APPENDIX B
ESTIMATED DESIGN EFFECTS

As discussed in chapter 1, a clustered sample was used in the sampling work for the survey. The limited number of providers in some Primary Sampling Units, along with other factors, resulted in somewhat unequal sampling probabilities in drawing the samples. As a result, the standard rules for calculating variances for simple random samples cannot appropriately be used to directly estimate variances in the current context.

A standard approach to computing variances in this situation is to compute "design effects," which are essentially multipliers that can be used to adjust the "naive" variances obtained by treating the data as a simple random sample. We have computed these design effects for a set of representative variables by estimating the "true" variances for each variable using a Taylor Series approximation method and then dividing the resulting variances by estimated "naive" variances. This has been done for both the kitchen and pantry samples. The approach was also implemented for the samples taken as a whole and for subsets of the samples defined by metropolitan status and size of provider.

This appendix provides a set of tables with estimates of the design effects. As an illustration of how the tables can be interpreted, see table B.1, which presents overall design effects for the kitchen sample. For example, the entry under "Estimated Design Effect" for the estimator of the percent of kitchens that are operated by faith-based organizations (top row) is 2.63. This implies that the variance associated with the percentage estimate of that variable is 2.63 times greater than that which would be associated with an estimate derived from a simple random sample. Since standard errors and confidence intervals are based on the *square root* of variances, this implies that the width of a confidence interval around the percentage estimate is about 1.62 times what it would be with a simple random sample (1.62 is the square root of 2.63).

For the most part, the design effects in table B.1 are in the range of 1.7 to 3.4, implying multipliers on confidence intervals in the range of 1.30 to 1.84. Design effects tend to be somewhat greater for the nonmetropolitan subsample and somewhat lower for the metropolitan subsample (tables B.2 and B.3). They also tend to be relatively low for the subsamples defined by size of kitchens (tables B.4 through B.6).

Because there are many more pantries than kitchens, it was possible to select the pantries with fewer disparities in sampling probabilities. As a result, the design effects for the pantry sample (tables B.7 through B.12) are much smaller.

Table B.1
Design effects for kitchens - overall

Variable	Percent / Mean	Denominator Sample Size	Estimated Standard Error of Mean	Estimated Design Effect	Coefficient of Variation
Percent that are faith-based	65	1518	1.98	2.63	0.03
Percent that are in metro areas	85	1447	1.73	3.42	0.02
Percent open on weekends	52	1485	2.34	3.26	0.05
Number of people getting lunch on typical day when lunch is served	104	1050	5.23	1.72	0.05
Percent with policies on who can get served	15	1484	1.34	2.06	0.09
Percent turning people away in past 12 months	26	1480	1.71	2.26	0.07
Percent with paid employees	58	1239	2.13	2.26	0.04
Total number of FTE workers	4	1498	0.18	1.68	0.05
Percent with an increase in meals in past 3 years	53	1417	1.83	1.89	0.03
Percent that could handle an increase in need	91	1489	0.85	1.32	0.01

Table B.2
Design effects for kitchens - nonmetro only

Variable	Percent / Mean	Denominator Sample Size	Estimated Standard Error of Mean	Estimated Design Effect	Coefficient of Variation
Percent that are faith-based	53	79	6.57	3.74	0.12
Percent that are in metro areas	0	79	0 .	.	
Percent open on weekends	55	78	6.57	3.68	0.12
Number of people getting lunch on typical day when lunch is served	55	53	8.64	3.55	0.16
Percent with policies on who can get served	15	77	5.26	4.6	0.35
Percent turning people away in past 12 months	21	77	6.11	4.65	0.28
Percent with paid employees	57	63	7.01	3.42	0.12
Total number of FTE workers	3	78	0.36	2.66	0.12
Percent with an increase in meals in past 3 years	57	68	5.57	2.33	0.10
Percent that could handle an increase in need	95	77	2.14	2.13	0.02

