APPENDIX B

SAMPLING AND SAMPLE WEIGHTS

A. SAMPLE DESIGN AND ESTIMATION

This section documents the sampling and weighting procedures for the Summer Food Service Program (SFSP) Implementation Study. The sample design for the study was intended to achieve the following goals:

- The use of a two-stage sample design that produces a linkable analytic dataset of sponsors and sites. This design first selects a national probability sample of sponsors and then follows with the selection of one or more sites from each sponsor.
- Probability-proportional-to-size (PPS) sampling procedures to increase the precision of estimates involving total meals served. Sponsors, former sponsors, and sites were selected based on a measure of size relative to the estimated number of total meals served during their period of operation.
- Designing the sample so that accurate statements can be made for both the "percentage of meals served" and "percentage of programs" (sponsors, former sponsors, or sites).
- Obtaining a total of 120 new and continuing completed sponsor interviews to yield an average coefficient of variation (CV) of 10 percent across the survey characteristics for estimates of "percent of meals served" by sponsors with particular characteristics.
- Obtaining a total of 150 completed site visits to yield an average CV of 10 percent across the survey characteristics for estimates of "percentage of meals served" by sites with particular characteristics.
- Obtaining a total of 100 completed former sponsor interviews to yield an average CV of 10 percent across the survey characteristics.

B. SPONSOR SAMPLE SELECTION

The target population included all sponsors approved for the 2001 SFSP in the 48 states and the District of Columbia that had at least one site operating for a minimum of one week between June 9 and August 31, 2001.

The sampling frame of sponsors included (1) a list of sponsors approved for the 2000 SFSP in the 48 states and the District of Columbia that were open at least one week between June 9 and August 31, and (2) a list of expected new sponsors that had completed applications or attended training to be SFSP sponsors in 2001.

The sponsors were stratified into seven primary strata based on FNS region and average daily attendance. Next, each of the seven primary strata were further divided into substrata. A substratum was defined by (1) the state of the sponsor, and (2) whether the sponsor had one site or more than one site. This yielded a total of 98 substrata (48 states and the District of Columbia times 2 site categories), or 2 substrata per state. Sponsors were allocated to each substratum in proportion to the size of that substratum.

The sample of sponsors was chosen using Chromy's (1979) sequential PPS sampling procedure to obtain a representative sample of 138 sponsors. The use of a PPS sampling procedure gives larger sponsors a higher chance of selection to improve the statistical precision in the survey data by producing survey weights that are inversely proportional to the reported quantities. In developing the sample sizes needed to obtain the 138 completed sponsor interviews, Mathematica Policy Research, Inc. (MPR) accounted for (1) an estimated 92 percent response rate among selected sponsors, (2) approximately 10 percent of prior-year sponsors dropping out of the program, and (3) an expected 10 percent of the sampling frame being new sponsors. Of the 138 sponsors in the sample, 130 were continuing sponsors and 8 were new sponsors.

Sponsors were selected with probability proportional to the square root of the estimated number of meals served.[1] The square root is the preferred method when estimating both the percentage of entities (such as sponsors) with a certain characteristic, as well as the percentage of participants or services provided (in this case, meals served) by entities with a certain characteristic. Sponsors were ordered within substratum by zip code and meal counts before sampling to ensure a representative sample of sponsors.

After sample selection, the primary sample cases were removed from the frame and a second set of replacement sample was selected from each of the substrata in the same way as the first. The second sample was paired with the first such that each sample case had a replacement in the same geographic area with a similar number of sites and meal counts. This replacement was used for sponsors who refused to participate in the study during their initial contact.

C. SITE SAMPLE SELECTION

For the second stage of selection, the sponsors selected in the first stage were asked to provide a list of their member sites. Because of the tight timing of the study, MPR could not wait until complete lists of sites from all 138 prior-year and new sponsors were available to conduct the sampling and begin the site visits. Instead, sampling of sites was conducted on a batch basis. Soon after a site list was obtained from a sampled sponsor, the site (or sites) was selected and a site visit was scheduled.

The sample selection procedure again used Chromy's sequential PPS sampling procedure to obtain a representative sample of 178 sites from the 138 sponsors selected for the study. For sponsors with only one site, that one site was automatically selected for sample. For all other sponsors, Chromy's PPS procedure was used to designate one to four primary sites per sponsor (based on the size of the sponsor). The results of the allocation were as shown in Table B.1.

