contacting sponsors who no longer participate in the program and locating individuals within the sponsoring organization who will be able to answer questions about SFSP and why they no longer participate. According to the 1997 GAO study, fewer than 10 percent of sponsors per year left the program between 1996 and 1997, and between 1997 and 1998 (GAO 1998b). Assuming the exit rate has remained stable, sufficient sample can be obtained from those who participated in the previous year (2000) but not in the current year (2001), which should help with this problem.

2. Pretest Experiences and Recommendations

In the pretest, we found that states could not easily produce lists of former sponsors or needed to do so manually. Therefore, we recommend that former sponsors be identified by initially calling sponsors who participated in the previous year in May or June, and screening for whether they plan to participate in the current year. Those who are not participating will be asked to complete the former sponsor survey right away. We also recommend that the contractor request the current-year sponsor list in the fall to identify additional sponsors who dropped out to interview in the fall. This

schedule allows for conducting telephone interviews with former sponsors during two time periods: May to June and September to October.

Some sponsors leave the SFSP but continue to feed children. Some of the former sponsors feed children throughout the year under various child nutrition programs, such as the Child and Adult Care Food Program or the NSLP. They switch or supplement that funding during summer months with SFSP funding. After "dropping" the SFSP, some simply continue the program with other funding. In these cases, the questions about other sponsors serving the children do not apply. In addition, the sites often had difficulty disentangling the costs, records, reimbursements, training, and outreach efforts of the SFSP from those of the other child nutrition programs.

We have been informed that some sponsors stop acting as sponsors, but that they do not actually leave the SFSP because they become sites for some other sponsor in their area. ERS has indicated that these sponsors should be considered eligible for the former sponsor interview.

F. SITE SURVEY

When MPR collected data on SFSP sites 14 years ago, we used a combination of interviewer observations of site operations and in-person interviews with supervisors or site directors at the sampled sites. Data on physical surroundings, conditions at the site, facilities available, participation on the given day, meal content and preparation, and uneaten food were collected through observation. In-person interviews with site directors covered questions related to the years of site operation, days and hours of operation, weeks that the site was open during the year, number of staff, other activities provided on-site, whether the day observed was typical or atypical, contingency plans (if more or fewer children show up than expected, if the weather was inclement, etc.), and information about the geographic area from which participants came and how they traveled to the

site. We recommend also asking site directors about training and monitoring of staff, their interactions with the sponsors of their site, and factors associated with children's participation.

1. Method

Given the research goals for this project, to accurately measure the areas of interest, particularly those concerning children's participation, adequacy of facilities, activities, quality of meals, plate waste, and program integrity, it is important to conduct observations and in-person interviews on-site. An on-site approach has the following advantages:

- It allows verification of basic program integrity issues, such as the approximate number of participants at the site (and, indeed, the existence of the site itself).
- It allows direct observation, which may be more reliable than site director reports.
- It is less burdensome on respondents in that much of the questionnaire consists of observations by site interviewers, not interactions with staff.
- It is the only mode of interviewing that allows a credible evaluation of plate waste.
- It allows comparison with past data to describe changes in site operations.

The following are additional considerations related to collecting site data though telephone or self-administered modes of interview as opposed to on-site data collection:

- Not every site supervisor will have access to a phone, especially at outdoor sites. Supervisors who have cell phones might be unwilling to use them to complete a telephone interview.
- Depending on the director's schedule, it might be necessary to do the telephone interview during the scheduled meals, which is likely to increase the rate of refusals.
- So as not to disrupt or change the usual site procedures, it might be necessary to collect information after the meal is served on the day selected for a site visit. It is questionable whether or not the supervisor would be able to accurately give answers. As noted, certain questions that might be asked, such as the ages of participants and the number

of meals taken off-site, might be difficult to answer after the fact, but disruptive to answer while children are being fed.

- A mail questionnaire would need to be short and simple, since no trained interviewers are present or on the telephone to help guide the respondent through the survey.

- Response rates to mail surveys are generally low unless there is extensive followup. There would likely need to be extensive tracking and followup at both the site and sponsor level in order to obtain respectable response rates. This could be difficult, given that some sites are open for a very short time. (In 1986, some remained open for only a week or two, and a few were in operation for only one day.)

- If there are any data quality problems, the short time that sites are open would likely result in missing or incomplete data, if an interviewer was unable to contact the supervisor at the site to rectify the problem.

Despite the advantages of on-site data collection, one of the main disadvantages (compared with a telephone or mail survey) is cost. While telephone or self-administered surveys are more economical, we believe the advantages to on-site data collection outweigh indirect methods of obtaining site information. Our pretest experience verifies the value of on-site observations; much information would have been lost if the study had to rely on telephone or mailed interviews with site staff.

Interviewers will first introduce themselves to the site supervisor and explain the purpose of their visit and how to minimize any disruption caused by their presence. The data collection effort will start with general observations about the site itself, meal preparations, and food safety practices. The interviewer will observe and record information about participants and the feeding process throughout the mealtime, which will be primarily during lunch but will include breakfast and snack periods where applicable. In-person interviews (20-30 minutes) with site staff will help to ascertain how the day of the visit differs from a typical day at the site. Other information about the site that cannot be directly observed, such as activities that might be offered on different days and contingency plans in case of inclement weather, will also be asked about. Measurements for

nutritional analysis and plate waste, taken before and after meals, are described in detail in Sections G and H.

For sites that only offer lunch, we anticipate that the interviewer will be on-site for about two to three hours, starting an hour before lunch is served and ending after the children have been fed. For sites that also offer breakfast, we estimate being on-site for an average of six hours, arriving prior to or during breakfast and staying on-site through completion of the lunch service.[5] An interviewer will visit no more than one site per day. To collect site-level data, we recommend using field interviewers who have received intensive training. Training is further discussed in Section I.

a. Staffing

Because of the short, fixed time frame for fielding the study, we recommend having additional staff available and trained to serve as backups to field interviewers who are unable to complete assigned site visits. Having staff who are willing to travel outside their local area will be critical in case local arrangements are not feasible in some areas. In addition, senior and junior survey staff will need to be trained and available to conduct emergency site visits.

[5]For residential camps, we recommend arriving in the morning and being on-site six hours to observe lunch and supper.

b. Timing

We recommend limiting the data collection period to the summer months. While there are SFSP sites that are in operation during the fall, winter, and spring months, these represent a small minority of sites and are typically tied to year-round school programs. Because of the difficulties in separating out SFSP and NSLP participants in year-round schools, coupled with the cost implications and questionable feasibility of visiting sites at other times of the year, we recommend collecting data only in the summer. Site visits should be scheduled for all days of the week to ensure adequate observation of activities and meals that may vary by day of the week.

c. Tracking Systems

In an effort to maximize the efficiency of data collection over a short period of time, we recommend creating systems that track site visits by date, announced versus unannounced visits, outcome of visits, interviewer assignments, interviewer availability to travel or cover sites other than those assigned, interviewer productivity, and completion rates. A separate database to track sampling issues such as whether sites opened or not (and why), with the ability to assign replacement sites "on the fly" will also be developed.

2. Pretest Experiences and Recommendations

In the pretest, after we selected a sponsor and site, we called the state office to confirm that the sponsor and site were in operation in July 2000. In about half the cases, we had to make adjustments to the original list of sites selected.[6] We were successful in selecting and observing nine sites that reflect the diversity of the program. We observed a National Youth Sports Program (NYSP) site;

[6]In one case, the sponsor was not in operation in 2000; in another, a sponsor insisted on accompanying us and selecting one site when we had requested visiting two others; and, in a third case, a site had only one child in attendance, so the state monitor accompanying us selected a replacement site.

government, school, and nonprofit-organization sponsorship; indoor and outdoor facilities; day camps and educational programs; vendor-provided and self-preparation meals; OVS and unitized meals (meals packaged separately for each child); hot and cold meals; breakfasts and lunches; and small-, moderate-, and large-sized sites (ranging from 16 to 360 children). In addition, some of the sites represented the sponsor's only site, whereas others were 1 of 700 or more sites run by the same sponsor.

a. Sample Design

Often, attendance figures available from the sponsor or state before the site visit differed from what we observed on site. At three sites, the state indication of size (in terms of meals) was more than 100 meals larger than the actual number of children.[7] Even at some of the smaller sites, there seemed to be a tendency to overstate the number of participants. It is possible that sponsors or site directors estimated attendance figures before the site had opened and then later adjusted the count downward to more accurately reflect the actual number of children attending the site. We still believe that using the estimated size figures available from the state or sponsor will be better than having no size data at all. However, because sampling will be with probability proportional to estimated size, it may be necessary to make postselection adjustments in the sampling weights.

We also could consider the selection of a nearby "back-up" site, especially when travel time to a site is significant. In one case during the pretest, the planned site was not fully operational, so the state monitor selected a back-up site, which we visited. The contractor can select a back-up site to match the first site's characteristics by selecting pairs of sites and then a "first-choice" site within

[7]A sport camp was listed as serving 500 meals, but we observed 320 children. A public school site in a large urban area was listed as having 350 children, but only 1 was present at breakfast. A day camp was listed as serving 320 children, but we observed 104 (another 100 were on a field trip).

the pair. However, this option would complicate the sampling process and may neither be necessary nor feasible in many areas (the interviewer may not have to travel far to the sites, or the sites may not be close enough together to function as effective backups).

b. Announced Versus Unannounced Visits

Unannounced visits are desirable in order to observe site operations as they normally are, as opposed to "cleaned up" for the observer, but they lead to some cooperation problems. For example, the appropriate staff to provide site director survey information may not be on site the day of the interview; thus, the interviewer may collect incomplete information or may have to speak with multiple respondents. With multiple respondents, the interview takes longer to complete, reducing the interviewer's available time to observe meals and plate waste. Furthermore, we would not have been able to complete the site director interview in one site without advance notice, as the site director had to ask someone to run his sport activities in order to meet with us. Some sites were extremely reluctant to cooperate with the data collection because MPR staff arrived unannounced; they often refused to cooperate until they had consulted the sponsor. In addition, many sites offer field trips, and one risks arriving on a day when nothing can be observed on-site.

Therefore, it is essential that all sponsors be aware of the study and understand that their site may be visited at some point. However, the sponsor should not routinely be informed about the exact day. If possible, the sponsor should be told only that "one of your sites will be visited in the next two weeks," for example, rather than which site will be visited. Use of the publicity brochure would facilitate sponsor awareness of the study. It would be useful if the data collection contract were written to state clearly that, if possible, visits are to be unannounced. In this way, the contractor will be able to inform sponsors that such visits are a requirement of their contract arrangement.

Some fallback arrangements may be necessary. For example, in the New York City public school sites, observers would have to convince a school police officer that they have legitimate business in a school. The sponsor representative at the NYC Board of Education thought it would be possible to arrange for access if the contractor let the sponsor know which schools were to be visited during a certain period. The contractor would not have to specify the day but would have to specify the particular schools, so that the security personnel could be informed to let contractor staff in.[8]

c. State Accompaniment

State accompaniment has both advantages and disadvantages. The main advantage is that it adds legitimacy to the survey. The site staff (and, often, their sponsor) are familiar with the state monitor or state administrator's name or office. We would not have been allowed on the premises of one large urban site in the absence of the state monitor because we lacked credentials and had not notified the sponsor in advance. The main disadvantage is that the site director tends to focus on the state monitor and usually is reluctant to take time away to meet with the interviewer. Furthermore, monitors who are conducting their monitoring visits may find violations, which might affect the site directors' willingness to talk openly about what they do--or even to talk with the interviewer at all. At one site, after discovering that the state monitor was there with us, the site staff spent as much time as possible avoiding our interviewer and the state monitor. The survey interviewer may also be blamed for the negative outcome resulting from a visit by the state monitor, such as disallowing meals.

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[8]It may be possible to negotiate alternative arrangements with this large, important sponsor to increase the unannounced nature of the visit. However, we have not explored this option in detail at this time. During the pretest site visits, we obtained access because our staff accompanied a state monitor; this arrangement may be an option for the full survey.

Because we decided to have the state monitors accompany us wherever possible during the pretest, we selected the actual days of the visits based on their availability. In most cases, the state monitors used our visits as a time to monitor the site. We conducted only one site visit without state monitor accompaniment. At two other sites, the monitors were there only to accompany us; they did not conduct their reviews. We did not have any refusals for the site interviews. Accompaniment by the state-level staff person or prenotification by that person to the sponsor or site about our visit most likely prevented refusals.

Based on our pretest experience, we recommend that the design not include state accompaniment, unless necessary. If the state agency wants to send a monitor to accompany the contractor on the site visit, the visit should occur according to the data collection schedule, not the state's schedule. We recommend that interviewers carry identification, and that key sponsor and state staff be informed of the project and approximately where our staff will be, so that they can confirm the legitimacy of the contractor staff.

G. OBSERVATION OF SFSP MEALS

Because the quality of meals is such an important variable in the evaluation, direct observation of SFSP meals is recommended during the site visits. These observations will provide descriptive information about the quality, quantity, and variety of meals served by sponsors. The general approach will be to record SFSP meals in detail, describing foods and beverages and estimating portion sizes using three-dimensional food models (or weighing particular food items if this proves feasible). This information will be later coded for food and nutrient content using software that estimate the *average food and nutrients available for consumption* from SFSP meals. Observed plate waste will then be used to modify intake estimates to estimate the *average intake consumed*

from program meals. Food and nutrient estimates will be averaged *across sites* for sites with a given characteristic.

1. Method

The purpose of observing meals on site is to develop a complete list of food and beverage items for each sampled meal, and the portion sizes of each food item. For instance, a field interviewer will record:

- Type of meal (breakfast, lunch, etc.)
- Whether the meals were provided as OVS
- Foods and beverages offered or served for that meal
- Whether the meal was hot or cold
- Source of the meal (vendor, central kitchen, or on-site preparation)
- Time and duration of the meal period
- Whether there was a "share box"
- Whether there were enough meals for all children present

The interviewer will record most of the information before the meal is served so that he or she can then observe children as they pass through the food line or as they are served meals; seconds will also be recorded. The interviewer will record (tally) the meal choice or the particular food items (for menu options or OVS sites) for a random sample of children. One of two options can be used to sample children randomly as they pass through the food line: (1) interval sampling of every *nth* child, after a random start; or (2) recording all children for a designated period (for example, three to five minutes) after a random start. Similar sampling strategies will be used for children served meals while they are seated at tables (for example, all children at the *nth* table or a random child per table).

Only meals served on site will be observed.[9] Personal foods brought from home or purchased on-site (such as from a vending machine) must be recorded, because these foods can affect the sampled children's food selection and plate waste but will not be considered part of the SFSP meal served. Data on weekly menus (if available), recipes, and any label or package information for foods served will also be collected and recorded to facilitate nutrient coding at a later time. A recipe form will be used to copy or record ingredients and preparation methods of recipes for foods prepared on-site.

In the 1986 study, portion sizes were estimated using three-dimensional food models, since actually weighing the food was felt to intrude on site operations. For the current study, the visual estimation method appears to be the most applicable and practical for estimating the portion sizes of most foods. It is recommended that *five meals* be randomly selected for visual estimation of portion sizes and for recording package amounts for particular food items.