Table B.3
Design effects for kitchens - metro only

Variable	Percent / Mean	Denominator Sample Size	Estimated Standard Error of Mean	Estimated Design Effect	Coefficient of Variation
Percent that are faith-based	68	1368	1.94	2.16	0.03
Percent that are in metro areas	100	1368	0 .		0.00
Percent open on weekends	51	1336	2.61	3.28	0.05
Number of people getting lunch on typical day when lunch is served	113	956	5.72	1.47	0.05
Percent with policies on who can get served	16	1336	1.38	1.75	0.09
Percent turning people away in past 12 months	26	1332	1.71	1.82	0.07
Percent with paid employees	58	1114	2.23	2	0.04
Total number of FTE workers	4	1349	0.21	1.68	0.06
Percent with an increase in meals in past 3 years	52	1279	1.96	1.79	0.04
Percent that could handle an increase in need	91	1342	0.87	1.09	0.01

Table B.4
Design effects for kitchens - small kitchens only

Variable	Percent / Mean	Denominator Sample Size	Estimated Standard Error of Mean	Estimated Design Effect	Coefficient of Variation
Percent that are faith-based	59	472	3.34	2.61	0.06
Percent that are in metro areas	74	448	3.56	3.54	0.05
Percent open on weekends	54	463	3.31	2.46	0.06
Number of people getting lunch on typical day when lunch is served	31	315	1.34	2.61	0.04
Percent with policies on who can get served	19	461	2.75	2.72	0.15
Percent turning people away in past 12 months	22	458	2.58	2.17	0.12
Percent with paid employees	55	378	3.46	2.16	0.06
Total number of FTE workers	3	465	0.18	1.74	0.07
Percent with an increase in meals in past 3 years	49	426	2.83	1.63	0.06
Percent that could handle an increase in need	91	463	1.57	1.62	0.02

Table B.5
Design effects for kitchens - medium-sized kitchens only

Variable	Percent / Mean	Denominator Sample Size	Estimated Standard Error of Mean	Estimated Design Effect	Coefficient of Variation
Percent that are faith-based	71	495	2.49	1.44	0.04
Percent that are in metro areas	90	472	2.43	3.13	0.03
Percent open on weekends	44	487	2.92	1.61	0.07
Number of people getting lunch on typical day when lunch is served	76	334	1.32	1.08	0.02
Percent with policies on who can get served	14	487	1.54	0.94	0.11
Percent turning people away in past 12 months	27	488	2.35	1.29	0.09
Percent with paid employees	54	402	3.18	1.54	0.06
Total number of FTE workers	3	490	0.27	1.49	0.09
Percent with an increase in meals in past 3 years	49	466	3.13	1.74	0.06
Percent that could handle an increase in need	90	487	1.8	1.74	0.02

Table B.6
Design effects for kitchens - large kitchens only

Variable	Percent / Mean	Denominator Sample Size	Estimated Standard Error of Mean	Estimated Design Effect	Coefficient of Variation
Percent that are faith-based	67	540	2.96	1.85	0.04
Percent that are in metro areas	93	516	2.11	3.11	0.02
Percent open on weekends	57	524	3.94	2.87	0.07
Number of people getting lunch on typical day when lunch is served	214	399	12.19	1.64	0.06
Percent with policies on who can get served	13	525	1.55	0.99	0.12
Percent turning people away in past 12 months	30	523	3.18	2.17	0.11
Percent with paid employees	68	450	3.04	1.59	0.05
Total number of FTE workers	5	534	0.42	1.62	0.08
Percent with an increase in meals in past 3 years	61	519	2.9	1.58	0.05
Percent that could handle an increase in need	92	530	1.32	1.1	0.01

Table B.7
Design effects for pantries - overall

Variable	Percent / Mean	Denominator Sample Size	Estimated Standard Error of Mean	Estimated Design Effect	Coefficient of Variation
Percent that are faith-based	67	1617	1.17	1.00	0.02
Percent that are in metro areas	69	1547	2.11	3.22	0.03
Number of days open per month	12	1555	0.26	1.37	0.02
Monthly Pounds Distributed	5782	1329	438.95	1.09	0.08
Percent with policies on who can get served	43	1614	1.40	1.28	0.03
Percent turning people away in past 12 months	34	1597	1.21	1.05	0.04
Percent with paid employees	32	1238	1.45	1.18	0.05
Total number of FTE workers	1.6	1559	0.11	1.04	0.07
Percent with an increase in households served in past 3 years	57	1469	1.40	1.18	0.02
Percent that could handle an increase in need	89	1586	0.82	1.10	0.01