[1]Because the sample was selected before the total number of meals served in 2001 could be known, size was estimated using total meals served in 2000 for sponsors that operated in 2000, and using the sponsor's estimate of the number of meals that would be served in 2001 for new sponsors.

The sample size of 178 sites was chosen to account for (1) an estimated 92 percent response rate from selected sites (some were expected to refuse a visit or close before the visit); (2) approximately 10 percent of sponsors dropping out of the program, with the result that their site(s) would become ineligible for interview; and (3) approximately 3 percent of sponsors would not open the selected site.

TABLE B.1

SITE ALLOCATION TO SPONSORS

Number of Sites Allocated per Sponsor	Number of Sponsors	Number of Sites
1	115	115
2	13	26
3	3	9
4	7	28
Total	**138**	**178**

Sites were selected with probability proportional to the square root of the estimated number of meals served. As was used in the first stage of selection, the square root of the total number of meals the sponsor expected to serve at the site was chosen as a size measure. Similarly, sites were ordered by zip code and meal counts before sampling to ensure that the sampled sites were representative.

At the time of sampling, two replacements were selected for each site to prepare for sites that MPR would not be able to visit in time. Thus, sponsors with two sites allocated had a total of six sites selected (one primary and two replacements for each site allocated). If a sponsor did not have enough sites to cover the replacements, the number of replacements was reduced to the number that the sponsor had available.

To ensure that the visits represented the range of program operations, MPR selected a random day of the week within the days that the operation was open for the site observation to take place. The day of week served as a "target" date for scheduling the interviewers. In addition, field visits were scheduled such that approximately 34 percent of programs were observed in the early stage (that is, the first third of the program), 33 percent in the middle stage, and 33 percent in the ending stage.

D. MEALTIME SELECTION

A decision was made to observe two meals at each site that served two or more meals: (1) lunch, and (2) one other meal. Thus, the lunch meal at each site was selected with certainty.

If the site served two meals, then the other meal was selected with certainty. For sites that served all three meals, we randomly selected either breakfast or supper for observation in addition to lunch. After sample selection of meals, 35.5 percent of the sites had only the lunch meal selected, 56.4 percent had the breakfast and lunch meals selected, and 8.1 percent had the lunch and supper meals selected.

E. FORMER SPONSOR SAMPLE SELECTION

The target population included all sponsors approved for and operating the SFSP in 2000 in the 48 contiguous states and the District of Columbia that *did not operate* the SFSP in 2001. To compile the sample frame, each SFSP state agency was asked in fall 2001 to provide a list of sponsors who participated in the SFSP in 2000 but did not do so in 2001. States were instructed to include sponsors that changed status from a sponsor to a site under a different sponsor. Sponsors that continued to feed children but did not participate in the program were also included. The states were instructed to include the sponsor's name, address, contact person's name, phone number, and sponsor type on the list. This information was matched to last year's sponsor list (2000) to obtain additional information such as the operation starting and ending date, number of sites, and total meals served during the dates of operation. There were a total of 367 former sponsors on the sampling frame. Only three states reported that they had no sponsors from the previous year that had left the program.

The former sponsors were stratified into seven primary strata based on FNS region and average daily attendance. Next, each of the seven primary strata were further divided into "substrata." A substratum was defined by (1) the state of the sponsor and (2) whether the sponsor had one site or more than one site. This yielded a total of 98 substrata (48 states and the District of Columbia times 2 site categories), or 2 substrata per state. Given the small size of the sampling frame, this level of substratification may seem excessive. However, substratification variables should be thought of as more like "sort" variables, not specified strata. The substratification within strata allows for additional controls on selecting a random sample across different domains. The randomized allocation and rounding technique enables us to obtain the same results as we would by sorting the data and then selecting a systematic sample of cases. At the same time, greater control is obtained since a pre-selected sample size is selected for the domain before sampling.

The sample was chosen using Chromy's (1979) sequential probability-proportional-to-size (PPS) sampling procedure to obtain a representative sample of 160 former sponsors. The use of a PPS sampling procedure gave larger former sponsors a higher chance of selection to improve the statistical precision in the survey data by producing survey weights that are inversely proportional to the reported quantities. In developing the sample size needed to obtain 100 completed former sponsor interviews, MPR accounted for (1) an estimated 90 percent eligibility rate among sponsors in the sampling frame (former sponsors are ineligible if they were not sponsors in the summer of 2000 or, conversely, are actual sponsors in the summer of 2001) and (2) an estimated 70 percent response rate among eligible former sponsors. Thus, the sample size selected was 160, since 160 x 0.90 = 144 eligible sponsors, and 144 x 0.70 = 100 completes.