2. Pretest Experiences and Recommendations

In general, it was possible to observe food preparation and obtain information on the content of meals before the meals were served. In one case, in which several food options were "offered," we were not allowed to enter the kitchen area where food was being prepared. Rather, we had to ask questions of the cooks, who often could not provide the level of detail we preferred. Although counting the children served was often feasible, it was difficult to gather head counts of SFSP children who were in the same room during lunch as children in other programs or who were served at multiple locations within a building. It was difficult to observe sample meals (children) when children made multiple trips through the line, or when counselors brought food to the table. It was

[9] Some sites essentially have two meal services (one meal for children going on field trips, and another for those staying at the site).

also difficult for one interviewer to distinguish firsts from seconds when the meal was served in courses or when the counselors brought food to the table.

We had the most difficulty with the OVS environment. In this type of arrangement, it is significantly more difficult to make observations, for the following reasons:

- Children sometimes are served meals in courses, making it difficult to record the meal content for multiple children. The interviewer had to return to each child many times to see what the child had been served at various times.

- The portion size of a meal component might be recorded incorrectly if a child takes a second helping, an action that the interviewer may fail to observe. With "offer" situations, there is also more variation in portion sizes, and children can skip an unwanted component.

- It is important to observe what the children are served throughout the lunch period, especially if beverages and food are in separate places, but this observation reduces the time available for counting the children and determining their ages and sex. In some instances, the interviewer asked the site staff or the state monitor to provide counts.

One option for resolving these problems is to try to identify in advance the OVS sites, and to consider sending two interviewers to these sites. In the original design, we had estimated that we generally would have to send two interviewers only to very large sites (more than 500 children), which we estimated would be eight percent of sites visited. We recommend increasing the number of two-person site visits to 12 percent of the sites (or possibly higher). This change would give the contractor more flexibility in sending two interviewers to somewhat smaller sites, particularly sites with OVS.

H. PLATE WASTE

Data on plate waste must be collected through on-site observation. The task can be difficult in many settings, and observers must be carefully trained. Information on plate waste is likely to be of even greater policy relevance than in the past, as SFSP sites in schools now have the option of using OVS. Commonly used in the NSLP, OVS is a waste-reduction measure in which children are allowed to decline certain meal components while the meal remains reimbursable (Dillon and Lane 1989).

1. Review of Plate Waste Literature

The literature on plate waste was reviewed to recommend a cost-effective method of collecting and estimating portion sizes and plate waste, and to identify potential improvements to the methods used in the 1986 study. Much of this work has been carried out in the NSLP. Three methods commonly used to estimate plate waste or portion sizes are scrape and weigh, visual estimation, and pooled waste.

a. Scrape and Weigh Method

The most precise technique is that recommended by the USDA, the "scrape and weigh" method. Researchers using this method normally proceed as follows. First, they randomly select a few complete trays (four or five) prior to or during the meal service. They weigh each of the foods from each tray to determine a mean serving weight, focusing on the weight of edible portions by subtracting the weight of inedible portions (for example, chicken bones and milk containers) from the total weight or by removing the food item from the container and then weighing. To estimate the amount of plate waste, investigators usually select a number of trays at random after the meal

service and calculate the weight of the remaining edible food items. This figure is then divided by the mean serving weight to yield the percentage of the food item wasted.

The primary advantage of the scrape and weigh technique is that it yields accurate and detailed information about the plate waste of individuals. The disadvantages include the following: (1) the technique requires space to hold trays and scrape and weigh waste, (2) the procedure is time-consuming and expensive, and (3) it is an impractical way to measure plate waste if more than 100 samples are desired (Comstock, Symington, and Mackiernan 1981).

b. Visual Estimation Technique

The second method of measuring plate waste is the visual estimation technique. In this method, researchers follow the same first step as in the scrape and weigh: they randomly select four or five trays containing uneaten food and weigh it to obtain mean serving weights for each. The mean serving weights are the figures for which estimates of plate waste are then calculated. After the meal service is complete, researchers randomly select a number of trays for visual estimation of plate waste. Different researchers use different estimation scales, but the Comstock scale is used most often by investigators who visually estimate plate waste.

The Comstock scale consists of six points: a 0 is assigned if no food remains, 1 if one-quarter remains, 2 if half remains, 3 if three-quarters remain, 4 if nearly a full portion remains but at least one bite has been taken, and 5 if the full portion of food served remains. Observers are generally trained to have a good sense of the average serving size so that they can more accurately estimate the percentage of different food components that remain on a tray.

Many studies have validated the ability of the visual estimation method to produce estimates that are similar to those yielded by scrape and weigh. Comstock, St. Pierre, and Mackiernan (1981) found that the correlation between visual estimates and the actual weights was high and statistically

significant (0.93). Other studies have also found similarly high correlations between the results obtained by the two methods (Thompson, Head, and Rodman 1987; Stallings and McKibben, Jr. 1982; and Dubois 1990).

Dubois (1990) conducted a study to determine the degree of bias and imprecision in the visual estimation method and found a small, but statistically significant, bias of 2.2 grams, on average, for visual estimation. On the other hand, the inaccuracy of estimates obtained visually averaged 13.7 grams (Dubois 1990). The author concluded that the high degree of imprecision was largely a result of the fact that the Comstock scale is discrete in nature, while the weights of plate waste are continuous.

The visual estimation method has a number of advantages over the scrape and weigh method: (1) it can be conducted at a lower cost, (2) it is more convenient, and (3) it is less intrusive (Dubois 1990; and Graves and Shannon 1983). However, the technique also has disadvantages. It yields less accurate estimates of plate waste (Dubois 1990; and Thompson, Head, and Rodman 1987) and is not as sensitive in detecting differences in portion sizes compared with the scrape and weigh method (Kirks and Wolff 1985).

c. Pooled Waste Method

A third method involves the weighing of pooled waste. Researchers first determine the mean serving weight as described in the other two techniques. Then, at the end of a meal service, they gather the trays of a number of individuals and pool all the remnants of the same food components. This pooled waste is weighed, and the average percentage of plate waste per person is determined by dividing the weight of the pooled waste by the number of individuals/trays sampled and then dividing this figure by the mean serving weight.

The primary advantage of the pooled waste method is that it is relatively easy to administer. However, an important drawback is that it does not allow researchers to determine the distribution of plate waste (Graves and Shannon 1983). This disadvantage is particularly problematic if the food item exhibits a bimodal waste distribution (Comstock and Symington 1982).

2. Proposed Method

For the new SFSP study, we recommend basically the same approach to sampling meals for plate waste used in the past. In Ohls et al. (1988), interviewers collected 6 to 10 discarded meals for plate waste analysis at each site. An important challenge to coding plate waste information that did not exist at the time of the 1986 study is the fact that sites operated by school food authorities now have the option of using OVS when serving SFSP lunches. In sites where OVS is available, interviewers coding the plate waste for meals may have difficulty determining whether certain components were fully consumed or simply were not selected. For example, it is difficult to determine from plate waste observation the type of beverage taken. It may only be practical to record milk (white or chocolate) or nonmilk beverage at sites that serve many beverages.

The OVS situation leads to challenges because more food options exist and more combinations of selected and wasted foods may be observed. It requires that interviewers be trained to record wasted food without worrying whether a particular item was selected (because there is no one-to-one ratio of selection and waste in OVS sampling situations). In sites with OVS meals, sampled meals (children) ideally should be observed during trips to the share box to record additional foods obtained from the box and foods returned to the box. In sites with unitized meals, information on foods placed and left over in the share box should be recorded and used to calculate average plate waste.

Since there is greater variability in discarded or wasted foods than in foods offered or served, it is recommended that *10 meals* be selected for recording plate waste at each site and that plate waste be estimated through the Comstock 0-5 rating scale. Plate waste information will be used primarily to estimate the *average* food and nutrient content wasted from SFSP meals *across sites*.

3. Pretest Experiences and Recommendations

In general, plate waste observations were easier to record than were the contents of the meals served. Plate waste measures were easiest to record at outdoor playground locations that served children bagged lunches. The children often put all their waste in the original bag and threw it away when they were finished. It was also easier to record plate waste associated with unitized meals than with OVS meals.

To obtain waste samples, we often had to solicit help from the site staff. As a result, it was not always possible to select every "nth" plate to measure. Instead, we tried to include a sample from each of the different types of participants (for example, from older children who often ate at one table, and from younger ones, who would eat at another). In addition, to help us, site staff sometimes had to change their normal clean-up routines. In some locations, staff help children by clearing away waste from the table as children finish; it was therefore more difficult to observe all the waste for a sampled child. At one location, the staff wrapped the waste from the entire table in the tablecloth and threw everything away.

Another difficulty in observing plate waste is the presence of a share box. Sites are supposed to have a share box to reduce food waste. If we knew that a lunch included a specific food (such as an apple) but did not observe the food item on a sample plate, we could not be sure whether it had been eaten, placed in the share box, or taken off site for later consumption. The lack of evidence of

a food, especially with the availability of a share box, increases the challenge of accurately determining what was wasted from a sampled plate.

During the training for the pretest and at the first site, we weighed particular foods to determine how long it took to weigh foods in the field, and how easy it was to do so. For example, we weighed lunch meats and cheeses left over from submarine sandwiches; sometimes, if the sandwich was not eaten at all, and we were able to separate the meat and cheese from the roll and condiments, it was possible to determine the weight of the food served. We concluded that weighing waste on site was impractical and not useful for enough foods to increase the overall accuracy of waste estimates. We also do not recommend recording amounts listed on the menus. For example, in the case of the submarine sandwich, the weighed amounts of meat (two ounces) and of cheese (one ounce) were greater than the menu listing of two ounces of meat and cheese combined. Instead, we recommend that training provide practice in observing and recording foods that are likely to be difficult to visually estimate in the field, such as sandwiches.

Due to the variability in portion sizes wasted, we recommend continuing with the 10 samples of plate waste for most sites, particularly in the OVS sites, which serve a wide variety of foods. However, it is sometimes difficult for one interviewer to select 10 plate waste samples, and having site staff help by selecting plates may lead to bias in plate waste estimates. Plate waste measures are facilitated by informing staff or counselors up front that waste will be collected. This information will enable staff to keep meal waste together, and to alter their usual routines for discarding waste. Plate waste samples need to be selected throughout the entire time that children finish, rather than entirely at the beginning or end of the eating and clean-up period; children may be served by age group or, if served all at once, younger children may take longer to finish. The "random selection" for plate waste may need to be modified in difficult environments, such as brief eating periods and

multiple eating locations. In addition, consideration should be given to collecting fewer waste samples in sites with 25 or fewer children (for example, five plates).

I. STAFFING AND TRAINING FOR DATA COLLECTION

1. Staffing

To conduct all the interviews over the summer months, it is critical to dedicate enough staff with the right qualifications to the project from spring 2001 through early fall 2001. The proposed survey staff will include one senior level survey director, who will be assisted by junior professional survey staff. We recommend one junior survey assistant for every 11 to 12 field interviewers in the field. In addition, sampling statisticians will handle all sampling functions, including monitoring completions and replacements to maintain quotas for each part of the sampling design. A database programmer will work with research staff to design and maintain the various databases used to manage the scheduling of observations and interviewers. The programmer will design the system to trigger the scheduling of a site observation once the sponsor interview is completed. Research and survey staff will be able to "run" reports on demand in order to monitor data collection and make adjustment to scheduling and interview assignments as needed. We recommend "front loading" the site visits as much as possible. Visiting sites as early in the summer as possible allows for time to send interviewers to distant sites, to sites that are only in operation during August, and to sites that must be contacted more than once to clarify information or to collect additional data.

Because of the geographic distribution of the sites, some interviewers will conduct site visits in multiple states, while others will mainly visit multiple sites in one area (for example, New York City). The actual number of interviewers to be trained will be determined after the size of the site sample has been decided because the short data collection period does not allow time to replace

interviewers lost to attrition. We recommend training about two times as many interviewers as are needed to complete the site visits.

2. Training

One or two training sessions for interviewers will be needed (depending on the actual number of interviewers). The training session itself will last three days and will be conducted by multiple senior project staff. We envision the training session as follows:

- **Day One**
  - Introduction to the study
  - Background on contract organization and history of SFSP
  - General interviewing techniques
  - What has happened prior to site visit
    - Call(s) to the sponsor
    - How site visits are scheduled
  - Procedures when interviewers arrive at the site
    - Who to contact about your arrival
    - What to observe
    - When to do interviews
  - Begin the question-by-question training

- **Day Two**
  - Continue the question-by-question training
  - Discuss obstacles and how to handle them
  - Meal observations training
    - Measurements
    - Content of meals
    - Plate waste
    - Problem solving
  - Completion of site observation and meal observation forms

- **Day Three**

  - Practice interviews
    - Observations
    - Interviews
    - Meal information recording
    - Plate waste
    - Problem solving

  - Administrative and travel issues

For the sponsor interviews conducted by executive interviewers, we recommend a half-day training session to cover questions in the interview as well as the background of the study. We also recommend having the interviewers work in close proximity to the senior survey director, who will be available to answer questions from sponsors and to smooth relations between sponsors and study staff as needed. Past experience suggests that the portions of the sponsor interview related to obtaining lists and gaining their study participation often requires higher-level intervention from senior research or survey staff.

V. ANALYSIS PLANS

Analysis of data from an evaluation study of the SFSP will involve preparing descriptive statistics such as means, medians, frequency distributions, and cross-tabulations to describe the characteristics and program operation practices of states, sponsors, former sponsors, and sites. These tabulations will require weighting of the data to produce estimates that reflect the program nationally. Standard errors that reflect the complex sample design will also need to be estimated. The data will be linked, based on an ID number system, allowing for appropriate cross-tabulations across levels of data.

We recommend that the study data be tabulated in two primary ways: (1) to reflect the populations of sponsors, former sponsors, and sites; and (2) to reflect the population of participants served by the various sponsors and sites. For example, data on the availability of site activities will be presented to show the percentage of all sites that provide other activities, as well as the percentage of children who attend a site that provides both activities and meals.

This chapter gives an overview of the types of data analysis that will be conducted to produce national estimates for states, sponsors, former sponsors, and sites. We provide examples of data tabulations to illustrate the types of data that will be analyzed and reported for the various levels of program operations.

A. STATE-LEVEL ANALYSIS

Administrative data from FNS provide a picture of the variation in SFSP participation in counts of participating children, the total number of meals served, the participation rate expressed as the percent of eligible children (based on NSLP figures), and the number of sponsors nationally. Table V.1 indicates the type of administrative data that will be available on the number and types

TABLE V.1

SFSP PARTICIPATION DATA, BY STATE AND TYPE OF SPONSOR

State and Region	Number of Sponsors					Number of Sites					Average Daily Attendance in July				
	School	Government	Nonprofit Organization	Residential Camps	Total	School	Government	Nonprofit Organization	Residential Camps	Total	School	Government	Nonprofit Organization	Residential Camps	Total
Northeast															
Connecticut															
Maine															
Massachusetts															
New Hampshire															
New York															
Rhode Island															
Vermont															
Total															
Mid-Atlantic															
Delaware															
District of Columbia															
Maryland															
New Jersey															
Pennsylvania															
Puerto Rico															
Virginia															
Virgin Islands															
West Virginia															
Total															
Southeast															
Alabama															
Florida															
Georgia															
Kentucky															
Mississippi															
North Carolina															
South Carolina															
Tennessee															

TABLE V.1 (continued)

State and Region	Number of Sponsors					Number of Sites					Average Daily Attendance in July				
	School	Government	Nonprofit Organization	Residential Camps	Total	School	Government	Nonprofit Organization	Residential Camps	Total	School	Government	Nonprofit Organization	Residential Camps	Total
Total															
Midwest															
Illinois															
Indiana															
Michigan															
Minnesota															
Ohio															
Wisconsin															
Total															
Southwest															
Arkansas															
Louisiana															
New Mexico															
Oklahoma															
Texas															
Total															
Mountain Plains															
Colorado															
Iowa															
Kansas															
Missouri															
Montana															
Nebraska															
North Dakota															
South Dakota															
Utah															
Wyoming															
Total															

TABLE V.1 *(continued)*

State and Region	Number of Sponsors					Number of Sites					Average Daily Attendance in July				
	School	Government	Nonprofit Organization	Residential Camps	Total	School	Government	Nonprofit Organization	Residential Camps	Total	School	Government	Nonprofit Organization	Residential Camps	Total
Western															
Alaska															
Arizona															
California															
Guam															
Hawaii															
Idaho															
Nevada															
Oregon															
Washington															
Total															
ROAP[a] States															
State Agency Operator															
U.S. Total															

[a]Regional-office-administered program.

of sponsors and sites for 54 jurisdictions, by FNS region for the entire United States. As Table V.2 shows, interviews with state and territory administrators will also provide descriptive information about staffing and administrative costs; sponsor turnover; type, duration, and frequency of training, monitoring, and technical assistance; outreach activities; number and frequency of state shutdowns of sponsors and sponsors' sites; and adequacy of reimbursements for administrative costs. These state data will be reported in aggregate form at the FNS region level and for the total United States.