Table B.8
Design effects for pantries - nonmetro only

Variable	Percent / Mean	Denominator Sample Size	Estimated Standard Error of Mean	Estimated Design Effect	Coefficient of Variation
Percent that are faith-based	63	469	2.26	1.05	0.04
Percent that are in metro areas	0	469	0.00	.	.
Number of days open per month	11	442	0.41	1.01	0.04
Monthly Pounds Distributed	3328	383	360.17	1.30	0.11
Percent with policies on who can get served	45	468	3.10	1.85	0.07
Percent turning people away in past 12 months	33	461	2.39	1.21	0.07
Percent with paid employees	28	347	2.57	1.14	0.09
Total number of FTE workers	1.2	449	0.17	1.24	0.14
Percent with an increase in households served in past 3 years	51	421	2.86	1.40	0.06
Percent that could handle an increase in need	88	457	1.50	0.98	0.02

Table B.9
Design effects for pantries - metro only

Variable	Percent / Mean	Denominator Sample Size	Estimated Standard Error of Mean	Estimated Design Effect	Coefficient of Variation
Percent that are faith-based	69	1078	1.43	1.01	0.02
Percent that are in metro areas	100	1078	0.00	.	0.00
Number of days open per month	12	1049	0.34	1.50	0.03
Monthly Pounds Distributed	6954	887	638.85	1.08	0.09
Percent with policies on who can get served	42	1076	1.60	1.11	0.04
Percent turning people away in past 12 months	35	1069	1.41	0.93	0.04
Percent with paid employees	34	834	1.76	1.14	0.05
Total number of FTE workers	1.8	1042	0.14	0.99	0.08
Percent with an increase in households served in past 3 years	59	982	1.56	0.98	0.03
Percent that could handle an increase in need	89	1062	1.03	1.14	0.01

Table B.10
Design effects for pantries - small pantries only

Variable	Percent / Mean	Denominator Sample Size	Estimated Standard Error of Mean	Estimated Design Effect	Coefficient of Variation
Percent that are faith-based	70	597	1.99	1.17	0.03
Percent that are in metro areas	60	577	3.12	2.41	0.05
Number of days open per month	11	559	0.41	1.24	0.04
Monthly Pounds Distributed	419	471	22.06	1.10	0.05
Percent with policies on who can get served	32	596	2.08	1.21	0.06
Percent turning people away in past 12 months	29	588	1.94	1.10	0.07
Percent with paid employees	23	462	2.04	1.10	0.09
Total number of FTE workers	0.9	565	0.13	1.00	0.15
Percent with an increase in households served in past 3 years	41	546	2.16	1.09	0.05
Percent that could handle an increase in need	87	589	1.49	1.16	0.02

Table B.11
Design effects for pantries - medium-sized pantries only

Variable	Percent / Mean	Denominator Sample Size	Estimated Standard Error of Mean	Estimated Design Effect	Coefficient of Variation
Percent that are faith-based	68	576	2.05	1.10	0.03
Percent that are in metro areas	72	539	2.49	1.63	0.03
Number of days open per month	12	567	0.38	1.11	0.03
Monthly Pounds Distributed	2425	497	82.88	1.16	0.03
Percent with policies on who can get served	47	575	2.27	1.18	0.05
Percent turning people away in past 12 months	34	570	1.99	0.99	0.06
Percent with paid employees	32	442	2.43	1.16	0.08
Total number of FTE workers	1.3	563	0.13	1.10	0.10
Percent with an increase in households served in past 3 years	63	525	2.39	1.26	0.04
Percent that could handle an increase in need	92	563	1.19	1.02	0.01

Table B.12
Design effects for pantries - large pantries only

Variable	Percent / Mean	Denominator Sample Size	Estimated Standard Error of Mean	Estimated Design Effect	Coefficient of Variation
Percent that are faith-based	61	410	2.53	1.07	0.04
Percent that are in metro areas	79	398	2.55	1.51	0.03
Number of days open per month	13	403	0.54	1.54	0.04
Monthly Pounds Distributed	17809	361	1499.77	1.17	0.08
Percent with policies on who can get served	52	410	2.50	1.00	0.05
Percent turning people away in past 12 months	40	406	2.48	1.02	0.06
Percent with paid employees	47	312	3.02	1.12	0.06
Total number of FTE workers	3.3	406	0.33	1.09	0.10
Percent with an increase in households served in past 3 years	75	373	2.35	1.06	0.03
Percent that could handle an increase in need	89	404	1.66	1.14	0.02