Former sponsors were selected with probability proportional to the square root of the number of SFSP meals they served in 2000, as reported by the state agencies. The square root is the preferred method when estimating both the percentage of entities (such as former sponsors) with a certain characteristic as well as the percentage of participants or services provided (in this case, meals served) by entities with a certain characteristic. Out of the 367 sponsors in the sample frame, 27 were sufficiently large that they would have probability of selection greater than 1. These former sponsors were selected with certainty and removed from the frame. The remaining former sponsors were ordered within substratum by zip code and meal counts before sampling to ensure a representative sample of former sponsors. Then, 133 additional former sponsors were selected.

F. ESTIMATION

Because of the different levels of analysis for this study, there are six different sets of weights. These include sponsor, site, mealtime, plate, and plate waste weights, as well as former sponsor weights.

1. Sponsor Weighting

a. Sponsor Base Weight

The first step in weighting the sponsor sample was to calculate the sponsor sampling weight. The sponsor sampling weight $BW_{spon}(i)$ for the ith sampled sponsor was calculated as the inverse of the probability of selection or:

$$BW_{spon}(i) = \frac{S(+)}{n_{total} S(i)} ,$$

where:

- $S(+)$ is the sum of the square root of total meals for all eligible sponsors on the sampling frame
- $S(i)$ is the square root of total meals for sponsor i
- n_{total} is the total number of sponsors selected, or 138

b. Sponsor Nonresponse-Adjusted Weight

The next step in the sponsor weighting was to adjust for nonresponse occurring during the survey interview. Complete response for a sponsor means that MPR (1) determined whether the sponsor was eligible for interview (that is, whether it was in operation for at least one week during June, July, or August of 2001); and (2) obtained interview data from the eligible sponsor. The nonresponse adjustments were conducted within two classes defined by whether the sponsor had one site or more than one site.

The nonresponse adjustment adjusted the base weight to account for data loss from sponsors who did not complete an interview. The nonresponse adjustment was defined as follows:

- For ***records where the sponsor completed a questionnaire,*** the questionnaire completion nonresponse adjustment $ADJ_{quest}(ci)$ for record i in class c is defined as:

$$ADJ_{quest}(ci) = \frac{\sum_{i=1}^{n_c} \delta_{eligspon}(ci) BW_{spon}(ci)}{\sum_{i=1}^{n_c} \delta_{questresp}(ci) BW_{spon}(ci)} ,$$

  where $BW_{spon}(ci)$ is the sponsor base weight for record i in class c, $\delta_{eligspon}(ci)$ is equal to 1 for eligible sponsors and 0 otherwise, and $\delta_{questresp}(ci)$ is equal to 1 for sponsors who responded to the questionnaire and 0 otherwise.

- For records ***where the sponsor did not complete the questionnaire,*** the questionnaire completion nonresponse adjustment $ADJ_{quest}(ci)$ is equal to 0.

- For ***ineligible sponsors,*** the questionnaire completion nonresponse adjustment factor $ADJ_{quest}(ci)$ is equal to 1.

The nonresponse-adjusted weight $W_1(i)$ was then calculated as the product of the base weight and the questionnaire completion nonresponse adjustment factor as follows:

$$W_1(i) = BW_{spon}(i) \times ADJ_{quest}(ci) .$$

c. Final Sponsor Weights

Because two types of estimates were computed for this survey—the percentage of sponsors with a certain characteristic and the percentage of total meals served by sponsors with a certain characteristic—*two different* final weights were computed using the nonresponse-adjusted weight computed above. For the first type of tabulation, a poststratification adjustment was done to ensure that the survey-weighted count of sponsors equals the population count of sponsors approved for the 2001 SFSP. For the second type of tabulation, the poststratification adjustment was made to ensure that the survey-weighted count of the total number of meals served equals the total number of meals served by all sponsors approved for the 2001 SFSP.[2]

[2]Poststratification totals were derived from the 2001 SFSP Sponsor-Site Database, which is described in Appendix A.

Final Sponsor Weight. The sponsor-adjusted final weight reflects the total number of sponsors approved for the 2001 SFSP. The poststratification cells consist of the types of sponsor—school, government, nonprofit, and camp/NYSP. (Camp and NYSP cells were collapsed together because of small cell size.)