State-level information will be used to produce (1) national estimates (by combining information for all states); (2) state estimates for the number of sponsors and sites and for average daily attendance; and (3) categorical data analysis showing the variability across states for characteristics such as staffing, training, and average costs of operating the program. Descriptive data analysis--primarily of means, medians, and ranges--will address the following research questions: Do federal funds cover the administrative costs of the program? Has program staffing changed in the past three years? How do states identify, obtain, and monitor sponsors? What do states do to retain current sponsors? What is the average proportion of sponsors that leave the program, and how does it vary across states? What types of training and outreach do states typically provide?

B. SPONSOR- AND FORMER SPONSOR-LEVEL ANALYSIS

Information on the number of sites, types of sites (urban, suburban, or rural; closed enrolled, open, or restricted open; indoors or outdoors or both), number of participating children, and number and types of meals served will be assessed and compared across sponsor types (school, government, nonprofit organization, NYSP, and residential camp). (Tables V.3 and V.4 are illustrative examples.) In addition, the type, duration, and frequency of training, monitoring, and outreach activities will be evaluated for all sponsors and by sponsor type. Mean characteristics and the range

TABLE V.2

CHARACTERISTICS OF STATES ADMINISTERING THE SFSP[a]

Characteristic	Weighted to Reflect Participants Served			Weighting Each State Equally		
	Mean	Median	Range	Mean	Median	Range
Managing and Monitoring Sponsors						
Number of sponsor applications						
Sponsors approved						
Number of total sponsors						
Number of new sponsors						
Percentage (of total applicants)						
Sponsors not approved by state						
Number						
Percentage (of all applicants)						
Training						
Number of training sessions held for sponsors						
Number of training sessions attended for site personnel						
Monitoring Sponsors and Sites						
Sponsors receiving state administrative review						
Number (percentage)						
Sites receiving state administrative review						
Number (percentage)						
Percentage of unannounced site reviews						
Administrative Costs						
Number of administrative staff						
Percentage of administrative costs recovered from FNS						

[a]Shown for illustrative purposes; does not include all variables to be tabulated.

TABLE V.3

SELECTED SPONSOR CHARACTERISTICS[a]

	Weighted to Reflect Percent of Participants			Weighted to Reflect Percent of Sponsors		
Variable	Total	New	Continuing	Total	New	Continuing
Type of Sponsor						
Government						
Local/municipal						
County/state						
School						
Public						
Private						
Private Nonprofit Organization						
National Youth Sports Program						
Residential Camp						
Average Daily Attendance						
Less than 100						
100 to 500						
501 to 1,000						
More than 1,000						
(Mean)						
(Median)						
Any Rural Sites						
Type(s) of Site						
Open						
Restricted open						
Closed enrolled						
Number of Sites						
1						
2 to 5						
6 to 10						
More than 10						
(Mean)						
(Median)						
Previous Years as Sponsor						
0 to 1 year						
2 to 3 years						
4 to 5 years						
6 to 9 years						
Longer than 9 years						
(Mean)						
(Median)						
Number of Observations						

[a]Shown for illustrative purposes; does not include all variables to be tabulated.

TABLE V.4

SELECTED CHARACTERISTICS BY TYPE OF SPONSOR[a,b]
(PERCENT OF PARTICIPANTS)

Variable	Type of Sponsor						
	School		Government		Private Nonprofit Organization	National Youth Sports Program	Residential Camp
	Public	Private	Local/Municipal	County/State			
Average Daily Attendance							
Less than 100							
100 to 500							
501 to 1,000							
More than 1,000							
Total							
(Mean)							
(Median)							
Number of Sites							
1							
2 to 5							
6 to 10							
More than 10							
Total							
(Mean)							
(Median)							

TABLE V.4 (continued)

Variable	Type of Sponsor						
	School		Government		Private Nonprofit Organization	National Youth Sports Program	Residential Camp
	Public	Private	Local/Municipal	County/State			
Any Rural Sites							
Type(s) of Site:							
Open							
Restricted open							
Closed enrolled							
Number of Years as Sponsor							
0 to 1 year							
2 to 5 years							
Longer than 5 years							
(Mean)							
(Median)							
Meals served:							
Breakfast							
Snack - morning							
Lunch							
Snack - afternoon							
Supper							
Snack - evening							
Number of Observations							

[a]Shown for illustrative purposes; does not include all variables to be tabulated.

[b]This table will also be produced for new sponsors and experienced sponsors separately.

of characteristics for new sponsors (in their first year of operation) will also be compared to those for experienced sponsors, defined as those successfully participating in the program during the preceding year (Tables V.3 and V.4).

Sponsor and former sponsor information will be used to answer research questions such as: How does the length of time as a sponsor affect participation[1] and the costs of operating the program? Which sponsor activities are associated with higher participation levels, and how does this vary by type of sponsor? What is the average number (and range) of sites that sponsors manage? How many meals are served, and how many children participate in SFSP programs? How does children's participation vary by sponsor type and geographic region? What barriers to participation do sponsors identify?

Similar information obtained from former sponsors will be used to compare current sponsors and former sponsors across a number of program parameters (Table V.5). To further evaluate the factors that contribute to sponsors leaving the program, the responses of former sponsors can be compared to those of the state administrators. The type and frequency of reasons reported for leaving the program will be analyzed by sponsor characteristic.

Information on the percentage of sites that are urban or rural, enrolled or open, indoors or outdoors, use vended or other food source, and offer program activities to participants will be analyzed by type of sponsor. In addition, multiple regression techniques could be used to predict participation levels based on state, sponsor, and site characteristics. Dependent variables on program

[1]Participation levels can be estimated using the average daily attendance reported by sponsors and sites. Participation rates for children will be assessed using data collected in the participant/nonparticipant study, if conducted, or by using census data on the number of low-income children in the area around the site (see Volume II).

TABLE V.5

SELECTED CHARACTERISTICS FOR CURRENT AND FORMER SPONSOR[a,b]

Variable	Current Sponsors[b]		Former Sponsors	
	Weighted to Reflect Percent of Participants	Weighted to Reflect Percent of Sponsors	Weighted to Reflect Percent of Participants	Weighted to Reflect Percent of Sponsors
Type of Sponsor				
Government				
Local/municipal				
County/state				
School				
Public				
Private				
Private Nonprofit Organization				
National Youth Sports Program				
Residential Camp				
Average Daily Attendance				
Less than 100				
100 to 500				
501 to 1,000				
More than 1,000				
(Mean)				
(Median)				
Any Rural Sites				
Type(s) of Site				
Open				
Restricted open				
Closed enrolled				
Number of Sites				
1				
2 to 5				
6 to 10				
More than 10				
(Mean)				
(Median)				

TABLE V.5 (*continued*)

Variable	Current Sponsors[b]		Former Sponsors	
	Weighted to Reflect Percent of Participants	Weighted to Reflect Percent of Sponsors	Weighted to Reflect Percent of Participants	Weighted to Reflect Percent of Sponsors
Previous Years as Sponsor				
0 to 1 year				
2 to 3 years				
4 to 5 years				
6 to 9 years				
Longer than 9 years				
(Mean)				
(Median)				
Meals Served				
Breakfast				
Snack - morning				
Lunch				
Snack - afternoon				
Supper				
Snack - evening				
Cost Reimbursements				
Administrative costs recovered by reimbursement				
Meal costs recovered by reimbursement				
Number of Observations				

[a]Shown for illustrative purposes; does not include all variables to be tabulated.

[b]"Current sponsors" includes new and experienced sponsors.

operations at the state and sponsor levels could include the number and type of sponsors, duration of sponsorship, number of sites, number of administrative staff, and recovery of administrative costs.

C. SITE-LEVEL ANALYSIS

Information at the site level is of particular interest, since that is the program level children and their parents interact with. Descriptive data on sites will provide the following information on site operations: the average and range of hours, days, and weeks of operation; number and characteristics of sites; frequency and type of program activities offered; number of participants and meals served; facility in which the site is located; whether the site is located indoors or outdoors; and number of years of operation (see Table V.6). Claim forms for sites that are sampled will be reviewed to compare the number of children claimed with the numbers observed on a sample day.

Information on the meals provided at sites includes the distribution of meal source and type of meals offered; source of the food (vendor, central kitchen, school food service authority, or self-preparation by the sponsor); frequency of meal shortages; management of food leftovers; use of OVS; food sanitation practices; frequency of hot and cold meals; presence of food storage facilities; and contingency plans for meals (see, for example, Tables V.7 to V.9).

D. ANALYSIS OF SFSP MEALS

Observations of meals will provide information about foods and nutrients "available" for consumption by children. Data will be collected by observing meals and snacks for selected (or sampled) children, and then coding them for food and nutrient analysis. Group-level data will be provided by averaging the observations of foods offered (or served) and wasted across all sites and by sponsor or meal preparation characteristics.

TABLE V.6

SELECTED SITE CHARACTERISTICS[a]

Variable	Percent of Participants	Percent of Sites
Facility in Which Program Operates		
Community center		
Housing project		
Indoor recreation center		
Playground/park		
Religious institution		
Day camp		
Residential camp		
School		
University		
Other		
Outdoor Site Location		
Activities Provided		
None		
Arts/crafts		
Educational/instructional		
Free play		
Job training		
Organized games		
Religious		
Sports		
Cooking		
Other		
Meal Type		
Breakfast		
Snack — morning		
Lunch		
Snack — afternoon		
Supper		
Snack — evening		
Meal Source		
Vendor		
School food service authority		
Self-preparation		

[a]Shown for illustrative purposes; does not include all variables to be tabulated.

TABLE V.7

SELECTED MEAL SERVICE CHARACTERISTICS[a]

Variable	Weighted to Reflect Percent of Participants	Weighted to Reflect Percent of Sites
Food Storage and Handling		
Refrigeration Facilities On-Site:		
Yes		
No		
Percentage of Average Meal Service That Can Be Kept Overnight:		
Less than 25		
25 to 49		
50 to 74		
75 to 99		
All meals can be kept		
On-Site Facilities for Hand Washing:		
Yes		
No		
Meal Service		
Meal Service Arrangement:		
Serving line/food pickup line		
Meals served to seated children		
Meals served to children as they arrive		
Meals served to children dispersed throughout site		
"Share" box or "share" table		

[a]Shown for illustrative purposes; does not include all variables to be tabulated.

TABLE V.8

DISPOSITION OF AVAILABLE MEALS[a]

	Weighted to Reflect Percent of Participants	Weighted to Reflect Percent of Sites
Enough Meals Available for All Children:		
Yes		
No		
Percent of Available Meals That Were Served:		
Less than 70		
70 to 79		
80 to 89		
90 to 99		
All available meals served as "Firsts"		
(Mean)		
(Median)		
Meals Served as "Seconds," as Percentage of Total Meals		
Less than 5 percent		
5 to less than 10 percent		
10 to less than 20 percent		
20 percent or more		
Meals or Meal Components Carried Off-Site:		
Yes		
No		
At Sites with Leftover Meals, Excess Meals Are:		
Discarded		
Some		
All		
Stored		
Some		
All		
Whether Any Meals Held Over from Previous Day Are Served:		
Yes		
No		
Number of Observations		

[a]Shown for illustrative purposes; does not include all variables to be tabulated.

TABLE V.9

MEAL ORDER ADJUSTMENTS[a]

	Weighted to Reflect Percent of Participants	Weighted to Reflect Percent of Sites
For Sites Where Meals Are Delivered, Can Meal Orders Be Adjusted on Same Day That Meals Are to Be Delivered?		
Yes		
No		
How Are Such Adjustments Made?		
Telephone call from site to vendor		
Telephone call from site to sponsor, who then calls vendor		
Messenger		
Written notification, fax, or e-mail		
Other		
How Many Hours in Advance Must Adjustments Be Made?		
Less than 1		
1 to 2		
3 to 4		
5 to 6		
More than 6		
In Practice, How Often Are Meal Orders Adjusted?[b]		
Daily		
A couple of times a week		
Hardly ever		
Never		

[a]Shown for illustrative purposes; does not include all variables to be tabulated.

[b]Includes only sites where same-day adjustments are possible.

1. Coding of Meals

As one of the first steps in the data analysis of meals offered or served, detailed descriptions of foods and their portion sizes observed at each site will need to be entered into a standard nutrient-coding software package and their nutrient content and food groups coded.[2] For each site observed, an estimate of the average nutrient content of the observed meals will include the levels provided of food energy, macronutrients, vitamins and minerals, and other food components, such as sodium and cholesterol. Food group estimates, such as the number of servings of meat, dairy, fruits, vegetables, and grains, are also of interest. Average food and nutrient estimates can be averaged across all sites or across site or sponsor types.

Choosing a food and nutrient database and associated software for coding the dietary intake data is an important issue to consider in the design. Some considerations in deciding on the database and associated coding software are:

- Which one is the most current
- Which is better suited to assessing the dietary outcomes of interest (that is, food groups and nutrients)
- Which provides data most comparable to previous studies
- The cost and flexibility of the system

To meet the needs of the SFSP study, we recommend use of either the Food Intake Analysis System (FIAS, developed by the University of Texas) or the system at the University of Minnesota Nutrition Coordinating Center. Each has strengths and weaknesses, but either one is feasible and appropriate for this application.

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[2]This type of food coding usually involves having a trained nutritionist available to consult on special issues that arise, such as the coding of unusual foods, new foods on the market, and ethnic recipes and mixed dishes.

As in the analysis of other site-level data, the data on nutrient content of meals will be presented in two ways: (1) weighted to be representative of all SFSP sites, and (2) weighted to be representative of all SFSP participants. Standard errors for the estimates will need to reflect the complex sample design.

2. Relevant Nutritional Standards for SFSP Meals

Dietary outcomes of interest in an evaluation of the SFSP include the average contribution of foods and nutrients of meals offered or served (that is, available), the average proportion of foods and nutrients wasted, and an estimate of the average food and nutrients consumed by participating children from SFSP food. The important research questions related to meal content are:

- Are all the required meal components offered?
- Are meal components offered in the portion sizes required?
- Do SFSP meals meet current dietary recommendations for healthy Americans?
- Do meals served meet the USDA goal of offering one-third of the Recommended Dietary Allowance (RDA) (National Academy of Sciences [NAS] 1989) for food energy, macronutrients, vitamins, and minerals?

