

Appendix B

APPENDIX B. SAMPLING ERROR

The usual measure of sampling error is called the standard error. Table B-1 lists the theoretical standard errors, that is, the standard errors for simple random samples of various sizes encountered in the NRS. A percentage estimated from such a sample is expected to be within one standard error of the true population value two times out of three. It is expected to be within 1.96 standard errors of the true value 19 times out of 20. This is referred to as a 95-percent confidence interval. It clearly depicts the degree of precision of the estimated percentage.

The NRS sample was not a simple random sample but a multistage cluster sample. The sampling method is described in detail in the Methodological Report. This type of sample is generally less precise than a simple random sample of the same size, so the theoretical standard error is multiplied by a factor known as the design effect in order to estimate the standard error actually achieved in the survey. Design effects for 10 of the estimated percentages in the NRS were derived by a method called half sample analysis and are described in the Methodological Report.

Two 95-percent confidence intervals are computed here as examples. They represent the worst case (largest standard error—i.e., pool swimming) and the best case (smallest standard error—i.e., playing tennis) of the

trial standard errors based on the entire sample of 5,757 respondents.

Percentage who said they went swimming in an outdoor pool 43%
 Theoretical standard error (from table B-1) 0.65%
 Multiplied by observed design effect $\times 1.10$
 Observed standard error 0.72%
 95-percent confidence interval =
 $43\% \pm (1.96 \times 0.72)$ or $43\% \pm 1.4\%$

Percentage who said they played tennis 17%
 Theoretical standard error 0.47%
 Multiplied by observed design effect $\times 1.01$
 Observed standard error 0.47%
 95-percent confidence interval =
 $17\% \pm (1.96 \times 0.47)$ or $17\% \pm 0.9\%$

Design effects based on smaller subsamples ranged from 0.79 to 1.19 and averaged 1.03 over all the instances tested. The Methodological Report contains instructions on how to derive design effects for other estimates—averages and totals as well as percentages—by using the 16 half sample codes recorded for each respondent on the NRS data tape.

Table B-1. Theoretical Standard Errors for Various Size Samples and Estimated Population Proportions

Sample size	Estimated population proportion						
	50 percent	40 percent	30 percent	20 percent	10 percent	5 percent	2.5 percent
5,757	0.0066	0.0065	0.0060	0.0053	0.0040	0.0029	0.0021
4,317	0.0077	0.0075	0.0070	0.0061	0.0046	0.0033	0.0024
2,878	0.0094	0.0092	0.0086	0.0075	0.0056	0.0041	0.0029
2,158	0.0109	0.0106	0.0100	0.0087	0.0065	0.0047	0.0034
1,439	0.0132	0.0130	0.0122	0.0106	0.0080	0.0058	0.0042
720	0.0188	0.0184	0.0172	0.0150	0.0113	0.0082	0.0059
360	0.0267	0.0260	0.0245	0.0214	0.0160	0.0116	0.0082
100	0.0500	0.0490	0.0458	0.0400	0.0300	0.0216	0.0156