If C_k was the poststratification total number of sponsors for collapsed sponsor type k, then the poststratification adjustment $ADJ_{sp}(i)$ for sponsors in that collapsed sponsor type is:

$$ADJ_{sp}(i) = \frac{C_k}{\sum_{i=1}^{n_k} W_1(i)},$$

where n_k is the number of sampled sponsors in sponsor type k, and $W_1(i)$ is the nonresponse-adjusted sponsor weight.

The final sponsor weight $FSPW(i)$ was then calculated as the product of the nonresponse weight $W_1(i)$ and the sponsor poststratification adjustment factor as follows:

$$FSPW(i) = W_1(i) \times ADJ_{sp}(i).$$

This weight is used to analyze sponsor level data.

Final Quantity-Adjusted Sponsor Weight. The quantity-adjusted final weight reflects the total number of meals served by sponsors approved for the 2001 FSP. The poststratification cells consist of the type of sponsor.

If T_k is the poststratification total for the total number of meals served by sponsor type k, then the total meal poststratification adjustment $ADJ_{tl\_ml}(i)$ for sponsors in that sponsor type is:

$$ADJ_{tl\_ml}(i) = \frac{T_k}{\sum_{i=1}^{n_k} W_1(i) T_{ki}},$$

where T_{ki} is the total count of meals served for sponsor i in sponsor type k, n_k is the number of sampled sponsors in sponsor type k, and $W_1(i)$ is the nonresponse-adjusted sponsor weight.

The final quantity-adjusted sponsor meal weight $FMLW(i)$ was then calculated as the product of the nonresponse weight $W_1(i)$ and the total meal poststratification adjustment factor as follows:

$$FMLW(i) = W_1(i) \times ADJ_{tl\_ml}(i).$$

This weight is then multiplied by the estimated number of meals served by each sponsor, and this product is used to weight the sponsor-level data by total meals served.

2. Site Weighting

a. Site Base Weight

The first step in weighting the site sample was to calculate the sampling weight of each site. Since this was the second stage of selection, the sampling weight of each site depends on the probability of selection of the sponsor at the first stage. The base weight of the sponsor was used in calculating the site weight (as opposed to the final weight), because a sponsor could refuse to be interviewed but could allow a site visit.

Each site has a unique sampling weight. The site sampling weight $BW_{site}(ij)$ was calculated differently for sites where the sponsors were automatically assigned a particular number of sites or randomly allocated a particular number of sites.

For the sites that belonged to sponsors that were automatically assigned a number of sites, (129 sites total), the site sampling weight $BW_{site}(ij)$ for the jth sampled site from the ith sampled sponsor was calculated as the inverse of the probability of selection or:

$$BW_{site}(ij) = BW_{spon}(i) \times \frac{S(i)_2}{m_i S(ij)},$$

where:

- $BW_{spon}(i)$ is the sponsor base weight for sponsor i calculated in the first stage of sample selection
- $S(i)_2$ is calculated by summing the square root of total meals for all eligible sites for a particular sponsor
- $S(ij)$ is the square root of total meals for site j in sponsor i
- $m_i = 1$ for sites where the number of sites equals 1, and $m_i = 4$ for the sites where the sponsor was "capped" at a maximum of 4 sites each

For the remaining sites, the site sampling weight $BW_{site}(ij)$ for the jth sampled site from the ith sampled sponsor was calculated as the inverse of the probability of selection or:

$$BW_{site}(ij) = BW_{spon} \times \frac{S_{rem}(++)}{m_{rem} S(ij)},$$

where:

- BW_{spon} *(i)* is the sponsor base weight for sponsor *i* calculated in the first stage of sample selection
- S_{rem}*(++)* is the sum of the square root of total meals for all eligible sites on the sampling frame where the sponsor's number of sites was randomly allocated
- *S(ij)* is the square root of total meals for site *j* in sponsor *i*
- m_{rem} is the total number of sites allocated to sponsors remaining after the sites in the first step were removed (49, or 178 - 129)

b. Site Nonresponse-Adjusted Weight

The next step was to adjust for nonresponse occurring during the site visit. Complete response for a site means that MPR (1) determined whether the site was eligible for interview (that is, whether it was in operation for at least 1 week during June, July, or August of 2001); and (2) obtained interview data from site managers for eligible sites. The nonresponse adjustments were conducted within two classes defined by whether the sponsor had one site or more than one site.