On the basis of the goals of the SFSP, we recommend analyzing the data on the food and nutrient content of meals served, relative to the following nutritional standards:

- ***Nutrient Standards.*** Mean meal intakes will be compared to one-third of the RDA for energy, macronutrients, vitamins, and minerals (NAS 1989). Mean intakes for a group typically are reported relative to the age- and gender-specific RDA. The RDAs are currently being replaced by the Dietary Reference Intakes (DRIs), which provide a broader set of standards for alternative analytic uses (NAS 1998). DRIs are not currently available for all nutrients but will be established over the next few years. To the extent possible, it will be preferable to use DRIs in this study, since they represent the most current scientific knowledge concerning nutritional adequacy and recommended intake levels for the prevention of chronic disease. However, the RDAs should be used for

nutrients for which DRIs are not available and may remain useful for comparisons with previous studies.

- ***Dietary Guidelines.*** Other important standards for assessing dietary intake are provided by the *Dietary Guidelines for Americans* (2000), which include recommendations for a healthy diet that apply to people age two and older, such as eating a variety of foods, limiting intakes of total fat and saturated fat, and increasing intakes of fruits, vegetables, and grains. These guidelines have been used in the School Nutrition Dietary Assessment and other national research studies on diet. It is possible to compare mean intakes to the recommended intakes (for example, less than 30 percent of calories from fat) for breakfast and lunch, as long as it is kept in mind that the dietary guidelines are for intake over the course of a typical day, rather than for a particular meal.

- ***Food-Based Standards.*** The USDA Food Guide Pyramid provides one way of grouping foods and gives recommended numbers of servings for foods in each group. Foods can be identified using the USDA FoodLink.[3] The contribution of SFSP meals to recommended intakes of food groups will be assessed.

The current design allows for estimation of the proportion of sites serving meals lacking some meal components, since this is a significant failure to meet program regulations. Estimated portion sizes can be used to examine compliance with the SFSP meal pattern requirements, although accuracy depends on the precision of the portion size estimates.

In assessing the content of SFSP meals relative to nutrient standards, a challenging issue is that many of these standards vary by age and sex. In the Ohls et al. study, the RDAs for 7- to 10-year-old children were used to assess the nutrient content of SFSP meals. This approach, however, may lead to biases. For example, some sites may primarily serve teenagers and may offer larger portions to meet their greater nutritional needs. Such sites should not be assessed as offering more than the recommended amounts of food, but that is what would occur under the approach used in the previous study. To address this analytic issue, we recommend recording the approximate proportion of participants by school age group: prekindergarten; grade school (kindergarten to 5th grade), middle

[3]FoodLink, formerly known as the Food Grouping System, is a computerized research tool to link USDA survey foods to Food Guide Pyramid and ingredient information.

school (6th to 8th grades), and high school (9th to 12th grades), based on the site director interview. This will facilitate separate analysis of the meals for sites with predominantly younger or older children. Average estimated nutrient intakes from SFSP meals will be compared to the recommended intakes for younger and older children (by sex). For children age nine and older, recommendations for energy and some nutrients are higher for boys than for girls.

In designing ways of analyzing whether SFSP meals meet the nutritional standards, another key issue is whether to compare the *average* nutrient content of SFSP meals to the standards described above, or to assess the *proportion* of sites (or participants served by sites) serving SFSP meals that meet (and fail to meet) each standard. Both types of analysis are of interest in the current study.

Nutritional goals such as the *Dietary Guidelines* are, in general, intended to be met on average over time, not necessarily each day. Although there are day-to-day variations in the food and nutrient content of the SFSP meals at a particular site, SFSP meals are intended to meet the nutritional regulations for meals served over a particular time period (for example, one day or one week). We recommend that mean food and nutrient estimates be reported by (1) type of meal (for example, breakfast, lunch), (2) type of site, and (3) meal source (vended, school food service authority, or self-preparation). Mean available foods and nutrients will also be compared to the appropriate nutritional standards and presented by the approximate age of the children served (Tables V.10 and V.11).

TABLE V.10

AVERAGE DIETARY COMPONENTS AVAILABLE AND WASTED FROM SFSP LUNCHES[a]

	Available		Wasted		
Dietary Component	Mean	Median	Mean	Median	Percent[b]
Macronutrients					
Food energy (kcal)					
Protein					
(g)					
(% of food energy)					
Carbohydrate					
(g)					
(% of food energy)					
Fat					
(g)					
(% of food energy)					
Saturated fat					
(g)					
(% of food energy)					
Monounsaturated fat					
(g)					
(% of food energy)					
Polyunsaturated fat					
(g)					
(% of food energy)					
Vitamins					
Vitamin A (µ RE)					
Vitamin C (mg)					
Thiamin (mg)					
Riboflavin (mg)					
Niacin (mg)					
Vitamin B_6 (mg)					
Folate (µg)					
Vitamin B_{12} (µg)					
Minerals					
Calcium (mg)					
Iron (mg)					
Phosphorus (mg)					
Magnesium (mg)					
Zinc (mg)					
Other dietary components					
Sodium (mg)					
Cholesterol (mg)					
Fiber (g)					
Sample Size					

[a]A similar table will be produced for breakfast and other meals, as sample sizes permit, and for SFSP meals in general.

[b]Percent of available mean that is wasted.

TABLE V.11

PROPORTION OF RECOMMENDED INTAKES AVAILABLE FROM SFSP LUNCHES[a,b]

		Grade School		Middle School		High School	
Dietary Component	Pre-K	Boys	Girls	Boys	Girls	Boys	Girls
Macronutrients							
Food energy (kcal)[c]							
Protein (g)[c]							
Total fat (g)[e]							
Saturated fat (g)[e]							
Vitamins							
Vitamin A (µg RE)[c]							
Vitamin C (mg)[c]							
Thiamin (mg)[d]							
Riboflavin (mg)[d]							
Niacin (mg)[d]							
Vitamin B_6 (mg)[d]							
Folate (µg)[d]							
Vitamin B_{12} (µg)[d]							
Minerals							
Calcium (mg)[d]							
Iron (mg)[c]							
Phosphorus (mg)[d]							
Magnesium (mg)[d]							
Zinc (mg)[c]							
Other Dietary Components							
Sodium (mg)[e]							
Cholesterol (mg)[e]							
Sample Size							

[a]A similar table may be produced for breakfast and other meals, as sample sizes permit, and for SFSP meals in general.

[b]A similar table will be produced for nutrients consumed, which will be calculated by subtracting nutrients wasted from nutrients available.

[c]Compared to RDA (or DRI if it becomes available in time for study analysis)

[d]Compared to DRI.

[e]Compared to upper level recommended in the *Dietary Guidelines for Americans.*

3. Analysis of Plate Waste Data

As in the previous study, the major analysis of plate waste data involves computing the average percentage of each meal component wasted. The amount wasted will then be combined with the average nutrient content of the meals served to develop estimates of the average nutrient content of meals consumed by program participants. Estimates of mean nutrients wasted will be reported by the same categories as nutrients available (see Table V.10). The availability, wastage, and consumption of food groups from SFSP meals will also be calculated and reported.

E. USE OF SAMPLE WEIGHTS AND CALCULATION OF VARIANCES

The sample design effort considered the development of appropriate sampling weights for each type of analysis. Survey weights are necessary to account for differences in the selection probabilities of various units and for nonresponse bias adjustments. In general, the planned analyses require two sets of weights to produce representative statistics for the various types of providers (states, sponsors, former sponsors, and sites) and for program participants. The first set of weights is used to prepare provider-based estimates, such as the percentage of sponsors that use a vendor to prepare the meals. The second type of weights will be developed to produce statistics to reflect participant-based and meal-based analyses, such as the percentage of meals served by sites with regular activities. The contractor should prepare both of these types of weights for the sponsor and site samples. In addition, a set of sponsor weights could be computed to reflect the subset of sponsors from which sites were selected for observation. Appendix D describes our recommendations for the calculation of weights to be used in the analysis of the SFSP program operations data.

The complex sample design implies that standard errors computed by statistical packages that assume simple random sampling will be inaccurate. A number of statistical packages are available

that estimate standard errors under complex sample designs. We recommend conducting the data analysis using the SUDAAN software package in conjunction with SAS to appropriately account for the sample design process (Shah, Barnwell, and Bieler 1997). SUDAAN is primarily designed to use a Taylor-series estimation method to approximate the sampling precision in the both linear and nonlinear estimates of the survey data. However, other variance estimation techniques, such as Balanced Repeated Replication (BRR), and the Jackknife method, can also be used. SUDAAN has various procedures designed for comparing mean values, percentages, and totals between two analytic groups and for conducting model-based estimation techniques such as multivariate regression and logistic regression procedures. In each of these data analysis procedures, SUDAAN yields the appropriate design-based estimates of the standard errors, confidence interval, and design effects associated with the survey values or the model parameter estimates.

VI. COSTS

This chapter describes the estimated costs of MPR's recommended design for the program operations component of the SFSP Study. We developed cost estimates to provide information to ERS on the following issues:

- The costs of attaining various levels of precision
- The costs of each major data collection activity and associated analysis and reporting

ERS can then use the cost estimates for each precision level, broken down by major data collection activity, to assess which elements of the design should be funded and with what precision goal, given the resources available.

It is important to keep in mind, however, that the estimates presented in this chapter rely on a number of assumptions, based on MPR's experience completing similar studies, including the previous SFSP evaluation, and on the pretest experience. Senior MPR staff have reviewed the assumptions. We describe these assumptions in the first section of this chapter. The second section presents the cost estimates and briefly discusses their implications.

A. COST ASSUMPTIONS

In estimating costs, we have used average rates for various levels of staff, as well as typical assumptions about overhead and other direct costs. In addition, we have assumed that the contract will be fixed-price, with a fee level comparable to that of recent ERS contracts.

We have assumed that the data collection will occur in the year 2001 and that the project will start January 1, 2001, and continue for 18 months.

1. Start-Up Costs

Start-up costs are defined here as costs for early project activities that are not specific to particular components of the data collection and that do not depend on the final sample sizes chosen. We define two start-up tasks: (1) project orientation, and (2) data collection preparation.

a. Project Orientation

This is the cost for the project director and survey director to prepare for and attend the first project meeting with ERS.

b. Data Collection Preparation

This task includes several activities in preparation for data collection that are not related to the sample sizes chosen and that need to be completed in the early months of the project:

- Contacting FNS regional offices to inform them of the study and obtain lists of contacts at the state level
- Preparing materials to explain the study to the states and sponsors, as well as obtaining endorsement letters from USDA and other relevant agencies
- Publicizing the study by (1) developing a study brochure, and (2) making brief presentations at sponsor-training sessions in several large states
- Revising instruments in response to OMB comments for final OMB clearance (since final clearance will not be received within the time frame of the current study)
- Developing two tracking databases: (1) a sampling database to be used to select the samples at the various levels; and (2) a data collection tracking database to track scheduled interviews/observations, completed interviews/observations, quality assurance review and coding, and interviewer productivity.

We recommend that the brochure be a color, professionally developed product that describes the goals of the study, the data collection activities, and the importance of cooperation from agencies and organizations. We estimate the need for 5,000 brochures for states to distribute.

For the publicity efforts, we budgeted attendance at five training sessions or professional meetings, three with minimal travel and two with overnight travel and airfare.

This task also includes some time for the project team to become familiar with the overall design. Because we believe that these activities are not very sensitive to whether all data collection components are pursued in the final study, we did not attempt to break them down by data collection component.

2. State Administrator Survey

We assume that the state administrator survey is a census of those responsible for administering the program in all 50 states, the District of Columbia, Guam, the Virgin Islands, and Puerto Rico (54 interviews in all); for brevity, we refer to "states." Because of the importance of the state contacts in facilitating later aspects of the study, the interviews will all be conducted by professional staff. Most interviews will be conducted by the more junior professional staff on the survey team, but the survey director and the project director will each do a few interviews--they will handle the largest and/or most challenging states. The telephone interview is estimated to last 45 minutes, based on our pretest, but we assume that it will take 4.5 hours of staff time to complete each one and obtain the list of the current year's sponsors and an additional 4 hours to obtain preliminary lists beforehand.[1]

[1]We assume that all state administrator interviews can be completed in English. For ROAP states, the respondent will be someone from the FNS regional office staff.

There are three contacts with states. The first contact with state administrators (which may involve several calls) will be to introduce the study and to obtain the list of last year's sponsors. The caller will ask all states for sponsor lists with addresses and phone numbers and, if available at the state level, for lists of sites. An advance letter will be sent to all states, with a return envelope for the lists included. The second contact will occur in May or June to obtain the new sponsor list based on attendance at training. The third contact in the fall (preceded by a reminder letter) will be to complete the state administrator interview. States will also be asked to provide final sponsor and site lists for the year at this time, as well as meal claims for sites that are visited. The junior staff who conduct some interviews will be trained by the survey director.

These interviews are designed as paper-and-pencil surveys. The cost estimate includes a thorough quality control review, the coding of a small number of open-ended questions, and manual data entry. After data entry, basic data checks by survey programmers precede the production of a data file for analysis. (These last steps also apply to all other surveys discussed below.)

3. Sponsor Survey

We estimate the costs of the sponsor survey for two sample sizes; 120 interviews or 480 interviews. The survey will be conducted in the 50 states and the District of Columbia.[2] The sponsor interviews, when completed as telephone interviews, are assumed to last about 60 minutes, but sponsors are also given the option of completing a self-administered version of the survey.[3]

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[2]The sample could include the territories if ERS prefers, but we are concerned about possible language problems. The costs of translating the sponsor survey into Spanish have not been included in the estimates.

[3]We assume that 10 percent of sponsors will refuse to participate. Replacement sponsors will then be selected and called.

Sponsors will be selected in two stages: (1) experienced sponsors from the previous year's lists, and (2) new sponsors from the new sponsor-training lists. Experienced sponsors will be contacted earlier but, for both sets of sponsors, we assume that the data collection process is basically the same and that it will proceed as follows:

- An advance letter is sent to all sponsors asking for lists of their current sites. Then there will be follow-up calls, as needed, to obtain the sites lists (assumed to take 1.5 hours per sponsor).

- A second letter with the self-administered questionnaire is sent via overnight delivery two weeks after the sponsor's site(s) have opened. The letter will include a return envelope. The self-administered version will be a booklet printed on 8 1/2" by 11" paper.

- Phone calls will be made two to four weeks later to all sponsors who did not complete the self-administered version (or where problems were encountered in the self-administered version). At that time, interviewers will conduct telephone interviews with sponsors who prefer to do so. The telephone interview is budgeted as a paper instrument, using a version of the survey that is the same as the self-administered version except for minor changes to facilitate a telephone mode of interviewing. We assume only 20 percent of sponsors will complete the self-administered questionnaire.

- Executive interviewers will conduct the telephone interviews during the summer (over a six-week period). Either quality control clerks or survey professional staff, as appropriate, will call to clarify questions on the self-administered version. We assume that six executive interviewers will work an average of 25 hours per week for four weeks in the spring (calling about lists) and for six weeks during the summer (conducting phone interviews). We also assume that one-third of all sponsors will need clarification calls and two-thirds will need reminder calls to send back site lists. All interviewers will receive six hours of training.

- Phone calls will be made to sponsors a week or two before the site visit(s) to remind them that staff will be in the area to observe a site.

During the survey period, we assume that there will be weekly meetings of all survey professional staff to discuss problems and to review progress.