The nonresponse adjustment adjusted the base weight to account for data loss from sites that did not allow a visit. The nonresponse adjustment was defined as follows:

- For ***records where the site completed an interview,*** the questionnaire completion nonresponse adjustment $ADJ_{quest}(ci)$ for record *i* in class *c* is defined as:

$$ADJ_{quest}(ci) = \frac{\sum_{i=1}^{n_c} \delta_{eligsite}(ci) BW_{site}(ci)}{\sum_{i=1}^{n_c} \delta_{questresp}(ci) BW_{site}(ci)},$$

  where $BW_{site}(ci)$ is the baseweight for record *i* in class *c*, $\delta_{eligsite}(ci)$ is equal to 1 for eligible sites and 0 otherwise, and $\delta_{questresp}(ci)$ is equal to 1 for sites that responded to the interview and 0 otherwise.

- For ***records where the site did not complete the questionnaire,*** the questionnaire completion nonresponse adjustment ADJ_{quest} *(ci)* is equal to 0.
- For ***ineligible records,*** the questionnaire completion nonresponse adjustment factor ADJ_{quest} *(ci)* is equal to 1.

The nonresponse-adjusted weight W_1 (ij) was then calculated as the product of the base weight and the questionnaire completion nonresponse adjustment factor as follows:

$$W_1(ij) = BW_{site}(ij) \times ADJ_{quest}(ci) .$$

c. Final Site Weights

Because two types of estimates were to be computed for this survey—the percentage of sites with a certain characteristic and the percentage of total meals served by sites with a certain characteristic—MPR computed *two different* final weights using the nonresponse-adjusted weight computed above. For the first type of tabulation, a poststratification adjustment was done to ensure that the survey-weighted count of sites equals the population count of sites in the 2001 SFSP. For the second type of tabulation, the poststratification adjustment was made to ensure that the survey-weighted count of the number of meals served equals the total number of meals served by all sites. This number was equal to the total number of meals served by all sponsors approved for the 2001 SFSP, which was used in the sponsor-level final quantity-adjusted weight.[3]

Final Site Weight. The site-adjusted final weight reflects the total number of sites approved for the 2001 SFSP. The poststratification cells consist of the type of sponsor.

If C_k is the poststratification total of sites operated by sponsor type k, then the poststratification adjustment $ADJ_{st}(i)$ for sites in that sponsor type is:

$$ADJ_{st}(i) = \frac{C_k}{\sum_{i=1}^{n_k} W_1(ij)} ,$$

where n_k is the number of sampled sites in sponsor type k, and W_1 (ij) is the nonresponse-adjusted weight.

The final site weight $FSTW(i)$ was then calculated as the product of the nonresponse-adjusted site weight $W_1(ij)$ and the site poststratification adjustment factor as follows:

$$FSTW(ij) = W_1(ij) \times ADJ_{st}(i) .$$

This weight is used to analyze site-level data.

[3]As with the sponsor weights, poststratification totals were from the 2001 Sponsor-Site Database.

Final Quantity-Adjusted Site Weight. The quantity-adjusted final weight reflects the total number of meals served by sponsors approved for the 2001 SFSP. The poststratification cells consist of the type of sponsor.

If T_k is the poststratification total for meals served at sites operated by sponsor type *k*, then the total meal poststratification adjustment $ADJ_{tl\_ml}(i)$ for sites in that sponsor type is:

$$ADJ_{tl\_ml}(i) = \frac{T_k}{\sum_{i=1}^{n_k} W_1(ij)T_{kij}},$$

where T_{kij} is the total count of meals served for sponsor *i*, site *j* in sponsor type *k*, n_k is the number of sampled sites in sponsor type *k*, and $W_1(ij)$ is the nonresponse-adjusted weight.

The final quantity-adjusted meal weight $FSTMLW(ij)$ is then calculated as the product of the nonresponse-adjusted site weight $W_1(ij)$ and the total meal poststratification adjustment factor as follows:

$$FSTMLW(ij) = W_1(ij) \times ADJ_{tl\_ml}(i).$$

This weight is then multiplied by the estimated number of meals served at that site, and the product is used to weight the site-level data by total meals served.

3. Meal Weighting

The purpose of this section is to document how meal-level analysis weights were created. There were two levels of meal sampling. First, specific mealtimes (such as breakfast, lunch, or supper) were selected for visit at the site. Second, individual plates and "plate wastes" were independently randomly selected at the site for observation. To begin weighting the data for meals, the dataset of sites was expanded into a dataset containing one record per mealtime visit.

a. Mealtime Visit Weight

The first step in meal weighting was to calculate the mealtime visit weight. This weight was calculated differently for lunch meals than for breakfast and supper meals because lunch meals were selected with certainty.

For lunch meals, the mealtime visit weight $W_{meal}(v)$ for the *v*th sampled mealtime visit is equal to the final site weight (not quantity adjusted):

$$W_{meal}(v) = FSTW(ij).$$

For breakfast meals *or* supper meals, the mealtime visit weight $W_{meal}(v)$ for the vth sampled mealtime visit was calculated as the product of the site weight and the inverse of the probability of selection of the meal, or:

$$W_{meal}(v) = FSTW(ij) \times \frac{I_B(i) + I_D(i)}{1},$$

where $FSTW(ij)$ is the final site weight, $I_B(i)$ equals 1 if the site served breakfast and 0 otherwise, and $I_D(i)$ equals 1 if the site served supper and 0 otherwise.

b. Mealtime Visit-Adjusted Weight

The next step was to adjust for nonresponse to the mealtime. Interviewers missed five mealtimes due to inability to locate the site or the meal. Six mealtimes were considered ineligible because the sponsor had planned to serve the meal, but the site did not serve the meal at the time of the visit.

The nonresponse adjustment adjusted the mealtime visit weights $W_{meal}(v)$ to account for data loss from mealtimes that were not visited. The adjustment was calculated within class c defined by the type of meal—breakfast, lunch, or supper. The mealtime nonresponse adjustment was then defined as follows:

- For ***visited mealtimes,*** the mealtime nonresponse adjustment $ADJ_{meal}(cv)$ for record v in class c is defined as:

$$ADJ_{meal}(cv) = \frac{\sum_{i=1}^{n_c} \delta_{eligmeal} W_{meal}(cv)}{\sum_{i=1}^{n_c} \delta_{respmeal}(cv) W_{meal}(cv)},$$

  where $W_{meal}(cv)$ is the mealtime visit weight for record v in class c, $\delta_{eligmeal}(cv)$ is equal to 1 for eligible mealtimes and 0 otherwise, and $\delta_{respmeal}(cv)$ is equal to 1 for "responding" mealtimes and 0 otherwise.

- For records ***where the mealtime was not visited,*** the mealtime nonresponse adjustment $ADJ_{meal}(cv)$ is equal to 0.

- For ***ineligible meals,*** the mealtime nonresponse adjustment factor $ADJ_{mealt}(cv)$ is equal to 1.

The mealtime-visit-adjusted weight $W_{mealtime}(v)$ was then calculated as the product of the mealtime visit weight and the mealtime nonresponse adjustment factor as follows:

$$W_{mealtime}(v) = W_{meal}(v) \times ADJ_{meal}(cv).$$

4. Plate Weighting

a. Initial Plate Weight

The mealtime-visit-adjusted weight calculated above was used to calculate the plate observation weights. If sites served a standard meal, interviewers were instructed to randomly observe five meals. Otherwise, approximately 10 meals were observed at each site. To begin weighting plates, the dataset of meal times was expanded into a dataset containing one record per plate observed.

For all plate observations within a site and mealtime, the plate observation weight was calculated as the inverse of the probability of selection of a particular plate during that visit at that site at that mealtime, or:

$$PLTW_{obs}(vjk) = \frac{N(vj)}{n_{obs}(vj)} \times dayserv \times wkserv,$$

where $N(vj)$ is the total number of plates (children) served at that meal visit at that site, *dayserv* is the number of days per week this meal was served, *wkserv* is the number of weeks that meals were served at the site, and $n_{obs}(vj)$ is the total number of plates sampled for observation at that meal visit at that site.

The initial plate-observed weight $IPLTW_{obs}(vjk)$ for all k plate records sampled at the jth sampled site and vth mealtime visit was calculated as the product of the mealtime visit weight and the initial plate observation weight, or:

$$IPLTW_{obs}(vjk) = W_{mealtime}(v) \times PLTW_{obs}(vjk),$$

where $W_{mealtime}(v)$ is the mealtime-visit-adjusted weight and $PLTW_{obs}(vjk)$ is the plate observation weight.

b. Final Plate Weight

The final plate observation weight reflects the total number of meals served by sponsors approved for the 2001 SFSP in each state. These numbers are the same ones used in the poststratification of sponsors and sites to total meals served. The poststratification cells consist breakfast, lunch, and supper meals, by sponsor type.