4. Former Sponsor Survey

The former sponsor survey is designed as a 30-minute telephone interview with a national sample of sponsors who left the SFSP between summer 2000 and summer 2001. We estimate that the universe will be 350 to 400 former sponsors, that 250 will be sampled, and that 200 (or 80 percent) will complete the interview.[4] Any of last year's sponsors that are called during the sponsor interview process and that are no longer in the program will immediately be asked to complete the former sponsor survey. To obtain additional interviews, a random sample of former sponsors will be selected after the final 2001 sponsor lists are obtained in the fall.

The survey is expected to proceed as follows:

- An advance letter will be sent to all sampled former sponsors in the fall.
- The calls will be conducted primarily by executive interviewers (with a few conducted by survey professional staff). We assume that three executive interviewers will work an average of 20 hours per week over a four-week period in early summer and an eight-week period in the fall. The survey director will conduct a three-hour training session for interviewers.
- We assume that one-quarter of all former sponsors will need a follow-up clarification call.

Again, the cost estimates include time for addressing questions and problems during weekly staff meetings.

5. Site Data Collection

The site data collection involves conducting interviews and observations of program operations in either 150 sites or 350 sites, depending on the precision standard under consideration. The sites will be spread across the nation, although in many instances there will be two per sponsor, and more

[4]We assumed in budgeting that ERS would choose a 5 percent CV for this survey, regardless of the choice for the other surveys, as the sample needed for a 5 percent CV is relatively small.

sites will be selected from the largest sponsors (which are sampled with certainty). We assume that site visits may occur in any of the 50 states and in the District of Columbia.[5]

We have budgeted separately (1) the costs of site visits without recording the content of meals offered or plate waste, (2) the observation of meal content and food and nutrient coding of those observations, and (3) the observation of plate waste and associated coding. The cost estimates for sites include the cost of processing site lists. In estimating the costs of the meal observations, we assume that costs of the basic components of the site visits are already accounted for, and we only include additional costs related to the meal observations and nutrient coding. In estimating the costs of plate waste data collection, we assume that both basic site visits and meal observations will occur, and we thus estimate only the additional costs of plate waste.

a. Site Visits

The site visits include observations of program operations and an interview with the site director. Site visits will be conducted by senior-level field interviewers who receive extensive training. Training will be two days for the basic visit and will be conducted in two sessions (for 150 sites) or three (for 350 sites); interviewers will fly to the contractor's office for training.

Because these site visits are expected to be challenging, there may be higher-than-usual interviewer attrition. Given the short field period, we assume that many more interviewers will be hired and trained initially than would be needed if there were no attrition, because there will not be time to rehire and train later. For the option with 350 sites, we estimate that about 40 interviewers are needed on average but recommend that approximately 65 be trained; for the option with 150 sites, we estimate 21 interviewers are needed but recommend training 37.

[5]We recommend excluding sites in U.S. territories, because of cost and because they have relatively low participation. We did not specifically account for possible extra costs of including Alaska and Hawaii, as the probability of selecting sites in these states is small.

Based on past experience, we assume that interviewers will be willing to work an average of 16 hours a week (two day trips or one overnight site visit) and that about half the interviewers will be willing to travel overnight if needed. Each interviewer will average seven to nine site visits (with the high end assumed for the larger sample size).

Interviewers will be on-site for an average of three hours if the site has a lunch-only program and for an average of six hours if they are observing breakfast and lunch (assumed to occur at 30 percent of sites).[6] We assume that interviewers will spend 8 hours for shorter day trip visits (within 50 miles of home), 12 hours for more distant day trips (50 to 150 miles from home), 16 hours for single-site overnight trips, and 40 hours for visiting multiple sites (2.5 on average) on an overnight trip. Interviewing will begin in June 2001 and continue through August (12 weeks).

We assume that one master's level survey professional will coordinate the field effort, and that one supervisor will be assigned to every 10 interviewers. We also assume that there will be four regional field supervisors who will coordinate site assignments and serve as backups when interviewers cannot make scheduled visits or as the second interviewer at large or complex sites. These staff would travel extensively.

We made assumptions about travel based on past experience and on some approximate simulations of how sites might be distributed across the country. They are:

- One-quarter of the site visits will be day trips (eight hours total) that are within 50 miles of the interviewer's home. Interviewers will be reimbursed for mileage, parking, and one meal.

- Fifteen percent of sites will be "long" day trips--between 50 and 150 miles of home (125 miles on average), for which interviewers will charge a 12-hour day. Interviewers will be reimbursed for mileage, tolls, parking, and meals.

[6]A site visit to a residential camp will include observing lunch and supper.

- Forty percent of sites will require overnight trips to visit just that one site. We assume an average distance of 750 miles. The interviewer will be reimbursed for round-trip airfare (no more than seven days' advance notice), one night in a hotel, two days of meals, and car rental, plus miscellaneous expenses.

- Twenty percent of sites will be visited through overnight trips to multiple sites (two or three sites per trip). For example, we assume that, for the 350-site version of the design, there will be 28 trips to visit 70 sites. The average distance is assumed to be 750 miles. The interviewer will be reimbursed for round-trip airfare (no more than seven days' advance notice), an average of three nights in a hotel, meals, and car rental, plus miscellaneous expenses.

We assume that 12 percent of sites will be large enough or complicated enough (for example, due to OVS) to need two interviewers and that all such trips will involve an overnight stay for the second interviewer (the field supervisor).

Based on our experience in 1986 and in the pretest, we assume extra trips (equal to 10 percent of sites visited) to sites that do not result in a completed observation (for example, because the site is closed, the visit is not allowed, or the interviewers do not arrive in time to observe). We assume that these extra site visits (35 for the 350 sample) will have travel costs distributed in the same proportions as above (to continue the example, 9 local, 5 long local, 14 single-site overnight, and 7 multiple-site overnight).

We assume that junior survey staff will call the sponsor a week or two in advance to notify them that their site(s) will be visited. In addition, about 10 percent of the time, survey staff will need to call the site or its sponsor to clarify something after the site visit.

There will be more clerical time than is typical, to make travel arrangements for interviewers. In addition, we expect that the contractor will translate the site director instrument into Spanish.

We assume a junior sampling statistician will select sites between May 15 and July 15 (including replacement sites) and that this will take about one day a week for eight weeks. The cost

estimates include a weekly meeting of all levels of professional staff, from the project director on down, to review site visit problems and questions that arise.

b. Meal Observations

The meal observations are budgeted as an additional cost beyond the basic site visit. The key added costs for the meal observations are the cost of additional interviewer training and the cost of nutrient coding. Additional time on site is expected to be negligible.

Training for the meal observations is assumed to add a half-day (thus, an additional overnight stay) to the initial training session for each interviewer. A nutritionist at the senior researcher level will conduct meal observation training.

A more junior nutritionist will train coders who do the food and nutrient coding. Quality control clerks will also receive special training to help them in reviewing this work. The senior nutritionist will spend a few hours each week during the coding period responding to questions and making decisions on issues that arise.

The cost estimates include minimal costs for purchasing food models and portion size estimation guides and other materials that interviewers need to carry with them to observe and record meals (and plate waste).

c. Plate Waste Observations

The costs estimated for plate waste observations are additional costs above and beyond those estimated for the basic site visit and for the meal observations. Again, these costs are for extra interviewer training time and for coding. Training for plate waste observation is assumed to require an additional half-day (bringing the training to three full days, which is comparable to the 1986 study). The coding effort, however, is much smaller for the plate waste data than for the meals data.

6. Analysis and Reporting

It is important to note that we estimated the costs of analysis and reporting, assuming all data collection efforts proceed, then made assumptions about allocating these costs over the various data collection components. The analysis and reporting costs include the costs of cleaning the data and preparing files for analysis; developing sample weights; preparing tabulations and multivariate estimates; and preparing draft, revised, and final versions of a report. The report is assumed to include a stand-alone executive summary and appendixes on the data collection, methods, sample design, and sample weights.

The costs are allocated across data collection activities as follows, based on the length of the instruments and the analyses described in Chapter V:

- State administrator interviews--20 percent
- Sponsor interviews--25 percent
- Former sponsor interviews--15 percent
- Site observations/interviews (basic)--20 percent
- Meal observations--15 percent
- Plate waste--5 percent

We have not adjusted these estimates for the different sample sizes. However, we recognize that both data cleaning and subgroup analyses may be more extensive with larger samples. We believe these estimates reflect a level of effort more appropriate for the larger, more precise sample sizes.

7. Additional Tasks

We have added the costs of additional project tasks we expect ERS to be interested in that are not sensitive to sample sizes. These include a final briefing, as well as the preparation of

documented data files for USDA use (or possibly public use). If these are not of interest to ERS, their costs can simply be deducted from the totals.

In addition, we have added a line to indicate the costs for routine monthly reports and other contract management activities, assuming a contract duration of 18 months.

B. COST ESTIMATES

Table VI.1 summarizes estimated costs for the program operations study. Costs are estimated to be approximately $2.3 million to reach the higher precision level (corresponding to a 5 percent coefficient of variation (CV) for all components, as discussed in Chapter III), but only $1.5 million if a less precise precision level is used (a 10 percent CV for the sponsor and site data collection). This implies that costs would be about 50 percent higher if the higher precision level is chosen throughout.

Not surprisingly, the costs of the site observations are the largest component of costs, accounting for approximately half the costs. For the site observations in particular, substantial savings of about $555,000 could be achieved were ERS to choose the lower precision level corresponding to the 10 percent CV, with smaller savings for choosing a precision level that falls between the two illustrated. Choosing the lower precision level for the sponsor interviews would save about $205,000 in data collection costs. On the other hand, costs of the former sponsor survey, the meal observations, and the plate waste observations are smaller components in overall project costs.

TABLE VI.1

COSTS OF SFSP OPERATIONS STUDY AT TWO PRECISION LEVELS

	PRECISION LEVEL	
STUDY TASK	10% CV	5% CV
Orientation Meeting	$11,000	$11,000
Data Collection Preparation	$67,000	$67,000
State Administrator Survey		
Data Collection[a]	$70,000	$70,000
Analysis/Reporting	$73,000	$73,000
Sponsor Survey		
Data Collection	$130,000	$335,000
Analysis/Reporting	$91,000	$91,000
Former Sponsor Survey		
Data Collection[b]	$72,000	$72,000
Analysis/Reporting	$55,000	$55,000
Site Observations		
Data Collection	$630,000	$1,185,000
Analysis/Reporting	$55,000	$55,000
Meal Observations		
Data Collection	$58,000	$82,000
Analysis/Reporting	$55,000	$55,000
Plate Waste Observations		
Data Collection	$28,000	$36,000
Analysis/Reporting	$18,000	$18,000
Final Briefing	$6,000	$6,000
Data file Preparation	$25,000	$25,000
Project Management	$35,000	$35,000
Total	**$1,497,000**	**$2,289,000**

[a]State census is recommended so costs do not vary.

[b]Sample size used in cost estimates is for a 5 percent CV. Because this is low cost, we did not consider a 10 percent CV for this survey.

We have slightly increased our cost estimates since the draft design report on the basis of our pretest experience and the final versions of the instruments. We have not updated the salary escalation assumptions implicit in our cost estimates but, rather, continued to use those in place when the estimates were originally prepared. However, recent analysis suggests that the strong economy has led to substantial labor market pressures throughout our industry, implying that salary increases over the next several years are likely to be higher than our estimates reflect. Based on this information, ERS may want to set aside an amount 5 to 10 percent higher than the figures given in Table VI.1. In sum, our best estimate of the cost of the state/sponsor/site component of the study is in the range of $1,497,000 to $1,647,000 for a 10 percent CV, or $2,289,000 to $2,518,000 for a 5 percent CV.

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APPENDIX A

SUMMARY OF EXPERT PANEL MEETING, DECEMBER 10, 1999

EXPERT PANEL INPUT

In order to solicit input on the most relevant research issues on which the evaluation should focus, MPR assembled a group of four experts who are familiar with SFSP operations at the state and local level, and with general child nutrition issues. The day-long expert panel meeting, held on December 10, 1999 in Washington, DC, was intended to help MPR achieve the following three goals:

1. Ensure that the appropriate research issues are addressed in the evaluation (from the federal, state, and "grassroots" perspectives) and to help MPR prioritize the issues

2. Understand the range of program variation along the dimensions to be investigated so that MPR can better formulate the research issues and develop appropriate survey instruments

3. Determine the appropriate respondents for survey questions concerning particular issues, and determine whether questions should be asked at several levels of program administration

A. PANEL MEMBERS

Two of the panel members administer the SFSP at the state level. David Carson is the Associate Bureau Chief of the Bureau of Nutrition and Child Care Programs at the Missouri Department of Health. In his second year working with the SFSP, the number of program sponsors in Missouri increased from 95 to 134. He and his staff have sponsored two very successful statewide SFSP training institutes and were also nominated for an award for excellence shown by a state agency in SFSP administration.

Linda Miller is a Staff Specialist in the Summer Food Service Program and Nonpublic Schools and Residential Child Care Institutions at the Maryland Department of Education, Nutrition and

Transportation Services Branch. She was in charge of sponsor monitoring for eight years in her previous position and is currently responsible for outreach and for recruiting SFSP sponsors in Maryland.

The other two panel members work for state or local level nonprofit groups that either serve as sponsors, or work to recruit and train sponsors, and to represent their interests. Deena Kolbert is a Senior Policy Analyst at the Community Food Resource Center in New York City. She is nationally known for the outreach and training materials on the SFSP that she has developed, and she has extensive experience working with sponsors in an urban environment where transportation and access issues affect SFSP participation.

Dianne Radigan, Associate Director of the Ohio Hunger Task Force, has over 10 years experience working with USDA-sponsored child nutrition programs. She has worked to expand the SFSP in Ohio by joining forces with a diverse group of partners. Her organization also serves as a sponsor of the SFSP, operating both urban and rural sites.

Valuable insight was also provided at the meeting by Michele Tingling-Clemmons of the Food Research Action Center, Thomas Slomba, who directed the 1997 General Accounting Office study of the SFSP (GAO 1998b), and ERS and FNS attendees.

B. AGENDA

The meeting was designed to identify key research issues and to make the most of the panel members' experiences in dealing with these issues. MPR session moderators focused the discussions on four broad areas: (1) sponsorship, (2) effects of recent changes in federal policy, (3) participation of eligible children, and (4) management and integrity. The MPR project team was able to obtain additional information from the discussions; this information has been incorporated into the original list of research questions compiled by team members. MPR was also able to identify a number of

important themes that emerged early in the discussion and were frequently revisited throughout the day. These themes are summarized below.

1. The Role of Partnerships

Panel members stressed the importance of developing partnerships with government agencies, advocacy groups, and other local organizations for successful sponsorship. For example, some states have worked with other organizations to include outreach materials to recruit sponsors in their mailings. Others have made use of the expertise of advocacy organizations to train sponsors. Sponsors themselves sometimes partner with other organizations to receive financial assistance and to tap into different sources of volunteers. Community networks such as faith organizations, schools, food banks, housing authorities, and government agencies can be sources of funding and can help to find sponsors. Partnerships with other programs that provide activities such as summer school, 4-H Club, and parks and recreation programs increase participation. Survey questions that delve into the use of partnerships by states and sponsors will be asked to provide additional insight into the ways in which such collaborations affect program operations and management practices.

2. Training

Panelists raised a variety of issues concerning training throughout the meeting. Lack of adequate training from the states was cited as a barrier to the recruitment of new, inexperienced SFSP sponsors, whereas flexibility in tailoring training to more experienced sponsors was noted as a positive factor in retaining sponsors. Training issues also seem to be a problem at the site level. According to one panelist, although site employees are the individuals who are the most familiar with meal service operations, their access to training is not guaranteed and is heavily dependent on that which is offered by the SFSP sponsor. Sites that do not receive ample training may encounter

problems for which they can be held accountable and closed down. Clearly, adequate training opportunities are critical to the maintenance of a program with a high degree of integrity. Thus, specific questions addressing this issue will be incorporated into the study.

3. Pressures of Growth/Expansion

A related issue discussed by meeting participants is the pressure that accompanies program growth and expansion. One of the primary goals of many states is to increase the number of sponsors that operate the program. However, states often find that they cannot keep up with growth in sponsor participation because of fiscal and human resource limitations. An increase in the number of sponsors is accompanied by an increase in the number of entities that require training, monitoring, and technical assistance. According to many panelists, states often cannot expand the number of staff devoted to the SFSP, and as a result, sponsors do not receive the assistance they seek. Because this problem could serve as a disincentive for new sponsors to enter the program and for states to seek new sponsors, it needs to be explicitly addressed in the current study. The use of technology and communication as they relate to handling expansion was also cited as an important area to consider.

4. Meal Quality and Presentation

Children's participation or lack of participation in the SFSP is dependent on a number of factors. One of the issues on which panelists placed a high value is the influence of meal quality and presentation on participation. For example, if a child goes to a site for the first time and receives a meal containing an unripe fruit or a frozen carton of milk, he/she and/or his/her parents might be reluctant to have him or her return to the site for another meal. Also important is the attitude of SFSP employees/volunteers. If a child is intimidated by the person serving the meal, he/she is

unlikely to return to the site. These issues will be addressed in the participant/nonparticipant component of the project, and by the assessment of meal quality and presentation during the site observations.

Other meal issues include difficulty in securing meals or altering the number of meals due to shifting attendance; the use of more generic foods rather than culturally specific foods; the lack of training or skill in preparing specifications for vendors; sanitation issues, especially in very hot weather; and sources that compete with sound nutrition messages (e.g., vending machines in schools and site staff consuming fast food meals in front of SFSP children).

5. Transportation Issues

Panelists highlighted a number of transportation issues faced by sponsors and eligible children. The meeting participants agreed that walking is the most common means by which many children get to program sites. One of the barriers to participation in both urban and rural areas during the summer months is a concern about children's safety. Crossing guards are not available at urban school sites when school is not in session, and areas that may be considered safe during the academic year may not be so during the summer. In New York City, a pilot program was designed to have meals served at locations close to children's homes (e.g., in the housing project itself). In rural areas, the lack of public transportation can be a hindrance when the closest feeding site is not within walking distance. Some sponsors have instituted the use of mobile feeding sites to address the transportation issue.

Sites served by vendors must also deal with the issue of locating the means to transport meals from the vendor to the site. After the panel discussions, the importance of the transportation theme

became more apparent. MPR will ensure that this issue is adequately addressed in the various data collection components.

SUMMER FEEDING INTEGRITY STUDY

Expert Panel Meeting — Agenda

December 10, 1999

8:30 am	Welcome; introductions Purpose of study	Anne Gordon, MPR Mark Jekanowski, ERS
9:00 am	Overview of design study	Anne Gordon
9:30 am	View from Advocacy Community	Michele Tingling-Clemmons, Food Research and Action Center
10:00 am	Issue A: Sponsorship	Laura Kalb, MPR
11:00 am	Break	
11:15 am	Issue B: Effects of Recent Changes in Federal Policy	Ronette Briefel, MPR, Moderator
12:15 pm	Lunch	
1:15 pm	Issue C: Participation of Eligible Children	Anne Gordon, Moderator
2:15 pm	Issue D: Management and Integrity	Ronette Briefel, Moderator
3:15 pm	Break	
3:30 pm	Next Steps	Anne Gordon
4:00 pm	Adjournment	

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APPENDIX B

STATISTICAL MODEL USED IN PRECISION CALCULATIONS

This appendix describes the computational procedures used to develop a final model for predicting the precision in the 1986 survey variables. The model predictions are based on the data properties of the variables and the sample sizes selected at each stage of the design. We used these modeling procedures to (1) evaluate the two design options presented in Section III.C, based on a three-stage selection procedure; and (2) develop the final recommended sample sizes for the site observations presented in Section III.D for the proposed two-stage methodology.

Consider in equation (B.1) an estimated mean, *y*-bar, ($\bar{y}$), associated with $r = 1, ..,k$ sample selection stages in which responses, $y_{k,i}$, are obtained from a sample of *k*th stage (the last stage)

(B.1)
$$\bar{y}_0 = \frac{\sum_{i=1}^{n_k} w_{k,i} y_{k,i}}{W = \sum w_{k,i}}$$

sampled units,

$i=1, ...,n_k$. The survey weights for each of *k*-stage sampled units are denoted by $w_{k,i}$, which are composed of the product of various factors associated with the $r = 1$ through k stages of selection. With this notation, the squared coefficient of variation (CV) of the estimator in equation (B.1) can be expressed approximately as in equation (B.2):

(B.2) $$CV^2_{\bar{y}_0} = \frac{1}{\bar{y}_0^{\,2}} \sum_{r=1}^{k} \frac{S_r^{\,2}}{\prod_{r=1}^{k} \bar{n}_r} \left[1 - \frac{(\bar{n}_r - \bar{n}_r^{\,z})}{(\bar{N}_r - \bar{n}_r^{\,z})}\right] [PZ_r] [UE_r]$$

$$A \qquad B \qquad C \qquad D$$

In equation (B.2), we have similar definitions as given for equation (1) in Chapter III:

- S^2_r denotes the population variance among the *k*th stage units, aggregated to the *r*-stage level within the selected $r-1$ stage units. Note that, for $r = 1$, this term is defined as the variation between the primary stage sampling units (PSUs) with regard to the PSU totals among the k^{th} final stage units. For $r = 2$, this term defines the variation between second-stage units ($r = 2$) within the selected primary stage ($r = 1$) units, averaged over the primary stage units, and so on for $r = 3,..,k$.

- N_r denotes the average number of *r* stage units in the population within each $r-1$ stage selected units.

- n_r denotes the average number of *r* stage units selected from each $r-1$ selected unit. For $r = 1$, this term denotes the number of PSUs (states) sampled. The product of these terms for the *k*-stages of selection equals the total sample size of the final stage units.

The *n* terms with a *z*-superscript identify the average number of *r*-stage units that were selected with certainty from within each of the $r-1$ stage selected units. The "B" term in equation (B.2) represents the finite population correction factor for each stage of selection, after accounting for the certainty selections.

To estimate the values of S^2_r, we first obtained the sample variances from the 1986 survey data, using equation (B.3):

$$s_r^2 = \frac{\sum_{<r-1 \text{ stage units}} \sum_{i=1}^{n_{r-1}} w_{r-1,i}}{W} \left(\frac{\sum_{i=1}^{n_r} w_{r,i}(\bar{y}_{r,i} - \bar{y}_{r-1})^2}{\sum_{i=1}^{n_r} w_{r,i} - 1} \right) \quad \text{(B.3)}$$

Note that equation (B.3) obtains the survey weighted average of the variation of the *r*-stage units within the $r-1$ stage units. In the notation, $w_{r,i}$ denotes the sum of the weights among all *k*-stage units that are contained in a given *r*-stage unit, *i*. The sum of the survey weights among all *k*-stage units sampled is denoted by *W*. For this study, we used the 1986 survey weights, which consisted of the product of the inverse probability of selection and the number of participants attending the site.

For some of the sponsors, only one site interview was conducted. Therefore, we could not obtain an estimate of the variation in the site data for these sponsors. To solve this problem, we decided to pair sponsors with one site observation with other sponsors so that the resulting pairs had at least two site observations each. The pairs were formed by combining two sponsors that had similar ADA values within the same state. This process created a total of 86 paired sponsors among the 123 for which the site observations were conducted. We then computed the site sample variances given by equation (B.3) on a paired sponsor basis.

After we obtained the sample variances, we used the following relationships in equation (B.4) (from Cochran [1977], page 287), for $k = 3$ or fewer stages, to obtain estimates for each of the population variances from the sample variances computed in equation (B.3).

(B.4a) $S_3^2 \;'\; s_3^2 \quad alt:\; S_k^2 \,'\, s_k^2$

(B.4b) $S_2^2 \;'\; s_2^2 \& (1 \& \frac{\bar{n}_3}{\bar{N}_3}) \frac{s_3^2}{\bar{n}_3} \quad alt:\; S_{k\&1} \;'\; s_{k\&1}^2 \& (1 \& \frac{\bar{n}_k}{\bar{N}_k}) \frac{s_k^2}{\bar{n}_k}$

(B.4c) $S_1^2 \;'\; s_1^2 \& (1 \& \frac{\bar{n}_2}{\bar{N}_2}) \frac{s_2^2}{\bar{n}_2} \& (\frac{\bar{n}_2}{\bar{N}_2})(1 \& \frac{\bar{n}_3}{\bar{N}_3}) \frac{s_3^2}{\bar{n}_2 \times \bar{n}_3}$

Ideally, in equation (B.2), the value of *S* should be computed from the variation in the units from the noncertainty selections and divided by the non-certainty sample size. Because the impact of the noncertainty selections on *S* is known only for the observed sample, we cannot predict easily how *S* would change in the current design with different sampling strategies. To approximately account for the reduction in the CV^2 that results from selecting some of the *r*-stage units with certainty from each of the *r* - 1 stage units, we have assumed that the reduction in variance is approximately equal to the proportion of the *k*-stage units that are associated with the certainty selections among all *k*-stage units in the *r*-1 stage selected units. For example, the reduction in the sponsor variances due to the certainty-selected sponsors is equal to the proportion of sites accounted for by the certainty sponsors that are contained in the selected states. With this approximation, we compute the values of *s* and, hence, *S,* using all the selections (certainty and noncertainty), and in effect deflate the value to take into account the certainty selections. The estimated reduction in variance is denoted by the "C" term, *PZ*. For two of the 10 variables studied for which estimated standard errors were available from the 1986 final report, this approximation strategy sufficiently reproduced the report values.

Finally, the "D" term denoted by *UE*, is an optional factor that can be applied to increase or decrease the variance for a disproportionate allocation scheme that would result in an increase in the variation of the survey weights (or unequal weighting methods). This factor can be applied to the overall sum of the variance components, or different values can be used for each stage of the design (as indicated by the *r*-subscript). For estimating the required site sample sizes in Tables III.2 and III.5, we assumed that an overall factor effect of 1.2 would result from the oversampling of the rural sites.

To evaluate the different design strategies, we prepared a spreadsheet that reflected the relationships in equation (B.2). From our analysis of the 1986 data, we computed the sampling variances in equation (B.3) and converted these to the estimated population variances in the spreadsheet using equations (B.4 a-c). We were then able to estimate the CVs for the 10 variables studied from the original sample and population sizes, and to manipulate these values to evaluate the impact of different design options. We conducted a PPS sampling procedure among the states, using the ADA values and stratum definitions shown in Appendix Table C-1, to estimate the number that would be selected with certainty, and the proportion of the total ADA whose cases represented different state selection sizes.

The results in Table III.1 are based completely on the 1986 data. In our review of the 1986 study, we found that seven states were selected with certainty among the 17 state selections. These states represented 51 percent of the survey-weighted total ADA in 1986. On average, 2.32 sponsors among an average of 7.2 selected sponsors per state were selected with certainty and represented 13 percent of the total ADA in the selected states. For the 1986 model, we assumed the impact of the certainty-site selections was small. Under these assumptions, the values of *PZ* for the state stage, sponsor stage, and site stage were set to .49, .87 and 1.00, respectively. Finally, we set the value of

UE to 1.00 for all three stages of the design, because a proportional allocation method was used in 1986.

The CVs presented in Table III.2 were developed by modifying some of the parameters in the model from those used to obtain the 1986 estimated values. First, the population sizes were modified to reflect current SFSP estimates. Second, we modified the state and within-state sponsor sample sizes and some of the state certainty-selection parameters. Third, we incorporated a design effect of 1.2 (applying a value of $UE = 1.2$ to the sum of the variance components) to account for the potential oversampling of rural sites. As indicated in Section III.B, for the 30-state option, we assumed a total of 14 certainty state selections and a value for *PZ* equal to 0.28. In the 24-state option, we assumed a total of nine certainty-state selections and a value for *PZ* equal to .39. We used the same values for the remaining *PZ* terms and the values of *UE* as those used in Table III.1.

We used a similar approach to compute the CVs and the completed interview requirements for the final recommended two-stage site design. In this case, the sample variances were computed from the 1986 data, treating the data as if they had been collected using a two-stage design. The results yielded CVs similar to those obtained from the 30-state option presented in Table III.2, which indicated that a completed site interview size of about 360 would yield an average CV of 5 percent across the variables examined. This was expected, because selection of a large portion of states in the three-stage design should have similar properties to the non-state-clustered two-stage methodology. In addition, the values of *PZ* for the sponsor and site selection stage were set to .95 and 1.00, respectively, with an assumption that seven sponsors would be selected with certainty for both completed interview sample size options.

For developing the sponsor sample size requirements in Chapter III, Section F, to be commensurate, we assumed no effect. Given that we did not have a list of sponsors, we could not

evaluate how many sponsors would actually be selected with certainty. For the two-stage site design we felt that a 5 percent reduction in the sponsor variance component, due to certainty selections, was reasonable.

APPENDIX C

INSTRUCTIONS FOR THE SPONSOR AND SITE SAMPLE SELECTION PROCESS

This appendix presents the technical details of selecting sponsors and sites under the proposed design. Our intent is to lay out the procedures in a step-by-step fashion. We begin by describing sponsor selection, and then discuss selection of sites from among selected sponsors.

A. SPONSOR SELECTION PROCEDURES

The sponsor sample consists of two primary groups, with a third group that is a subset of the second. These groups are defined here:

1. A sample of former sponsors that will be interviewed by telephone to determine why they left the program

2. A main sample of new and continuing sponsors that will also be interviewed by telephone, or by mailed survey

3. A random subset of main sample (2), for which one or more of the selected sponsor's sites will be selected for observation. These sponsors will be requested to provide a list of their current-year sponsored sites as soon as available.

We propose selecting the former sample and the main sample from all 54 state offices and territories, using a stratified three-phase design with PPS selection procedures. The contractor should then select a random subsample of sponsors from the initial sponsor sample, limiting the subsample to selections in the 51 state offices (excluding Guam, Puerto Rico, and the Virgin Islands) for which one or more site observations will be conducted.

We recommend selecting the sponsor sample in three phases to expedite the data collection process. The states will provide a list of their prior-year sponsors in winter or by early in the spring (March). From these lists, an initial sample of sponsors will be selected. (Some former sponsors also will be identified as the initial sponsor sample is contacted.) States will then provide a list of sponsors who attended new sponsor training; this will identify new sponsors from which we will

select a sample. For phase three, we will obtain current-year lists to select a supplemental sample of former sponsors.

1. Phase 1 Sample

From the prior-year list of sponsors for phase 1 of the selection process, we recommend stratifying the sponsors into seven primary strata based on FNS region and ADA, as presented in Table C.1. Within each of the seven primary strata, we suggest substratifying the sample into urban and rural groups to create a total of 14 sampling strata. The urban/rural strata will be based on the location of the majority of the member sites or from other available state-level information.[1]

We recommend allocating the sample across the seven primary strata in proportion to each stratum's total ADA (the sum of the ADAs among the member states). For example, suppose the sample size requirement for the phase 1 sample is 530 sponsors, and that the first stratum based on the most recent FNS data contains 55 percent of the total ADA. In this example, the design would allocate 55 percent of the sample size (292 sponsors) to this stratum.