If T_k is the poststratification total for meals served by poststratification cell *k*, then the total meal poststratification adjustment $ADJ_{\text{tl\_meal}}$ *(k)* for records in that cell is:

$$ADJ_{tl\_meal}(k) = \frac{T_k}{\sum_{i=1}^{n_k} IPLTW_{obs}(vkj)},$$

where n_k is the number of sampled plates in poststratification cell *k*, and $IPLTW_{obs}(vjk)$ is the initial plate observation weight.

The final plate-observed weight $FW_{obs}(vjk)$ was then calculated as the product of the initial plate-observed weight $IPLTW_{obs}(vkj)$ and the total meal poststratification adjustment factor as follows:

$$FW_{obs}(vjk) = IPLTW_{obs}(vjk) \times ADJ_{tl\_meal}(k).$$

This weight is used to analyze plate observations at each site.

5. Plate Waste Weighting

a. Initial Plate Waste Weight

The mealtime-visit-adjusted weight was also used to calculate the plate waste weights. Interviewers were instructed to randomly observe a total of 10 plates as they were discarded, and to examine the types and amounts of food uneaten (plate waste). The dataset of meal times was expanded into a dataset containing one record per plate waste observed. At one site, the interviewer missed the plate waste observation for lunch, so a nonresponse adjustment was used to adjust the weights of the other lunchtime plate waste observations for this missing data.

For all plate waste records within a site and mealtime, the plate waste observation weight was calculated as the inverse of the probability of selection of a particular plate for waste observation during that visit at that site at that mealtime, or:

$$PLTW_{waste}(vjk) = \frac{N(vj)}{n_w(vj)} \times dayserv \times wkserv,$$

where $N(vj)$ is the total number of plates (children) served at that meal visit at that site, *dayserv* is the number of days per week this meal was served, *wkserv* is the number of weeks that meals were served at the site, and $n_w(vj)$ is the total number of plates sampled for waste observation at that meal visit at that site.

The initial plate waste weight $IPLTW_{waste}(vjk)$ for all k plate waste records sampled at the jth sampled site and the vth mealtime visit was calculated as the product of the meal visit weight and the plate waste weight, or:

$$IPLTW_{waste}(vjk) = W_{mealtime}(v) \times PLTW_{waste}(vkj),$$

where $W_{mealtime}(v)$ is the mealtime-visit-adjusted weight and $PLTW_{waste}(vkj)$ is the plate waste observation weight.

b. Final Plate Waste Weight

The final plate waste observation weight reflects the total number of meals served by sponsors approved for the 2001 SFSP in each state. These numbers are the same ones used in the poststratification of sponsors and sites to total meals served. The poststratification cells consist of breakfast, lunch, and supper meals, by sponsor type.

If T_k is the total for poststratification cell k, then the total meal waste poststratification adjustment, $ADJ_{wst}(k)$ for records in that cell is:

$$ADJ_{wst}(k) = \frac{T_k}{\sum_{i=1}^{n_k} IPLTW_{waste}(vjk)},$$

where n_k is the number of sampled plates observed for waste in poststratification cell k, and $IPLTW_{waste}(vkj)$ is the initial plate waste weight.

The final plate waste observation weight $FW_{waste}(vkj)$ was then calculated as the product of the initial plate waste weight $IPLTW_{waste}(vjk)$ and the total meal waste poststratification adjustment factor as follows:

$$FW_{waste}(vjk) = IPLTW(vkj) \times ADJ_{wst}(k).$$

This weight is used to analyze plate waste observations at each site.

6. Former Sponsor Weighting

a. Former Sponsor Base Weight

The first step in weighting the former sponsor sample was to calculate the former sponsor sampling weight. Since the sample frame was small (367 sponsors), some former sponsors who had served a large number of meals in 2000 had a probability greater than one of being selected

in the sample. These 27 former sponsors were labeled "certainty sponsors," automatically selected for the sample, and assigned a former sponsor base weight $BW_{spon}(i)$ equal to one. For the remaining 133 noncertainty former sponsors, the former sponsor base weight $BW_{spon}(i)$ for the *i*th sampled sponsor was calculated as the inverse of the probability of selection or:

$$BW_{spon}(i) = \frac{S(+)}{n_{ncert} S(i)} ,$$

where:

- $S(+)$ is the sum of the square root of total meals for all eligible *noncertainty* sponsors on the sampling frame
- $S(i)$ is the square root of total meals for noncertainty sponsor *i*
- n_{ncert} is the total number of noncertainty sponsors selected, or 133

b. Former Sponsor Nonresponse-Adjusted Weight

The next step in former sponsor weighting was to adjust for nonresponse to the survey. Complete response for a sponsor means that MPR (1) determined whether the sponsor was eligible for interview (that is, whether they were, in fact, in operation in 2000 and not 2001); and (2) obtained interview data from the eligible sponsor. The nonresponse adjustments were conducted within two classes defined by whether the sponsor had one site or more than one site.