In developing the sample sizes to select to obtain the desired number of completed interviews, we must account for possible nonresponse among the selected sponsors, and for the fact that some of the phase 1 sampled cases will be identified as dropouts. Furthermore, we must account for the expected number of new sponsors to be sampled in phase 2. We have assumed that, out of the prior year's population of sponsors, about 10 percent of the sponsors selected will be dropouts, and that,

[1]Many of the sponsors only have one or two sites, and the sites tend to be in the same geographic area. Therefore, the rural vs. urban status of each site can be captured by the sponsor's status based on the location of the majority of its sites. Furthermore, because most of the sponsors have only one or two sites, we recommend sampling an average of about 1.5 sites from each. Hence, it would be difficult to oversample the rural sites directly at the site selection stage. Therefore, we have designed the sponsor and site sampling procedures so that the oversampling of rural sites is conducted at the sponsor selection stage.

TABLE C.1

PROPOSED PRIMARY SPONSOR STRATIFICATION[1] BASED ON STATE MEMBERSHIP

STATE	FNS Region #	FNS Region	Average Daily Attendance	Number of Sponsors	Number of Sites	Proposed Sponsor Strata Membership
NEW YORK	4	Northeast	445,363	321	2,866	1
FLORIDA	5	Southeast Region	216,323	125	2,050	1
CALIFORNIA	7	Western	169,156	273	1,916	1
PENNSYLVANIA	1	Mid-Atlantic	121,372	167	2,162	1
ILLINOIS	2	Midwest	114,116	99	1,656	1
GEORGIA	5	Southeast Region	100,949	109	1,777	1
TEXAS	6	Southwest	98,063	207	1,460	1
NEW JERSEY	1	Mid-Atlantic	61,398	102	1,139	2
MASSACHUSETTS	4	Northeast	46,774	93	593	2
VIRGINIA	1	Mid-Atlantic	37,940	82	605	2
MARYLAND	1	Mid-Atlantic	33,358	46	574	2
PUERTO RICO (PR)	1	Mid-Atlantic	29,096	2	429	2
CONNECTICUT	4	Northeast	23,998	32	329	2
DISTRICT OF COLUMBIA	1	Mid-Atlantic	23,698	5	212	2
OHIO	2	Midwest	40,710	105	840	3
MICHIGAN	2	Midwest	38,822	102	923	3
WISCONSIN	2	Midwest	32,633	65	376	3
MINNESOTA	2	Midwest	27,294	48	408	3
LOUISIANA	6	Southwest	53,471	79	514	4
NEW MEXICO	6	Southwest	51,291	57	742	4
MISSOURI	3	Mountain	32,411	95	526	4
WASHINGTON	7	Western	28,772	98	463	4
ARIZONA	7	Western	24,713	59	324	4
UTAH	3	Mountain	20,516	27	143	4
SOUTH CAROLINA	5	Southeast Region	64,573	50	1,218	5
ALABAMA	5	Southeast Region	45,774	66	730	5
NORTH CAROLINA	5	Southeast Region	43,318	116	719	5
TENNESSEE	5	Southeast Region	42,274	44	844	5
MISSISSIPPI	5	Southeast Region	31,663	70	202	5
KENTUCKY	5	Southeast Region	26,438	120	456	5

[1]Subject to change based on final state data.

TABLE C.1 (*Continued*)

STATE	FNS Region #	FNS Region	Average Daily Attendance	Number of Sponsors	Number of Sites	Proposed Sponsor Strata Membership
INDIANA	2	Midwest	16,376	63	256	6
WEST VIRGINIA	1	Mid-Atlantic	15,615	72	503	6
RHODE ISLAND	4	Northeast	15,376	16	205	6
DELAWARE	1	Mid-Atlantic	11,688	17	230	6
MAINE	4	Northeast	6,211	51	124	6
VIRGIN ISLANDS (VI)	1	Mid-Atlantic	5,060	3	167	6
VERMONT	4	Northeast	3,104	32	121	6
NEW HAMPSHIRE	4	Northeast	1,858	20	37	6
COLORADO	3	Mountain	15,212	48	149	7
OKLAHOMA	6	Southwest	14,931	62	382	7
OREGON	7	Western	13,587	59	227	7
ARKANSAS	6	Southwest	9,948	78	130	7
NEVADA	7	Western	7,353	35	83	7
KANSAS	3	Mountain	7,115	27	94	7
NEBRASKA	3	Mountain	6,438	20	94	7
HAWAII	7	Western	5,725	10	42	7
IOWA	3	Mountain	5,688	23	94	7
IDAHO	7	Western	4,155	18	64	7
MONTANA	3	Mountain	4,123	24	69	7
SOUTH DAKOTA	3	Mountain	4,086	37	61	7
NORTH DAKOTA	3	Mountain	2,267	23	23	7
WYOMING	3	Mountain	1,041	5	8	7
ALASKA	7	Western	305	10	18	7
GUAM	7	Western	0	0	0	7
Total (excluding PR, VI and Guam)			**2,269,383**	**3,612**	**29,781**	
Total			**2,303,539**	**3,617**	**30,377**	

in the current year, about 10 percent will be new sponsors. We also expect that about 90 percent of continuing sponsors selected in phase 1 will complete the survey. Given these assumptions, we prepared the recommended phase 1 sample sizes shown in Table C.2.

Within each of the primary strata, the allocation should be split across the two substrata as deemed appropriate, based on the desired level of rural site interviews required. At a minimum, for phase 1 of the selection process, we recommend selecting three sponsors in each of the 14 sampling strata (7 primary strata by 2 substrata).

Within each of the 14 sampling strata, we recommend selecting the sponsors using systematic PPS sampling procedures, which are based on the techniques outlined by Chromy (1979). This systematic sample selection process sorts the sampling units in each sampling stratum in a serpentine fashion on the basis of the units' characteristics. The process imposes stratification beyond the sampling strata to ensure that the sample is balanced by a variety of available characteristics that do not adversely affect precision and allocation.[2] For the sponsor selection procedures, we recommend sorting the sponsors within strata by state membership and within state by the county or postal ZIP code membership of the sponsor.

Based on these selection procedures, the phase 1 probability of selection of sponsor p in sponsor sampling stratum h, $h = 1,..,14$ is as in equation (C.1):

[2]Serpentine ordering is an ordering of units using multiple factors that increases the similarity of units near each other. In contrast, a sequential sort that uses multiple factors is different at changes in the levels of the ordering factors. For example, using factors each with "high/low" levels, a sequential sort results in an ordering of "low/low, low/high, high/low, and high/high." The serpentine ordering results in an ordering of the form "low/low, low/high, high/high, and high/low." With serpentine ordering, the middle units differ only on the first factor; they are the same on the second factor. In contrast, the middle units under the sequential ordering are at different levels on both factors.

TABLE C.2

SUMMARY OF THREE-PHASE SPONSOR SELECTION PROCESS

Phase	Sponsor Group	5% CV: Number of Sponsors to Select	5% CV: Completion Rate[c]	5% CV: Expected Sample Size	10% CV: Number of Sponsors to Select	10% CV: Completion Rate[a]	10% CV: Expected Sample Size
1	Continuing[a]	477	90%	430	117	90%	105
Prior-	New	-	NA	-	-	NA	-
Year	Former[a]	53	80%	42	13	80%	10
List	Total	530		472	130		116
2	Continuing	-	NA	-	-	NA	-
New	New[b]	70	72%	50	21	72%	15
Sponsor	Former	-	NA	-	-	NA	-
Training	Total	70		50	21		15
3	Continuing	-	NA	-	-	NA	-
Current	New	-	NA	-	-	NA	-
List	Former[d]	197	80%	158	113	80%	90
	Total	197		158	113		90
Combined	Continuing	477	90%	430	117	90%	105
	New	70	70%	50	21	70%	15
	Subtotal (New and Continuing)	547		480	138		120
	Former	250	80%	200	126	80%	100
	Total	797		680	264		220

[a]Counts are expected from the prior-year list.

[b]Counts are expected from the sponsor training list (by comparison to the prior-year list).

[c]The rate of completed interviews in the sample selected. This accounts for nonresponse and ineligiblity of the sample records. For continuing sponsors we have assumed a response rate of 90 percent, for former sponsors a response rate of 80 percent and for new sponsors, given they are selected from the training list, an eligiblity of 80 percent and a response rate among the eligible of 90 percent (a 72 percent completion rate).

[d]Counts are expected from the comparison of the current- and prior-year lists.

NA = Not applicable.

$$P1(sponsor)_{h,p} = \frac{n1_h \times MOS_{h,p}}{MOS_h = \sum_{p=1}^{N1_h} MOS_{h,p}} \quad , \tag{C.1}$$

where h indexes the phase 1 sponsor sampling strata for selection of sponsors; $h = 1,...,14$; $n1_h$ is the number of noncertainty sponsors allocated in phase 1 to sponsor sampling stratum h; $N1_h$ is the number of noncertainty sponsors in phase 1 sponsor sampling stratum h; MOS_h is the total measure of size (MOS) associated with all sponsors (less the contribution of the certainty selections) in phase 1 sampling stratum h; and $MOS_{h,p}$ is the measure of size of sponsor p in phase 1 sampling stratum h. The MOS should be set equal to the estimated total number of meals served in the prior year or, if these values are not available for all sponsors, set equal to the ADA of the sponsor in the prior year.

With proportional allocation based on the stratum's total measure of size, the stratum sample sizes become:

$$n1_h = n \times \frac{MOS_h}{MOS} \quad . \tag{C.2}$$

In this special case, this reduces equation (C.1) to:

$$P1(sponsor)_{h,p} = \frac{n \times MOS_{h,p}}{MOS} \quad . \tag{C.3}$$

Before selecting the sample and determining the final sample sizes to select, each sponsor's probability of selection should be computed using equation (C.1). If some sponsors have probabilities greater than one, these sponsors should be selected with certainty. In the final selection

process, the largest sponsors in each stratum should be selected with certainty as necessary to ensure that none of the remaining sponsors have probabilities of selection that exceed one.

2. Phase 2 Sampling Procedures

After the list of sponsor attending training have been obtained from all the states, we will select a sample of new sponsors for the current year. For the new sponsors, we recommend stratifying the sample by the seven strata based on region and size. Given the expected small sample size requirements for the new sponsors, we do not recommend substratifying these cases by urban/rural status. The new sponsor sample should be allocated across these strata proportionally, with a minimum of one new sponsor selected per stratum. Certainty selections for new sponsors should be identified as in phase 1.

Table C.2 presents our tentative phase 2 sample size recommendations. The suggested new sponsor sample sizes are based on a tentative requirement to obtain about 10 percent of the completed sponsor interviews from new sponsors, based on a rough estimate that new sponsors comprise 10 percent of the population. This requirement could be decreased or increased if a better estimate becomes available, or if there is interest in oversampling new sponsors. We have assumed that, given the list is based on the training attendees, 80 percent of the sample cases will actually participate and that about 90 percent of these will complete the survey (for an overall completion rate of 72 percent).

As for phase 1, the new sponsor sample should be selected using the same systematic PPS selection technique. For the new sponsors, the probability of selection of new sponsor, *np*, in sponsor sampling stratum l, $l = 1,..,7$ is as in equation (C.4).

(C.4) $$P(new\ sponsor)_{l,np} = \frac{nw_l \times MOS_{l,np} / NW_l}{MOS(new)_l = \sum_{np=1} MOS_{l,np}},$$

where l indexes the phase 2 sponsor sampling strata based on the FNS region/size strata; $l = 1,...,7$ (defined the same as the primary stratum used for phase 1); nw_l is the number of noncertainty new sponsors allocated in phase 2 sponsor sampling stratum l, assumed to be about 10 percent of the total nondropout sample; NW_l is the number of noncertainty new sponsors in phase 2 sponsor sampling stratum l; $MOS(new)_l$ is the total MOS associated with all new sponsors (less the contribution of the certainty selections) in phase 2 sampling stratum l; and $MOS_{l,p}$ is the measure of size of new sponsor np in phase 2 sampling stratum l. The MOS should be set equal to the estimated total number of meals to be served in the current year.

With proportional allocation of the sample across the seven sampling strata, the strata sample sizes are as follows:

(C.5) $$nw_l = nw \times \frac{MOS(new)_l}{MOS(new)}.$$

3. Phase 3 Sampling Procedures

Once the current-year lists become available, we recommend comparing the list with the prior year's list to classify the combined list of sponsors into 3 categories:

1. *Continuing sponsors*: Prior- and current-year sponsors
2. *New sponsors:* New to the current year

3. *Former Sponsors:* Prior-year sponsors that elect not to participate in the current year.

The phase 1 sampling process will have selected a representative sample from both category 1 and category 3. The phase 2 sampling process selected a representative sample from category 2. Given the phase 1 sampling will not produce a sufficient number of former sponsors, a supplemental sample of dropouts will be selected in phase 3.

For the former sponsors, we recommend stratifying the phase 3 sample, using the same procedures as in phase 1, into 14 sampling strata. The sample size should be allocated by strata proportionally, with a minimum of two sponsors per stratum. Certainty selections for former sponsors should be identified as in phase 1.

Table C.2 presents our tentative phase 3 sample size recommendations. The suggested former sponsor sizes are designed to yield a total of 200 (5% CV) or 100 (10% CV) completed interviews from the combined phase 1 and phase 3 sample, assuming an 80 percent response rate.

As for phase 1, the supplemental former sponsor sample should be selected using the same systematic PPS selection technique. For the former sponsors, we suggest selecting an initial sample from the full list of dropouts identified and then eliminating any of the selections that were also selected in phase 1.

For the dropouts, the phase 2 sample probability of selection of a former sponsor, *dp*, is given in equation (C6):

$$P3(dropout)_{h,dp} = \frac{nd_h \times MOS_{h,dp}}{MOS(dropout)_h \sum_{dp=1}^{ND_h} MOS_{h,dp}} \quad , \tag{C.6}$$

where the components are defined as in equation (C.4) with *nd*, and *ND* defining the respective total number of noncertainty former sponsors in the population and sample, respectively.

For the combined sample of former sponsors in phase 1 and 3, the final probability of selection for each selected sponsor, *dp*, in stratum *h*, is given in equation (C.7):

$$(C.7) \qquad P(dropout)_{h,dp} = P1(sponsor)_{h,dp} + \left(1 - P1(sponsor)_{h,dp}\right) \times P3(dropout)_{h,dp} \quad .$$

4. Selection of Sponsors for Site Observations

Our proposed sampling plan calls for selecting a subset of the selected new and continuing sponsors. Sites would be selected for observation from this subset. For the continuing sponsors, we recommend selecting a subsample of the phase 1 selections (excluding selections from Puerto Rico, the Virgin Islands, and Guam) at random within each of the 14 sampling strata. Similarly, for the new sponsors, we suggest selecting a random subsample of the phase 2 selections (prior to determining eligibility, if needed) within each of the seven sampling strata. The recommended subsample sizes are presented in Table C.3. Basically, for the 10 percent CV, we recommend selecting sites from all sponsors to account for either sponsor or site nonresponse.

The subsample sizes should be allocated across the sampling strata in proportion to the original sample sizes, rounding the allocated sample size as needed to the nearest integer value. In this process, the within-sponsor probabilities of selection for the site interviews are as follows:

$$(C.8) \qquad P(cont\ sponsor\ site | selected\ phase\ 1) = \frac{ns_h}{n1_h^c} \quad ,$$

where

(C.9) $$ns_h = ns \times \left(\frac{n1_h^c}{n^c}\right)$$

and

(C.10) $$P(\textit{new sponsor site} | \textit{selected phase 2}) = \frac{nws_l}{nw_l^c} \quad ,$$

where

(C.11) $$nws_l = nws \times \left(\frac{nw_l^c}{nw_c}\right) \quad ,$$

TABLE C.3

RECOMMENDED SPONSOR SUBSAMPLE SIZES FOR SITE OBSERVATIONS

Precision Option	Sample Group	Number of Completed Sponsor Interviews Required to Conduct Site Observations	Expected Phase 1 and 2 Sample Sizes[a]	Suggested Subsample Size
5%CV	New	240	70	35
	Continuing		477	240
10% CV	New	100	21	21
	Continuing		117	117

[a]Less any sponsors that were selected in Puerto Rico, Virgin Islands, and Guam.

where the terms, *nws* and *ns*, denote the subsample sizes for, respectively, the new sponsor and continuing sponsors from which the site observations are conducted. The *c* superscript on the phase 1 and 2 sample sizes from equations (C.1) and (C.4) denote these sample sizes after the elimination of any selections in Puerto Rico, the Virgin Islands, and Guam. Hence, the overall probability of selecting a new sponsor, *np*, within each sampling stratum, from which one or more sites will be selected for visiting, is given in equation (C.12):

$$(C.12) \qquad P(new\ \ sponsor\ \ w/site)_{l,np} \;'\; \frac{nw_l \times MOS_{l,np}}{MOS(new)_l} \times \frac{nws_l}{nw_l{}^c} \quad ,$$

and the corresponding probability for continuing sponsors is given in equation (C.13):

$$(C.13) \qquad P1(cont\ \ sponsor\ \ w/site)_{h,p} \;'\; \frac{n1_h \times MOS_{h,p}}{MOS_h} \times \frac{ns_h}{n1_h{}^c} \quad .$$

The inverse of the probabilities of selection outlined in equations (C.1), (C.4), (C.7), (C.12) and (C.13) will be used a first component of the survey weights, as discussed in Appendix D.

B. SITE SELECTION PROCEDURES

The selected sponsors from which the site observations are to be attempted will be asked to provide a list of their member sites. We suggest selecting a relatively fixed number of sites from these lists--about 1.5 sites per sponsor--for both precision level requirements. If the sponsor has two or fewer sites, we recommend selecting all the sites for observation. If the sponsor has three or more

sites, we recommend selecting a PPS sample of two sites[3] from the noncertainty sponsors. For the certainty sponsors, we provide a formula in this section for determining the number to select that will minimize the variation in the survey weights. The site selections should be conducted using the same PPS procedures as described for the phase 1 sponsor sample. The measure of size should be the best estimate of the total number of lunches that will be served by the site in the survey year (which can be estimated by multiplying the expected ADA times the number of days of operation).

The proposed sampling procedures should be conducted for each sponsor as soon as the site lists for that sponsor are received. Some sites may operate only for a few weeks early in the summer. This process will increase the chance they can be visited, if selected.

With this selection methodology, the within-sponsor site probabilities of selection are equal to one for the sponsors with two or fewer sites. If a noncertainty sponsor has three or more sites, the probability of selecting a site, *t*, from a new sponsor or from a continuing sponsor is given in equations (C.14) and (C.15), respectively:

$$(C.14) \qquad P(site|new\ \ sponsor)_{l,np,t} = \frac{2\times MOS^{)}_{l,np,t}}{MOS(new\ \ sponsor)^{)}_{l,np} = \sum_{t=1}^{T_{l,np}} MOS^{)}_{l,np,t}}$$

[3]Some site level nonresponse will occur. If the sponsor fails to participate or if all the sponsor's selected sites fail to be observed, the sponsor sample sizes should provide sufficient replacement sponsor and site selections. If the sponsor has more than two sites, and only one of the two sampled selections can be observed, a replacement site could be selected. Hence, we recommend selecting a minimum of three sites from sponsors that have three or more, but treating two of the selections (selected at random) as the main sample.

and

$$(C.15) \qquad P(site|cont\ sponsor)_{h,p,t}' \frac{2\times MOS^{)}_{h,p,t}}{MOS(cont\ sponsor)^{)}_{h,p}' \sum_{t'1}^{T_{h,p}} MOS^{)}_{h,p,t}} ,$$

where l and h are as defined previously, and $T_{l,np}$ defines the number of sites run by the selected new sponsor np, from sampling stratum l; $T_{h,p}$ defines the number of sites run by the selected continuing sponsor p, from sampling stratum h; $MOSN_{l,np,t}$ equals the total MOS associated with site t, from new sponsor np;[4] and $MOSN_{h,p,t}$ equals the total MOS associated with site t, from continuing sponsor p. Combining equations (C.12) and (C.13) with (C.14) and (C.15) provides the overall probability of selecting a site for observation in this study for the noncertainty sponsors with three or more sites.

When the sponsor is selected with certainty, we recommend selecting a site sample size that is based on the following guidelines:

- For a new certainty sponsor, we recommend setting the site sample size equal to :

$$(C.16) \qquad sample\ size' \frac{nws \times 1.5 \times MOS^{)}_{cert\ sponsor}}{MOS(new)} \times \frac{\bar{MOS}_{l,np}}{\bar{MOS}(new\ sponsor)^{)}_{l,np}} .$$

- Similarly, for a continuing certainty sponsor, we recommend setting the site sample size equal to:

$$(C.17) \qquad sample\ size' \frac{ns \times 1.5 \times MOS^{)}_{cert\ sponsor}}{MOS} \times \frac{\bar{MOS}_{h,p}}{\bar{MOS}(cont\ sponsor)^{)}_{h,p}}$$

[4]The measure of size used to select the site sample may be based on a different quantity than the size measure used to select the sponsors. Therefore, we have identified this potential difference by adding a prime to variables in our notation.

These procedures basically allocate a site sample size to each sponsor that is proportional to the size of the certainty sponsor relative to the measure of size accounted for by all the noncertainty sponsors. The last ratio in this term adjusts for differences in the average sponsor measure of size used to select the sponsors relative to the size measure used to select the sites (which may not be required if the same size measures are used).

APPENDIX D

RECOMMENDED SAMPLE WEIGHTING PROCEDURES

This appendix presents recommendations for the calculation of weights to be used in the analysis of the SFIS program operations data. We begin with an overview of the major types of weights that will be needed. We then provide additional background material on the analytic objectives of the weights. The last section describes an algorithm for computing the survey weights, which are based directly on selection probabilities.

A. WEIGHTS NEEDED

As discussed in Chapter V, two types of tabulations will be constructed with the program operations variables to be collected in the survey. The two types are:

1. Tabulations that are representative of ***average characteristics*** of various types of providers
2. Tabulations that are representative of program variables as they are experienced by the ***average participant*** in the program

Examples of the first type of tabulation would be the percentage of all sponsors that are camps or schools, the percentage of sites operated at a playground, or the percentage of states that conduct monitoring visits to all their sites. Examples of the second type of tabulation would be the percentage of all meals served at a sponsor of a given type, the percentage of all children attending a site that is a playground, or the percentage of all children in states in which all sites are monitored.

The weights that generate each of these two types of tabulations are composed of a common underlying component plus a scaling component that depends on the analytical objective. This common component, referred to as a survey weight, is based on the probability of selecting the unit which is sometimes adjusted by other factors to compensate for survey non-response, ineligibility of the sampled cases, or to benchmark the survey results to corresponding administrative data. For the first type of tabulation, a scaling factor could be used to ensure the survey weighted count of

units reproduces the population count (i.e., the weighted count of interviewed sponsors equals the total number of sponsors obtained from the state lists). For the second type of tabulation, the scaling factor might reflect a unit's measure of size, such as the number of meals served by the site.

The remainder of this appendix discusses how the survey weights should be calculated in the planned study. The next section provides some additional discussion on how these survey weights can be modified for different analytical objectives. Furthermore, we discuss the relationship between the survey weights and the planned analysis and how this relationship provided us with a rationale for recommending the PPS sampling methodology.

B. BACKGROUND

As mentioned in the previous section, a variety of weights can be developed from the underlying survey weights to meet either of two types of tabulation requirements. Following the second tabulation requirement, suppose the objective is to estimate the average caloric content of a meal served on a given day of operation. The study will collect information from the surveyed site on the total number of meals served on the observed day. Then, for a sample of the meals from the site, the average caloric content will be evaluated. The level of meals served by site varies considerably. Therefore, the study will need to account for this variation in estimating the population value. In this case, the average caloric content of the meal served at the site could be multiplied by the number of meals served to obtain a site estimate of the total calories distributed by the site. These values could then be weighted by the survey weights to obtain an estimate of the total calories distributed among all sites on a given day. Finally, by dividing this value by a survey-weighted estimate of the total number of meals served on a given day from all sites in the population, we obtain a population estimate of the average caloric content of the meal.

This statistic can be computed in a more straightforward manner by multiplying the survey weights by a scaling factor. For the above example, we set the scaling factor equal to the observed number of meals served on the observation day. Under this approach, the population estimate can be obtained directly from the weighted average of the site values of the average caloric content of the meal. This procedure was used in the 1986 study to prepare the participant representative data analysis weights.

We anticipate that the most important estimates made from the study will be quantity-weighted (that is, reflecting the experiences of participants or the characteristics of meals similar to the example just discussed). We, therefore, decided to use a PPS selection procedure, which gives higher selection probabilities to the larger providers.[1] However, the planned sample will not be optimal for estimating the number of sponsors or sites that have a given characteristic, even though the survey weights may be used to derive these estimates.

For this study, we anticipate a minimum of two survey weights, from which analysis weights can be generated:

1. Sponsor weights for each of the completed sponsor surveys (120 or 480 recommended)
2. Site weights for each of the sites observed (150 or 350 recommended)

[1]At a more formal level, when weights are constructed by multiplying the *survey* weights, which reflect the uneven selection probabilities, by the measure of size, then the "probability of selection" factor and the "measure of size" factor tend to cancel out, leading to composite weights that are very similar to each other across observations. The equality of these composite weights reduces variance in the estimation.

In addition, a set of sponsor weights could be computed for the subset of sponsors from which sites were selected for observation. The next section describes how the survey weights should be calculated.

C. CALCULATION OF SURVEY (PROJECTION) WEIGHTS

For each unit of analysis, the projection survey weights can be computed using a general formula that consists of the product of the four independently derived factors described in Table D.1. For an observed site from a continuing sponsor, the site's survey weight can be expressed as in equation (D.1) using the definitions in Table D.1:

$$\text{(D.1)} \qquad Wgt(site) = F1_{h,p,t} \times F2_{h} \times F3_{h} \times F4_{h,k} \ ,$$

where

h indexes the sponsor sampling strata membership, $h = 1, ...,14$;

p indexes the selected sponsor from which the site was selected;

t indexes the selected site within the selected sponsor; and

k denotes a class of sites within each sampling stratum, *h*, that have similar response patterns or characteristics that appear to be related to the response process.

These indexes indicate the level at which the various weighting factors are applied.

TABLE D.1

COMPONENTS OF THE SURVEY WEIGHTS

Factor	Purpose
1	Reflects the inverse probability of selection of the respondent within each sampling stratum based on the sample design
2	An alignment factor that adjusts the factor 1 survey weights (or some function of these weights) to sum to a specified value, such as the total number of food service sites or the total number of meals served based on administrative data
3	Adjusts the weight from factor 1 for the estimated rates of ineligibility
4	A model-based or weighting class that accounts for differences among the respondents and nonrespondents based on the sampled unit's characteristics

The factors are computed in stages; each factor adjusts the weights based on the product of the preceding factors to achieve a given objective. The first factor weights each respondent to account for differences in the unit's probability of selection. These differences are based on either the ADA associated with the unit or the total number of lunches served. The factor is set equal to the inverse of the probability of selection. (The probabilities of selection of sponsors and sites are given in Appendix C.) The factor can also be adjusted if only a portion of the sampled cases are released for interviewing purposes.

The second factor is an optional adjustment that can be used to align the weighted total to some known external quantities. For example, if a population estimate of the total number of meals served on an average day is known from administrative data, then the weights can be adjusted so that the weighted survey data reproduces the total from the administrative data. In most cases, this factor simply takes the format of a ratio adjustment.

During the interviews, we anticipate that some of the units selected will be found to be ineligible. If some of these sampled units have an undetermined eligibility status (for example, the new sponsors), a third adjustment will be necessary as outlined in equation (D.2). In this factor, we assume that the ineligibility rate of the people in each sampling stratum is the same for cases for which eligibility status could be determined and for cases for which eligibility is unknown.

$$F3_h = \frac{c_h + ref_h}{c_h + ref_h + inelig_h} \qquad \text{(D.2)}$$

In equation (D.2), c_h denotes the number of units completing an interview; ref_h denotes the number of units for whom eligibility was determined, but who refused to complete the survey, and $inelig_h$ denotes the number of units found to be ineligible.

The fourth factor consists of a nonresponse adjustment to the survey weights. Given that the sampling frame may provide information on the characteristics of each unit, it might be possible to compare respondents with nonrespondents on these characteristics. There are two major approaches to nonresponse adjustment: (1) "propensity score" adjustments, and (2) "weighting class" adjustments.

A propensity score adjustment uses a weighted logistic regression model to predict response status on the basis of the available characteristics of the sampled units. Several authors have described and examined the use of propensity scores in adjusting for nonresponse (Rosenbaum and Rubin 1984; David et al. 1983; and Kalton and Kasprzyk 1986). From the logistic regression models, a propensity score can be computed for each respondent on the basis of the inverse of the respondent's estimated probability of responding. Under this approach, responding sample units that have characteristics similar to those that did not respond are given a larger propensity score than

sampling units with dissimilar characteristics. By applying this propensity score as an adjustment to the survey weights, the characteristics of the nonrespondents are appropriately represented in the final estimates. In general, this approach allows the researcher to adjust the survey weights to account for nonresponse based on a variety of characteristics and the interactions among these characteristics available from the sampling frame information.

As an alternative strategy, one can divide the sampled units into a variety of cells defined by the various combinations of categories among the available characteristics. Under this approach, known as a weighting class adjustment, the nonrespondents in each cell receive an adjustment to their survey weight based on the ratio of the sum of the survey weights associated with all the sampled units in the cell to the sum of the weights of the responding units. A disadvantage of this approach is that, if the number of combinations of categories becomes large, some collapsing of the categories is necessary to keep the range in the adjustments from becoming too large. In contrast, the propensity score approach often allows the researcher to incorporate a large number of characteristics, but with less impact on the weights. Even if the adjustments do become large, the process of trimming the weights is often less labor intensive under the propensity score approach than is collapsing the characteristic levels. Both approaches are limited to the characteristics available on the sampling frame, and therefore do not compensate for other factors that may contribute to nonresponse.

In this study, we recommend conducting a series of cross-tabulations to examine which of the available characteristics of each sampled unit seem to be related to survey response status. After the characteristics that affect response have been isolated, they can be used as the independent variables in modeling propensity scores or to create a set of weighting class adjustment cells. Overall, we

anticipate that the response rates for the surveys will be high. Thus, the use of a fairly simple non-response adjustment may be warranted.

After these survey weights have been developed, they should be multiplied by appropriate measures of size to develop the analytic weights required for participant-based or meal-based analyses.