The first nonresponse adjustment adjusted the base weight to account for data loss from former sponsors when MPR could not determine whether the sponsor was eligible. (For the weighting of current sponsors, this step was not necessary since MPR determined eligibility for all sponsors.) This nonresponse adjustment was defined as follows:

- For ***records where the sponsor's eligibility was determined,*** the screener completion nonresponse adjustment $ADJ_{screent}(ci)$ for record *i* in class *c* is defined as:

$$ADJ_{screen}(ci) = \frac{\sum_{i=1}^{n_c} BW_{spon}(ci)}{\sum_{i=1}^{n_c} \delta_{screenresp}(ci) BW_{spon}(ci)} ,$$

  where $BW_{spon}(ci)$ is the former sponsor base weight for record *i* in class *c*, $\delta_{screenresp}(ci)$ is equal to 1 for sponsors who responded to the questionnaire and 0 otherwise.

- For records ***where the sponsor's eligibility was not determined,*** the screener completion nonresponse adjustment $ADJ_{screen}(ci)$ is equal to 0.

The screener-adjusted weight NR_{screen} (i) was then calculated as the product of the base weight and the screener completion nonresponse adjustment factor as follows:

$$NR_{screen}(i) = BW_{spon}(i) \times ADJ_{screen}(ci).$$

The second nonresponse adjustment adjusted the weight to account for data loss from eligible former sponsors who did not complete an interview. This nonresponse adjustment was defined as follows:

- For ***records where the sponsor completed a questionnaire,*** the questionnaire completion nonresponse adjustment $ADJ_{quest}(ci)$ for record i in class c is defined as:

$$ADJ_{quest}(ci) = \frac{\sum_{i=1}^{n_c} \delta_{eligspon}(ci) NR_{screen}(ci)}{\sum_{i=1}^{n_c} \delta_{questresp}(ci) NR_{screen}(ci)},$$

  where $NR_{screen}(ci)$ is the screener-adjusted weight for record i in class c, $\delta_{eligspon}(ci)$ is equal to 1 for eligible sponsors and 0 otherwise, and $\delta_{questresp}(ci)$ is equal to 1 for sponsors who responded to the questionnaire and 0 otherwise.

- For records ***where the sponsor did not complete the questionnaire,*** the questionnaire completion nonresponse adjustment $ADJ_{quest}(ci)$ is equal to 0.

- For ***ineligible sponsors,*** the questionnaire completion nonresponse adjustment factor $ADJ_{quest}(ci)$ is equal to 1.

The nonresponse-adjusted weight W_1 (i) was then calculated as the product of the screener-adjusted weight and the questionnaire completion nonresponse adjustment factor as follows:

$$W_1(i) = NR_{screen}(i) \times ADJ_{quest}(ci).$$

c. Final Former Sponsor Weights

A poststratification adjustment was done to ensure that the survey-weighted count of former sponsors equals the estimated population count of former sponsors. The former sponsor adjusted final weight reflects the total number of former sponsors that participated in the SFSP in 2000 but not in 2001, based on the lists provided by states, adjusted for ineligible sponsors, based on

the proportion of sponsors identified as ineligible in the survey.[4] The poststratification cells are defined by the former sponsor's region.

If C_k was the poststratification total number of former sponsors for region k, then the poststratification adjustment $ADJ_{sp}(i)$ for former sponsors in that region is:

$$ADJ_{sp}(i) = \frac{C_k}{\sum_{i=1}^{n_k} W_1(i)},$$

where n_k is the number of sampled sponsors in region k, and $W_1(i)$ is the nonresponse-adjusted former sponsor weight.

The final former sponsor weight $FFSPW(i)$ was then calculated as the product of the nonresponse weight $W_1(i)$ and the former sponsor poststratification adjustment factor as follows:

$$FFSPW(i) = W_1(i) \times ADJ_{sp}(i).$$

This weight is used to analyze the former sponsor data.

[4]Although there were 367 former sponsors in the original sample frame, we estimate there were 330 eligible former sponsors nationally, using the eligibility rate from the survey.