

Appendix B:
Survey and Sampling Methodology

SURVEY AND SAMPLING METHODOLOGY

The 2004 Spotsylvania County Citizen Satisfaction Survey was conducted by the Center for Survey Research (CSR) using a Computer-Aided Telephone Interviewing (CATI) system, employing random-digit dialing to select the sample. A discussion of the general methodology appears in Chapter I of this report. This appendix provides additional details on how the questionnaire was developed, how the sample was selected, how the survey was administered, how the sample was weighted, and how statistical testing was used to evaluate the results.

Sample

CSR employed random-digit dialing (RDD) to reach a random sample of the households in Spotsylvania County for citizen satisfaction. RDD produces a more representative sample of the population than do most other sampling methods because households are selected for contact at random and all households with a working telephone can be reached. Listed and unlisted residential telephones have equal probability of being included in an RDD study. A sample of telephone numbers randomly generated from five-digit call groups known to be in operation in Spotsylvania County was purchased from Survey Sampling, Inc. of Fairfield, CT, a commercial sampling company that uses state-of-the-art methodologies. Some of the working phone numbers in a sample so generated are for households in the City of Fredericksburg or in other counties. Each contacted household was screened for location at the beginning of the interview.

Questionnaire

The questionnaire was developed in conjunction with key members of the Spotsylvania County staff. CSR also took special care to include comments and the opinions of Spotsylvania County Board of Supervisors and the county executive staff in the survey development process.

Prior to production calling, the questionnaire was pretested. Pretesting lasted from November 11th to November 14th and resulted in 30 completed interviews with households in Spotsylvania County using the RDD sample. The pre-test revealed that the survey took approximately 23.82 minutes to complete, considerably longer than had been planned. In conjunction with the county executive staff, certain questions were eliminated. In other cases, question rationing was employed.

Question rationing is a system for asking certain questions of only 400 to 500 respondents in order to ask a larger number of questions and obtain a sufficiently large sample of responses to each question without making the survey substantially longer for any individual respondent. Based on the pre-test, we refined our training procedures and made minor corrections in the CATI program for the interview.

Interviewing Procedures

CSR conducted the telephone interviews from its Computer-Assisted Telephone Interviewing (CATI) Laboratory at the University of Virginia. CATI is a system in which computers are

employed to increase the efficiency, accuracy, and flexibility of telephone surveys conducted by trained interviewers. Questions appear on the computer screen in programmed sequence as the interviewer presses the keys on the keyboard to record the respondent's answers. Accurate, instantaneous data entry is assured by the system. The computer system stores the data base of telephone numbers and is used to control the sampling process, dial each sampled number, schedule call-backs, and record the disposition of each attempted call. CSR's CATI lab also allows for audio monitoring of calls by lab supervisors.

Production calling for the survey was carried out from December 1st, 2004 through January 7th, 2005. All telephone calls for the study were made from the CATI laboratory under the direct supervision of CSR staff. Numbers were dialed automatically by the WinCATI computer system. Calling was done on Sunday through Friday evenings and on Sunday afternoons. The interviewers received at least six hours of training prior to production interviewing. Many had prior interviewing experience on similar studies. Each phone number was given a maximum of 10 call attempts before it was treated as a "no answer" or "busy" number. Residential phones answered by automatic answering machines were treated the same as "no answer" calls (although counted separately); CSR interviewers did not leave messages on the answering machines of potential respondents but simply returned the phone number to the sample pool for another calling attempt at a later time. Answering machine announcements that identified the phone number as a place of business, however, were recorded as such and not re-attempted.

In order to reduce non-response bias, we conducted "conversion calling." Non-response bias results in surveys results when qualified respondents do not complete a survey, usually because they refuse to cooperate. In conversion calling, our most highly trained interviewers call back households in which we previously had someone refuse to take the survey. First, we kept track of the "tone" of initial refusals. "Hard" refusals, those in which people explicitly asked not to be called again or were noticeably agitated or upset about our phone call, were not called back at all. "Soft" refusals, those for which it seemed that we only caught someone at a bad time, were called back and contacted once more after an interval of at least three days.

A total of 5727 phone numbers were engaged via a total of 14,205 dialing attempts in the course of the survey. The final disposition of each of the attempted phone numbers is shown in Appendix Table B-1, the Sample Disposition Report. The disposition report is presented in a format that has been recommended as an industry standard by the American Association for Public Opinion Research.¹ The AAPOR rate was calculated with the assistance of the Sawtooth WinCATI 4.2 CATI software, based on the full call history of each attempted number. This tool increases the accuracy of the calculation. CSR completed a total of 843 usable interviews with self-identified County residents in the production phase of calling, including a total of 813 fully completed interviews with residents of Spotsylvania County. (Included in the analyses are the data of 30 people who completed a substantial part of the survey, but did not complete it in its entirety.) The overall response rate (based on usable interviews) was 25 percent².

¹ The American Association for Public Opinion Research. 2004. *Standard Definitions: Final Dispositions of Case Codes and Outcome Surveys*. Ann Arbor, Michigan: AAPOR. See also the AAPOR website, www.aapor.org.

² Calculated according to AAPOR suggested formula RR4. with $e1=.187$ and $e2=.935$. We estimated the percent of working, residential numbers among those that were found to always be busy or no-answer (the residency rate) to be .20. This estimate is based on the results of prior CSR experiments that compare RDD sample results with

The final version of the interview took an average of 21.51 minutes to complete, with a median completion time of 18.83 minutes. The overall interview production rate was 1.35 interviews per hour.

Geographic Representation and Sample Weighting

When RDD sampling is employed, the surveying organization does not have any exact prior information on the location of the household. To protect respondent confidentiality and preserve a sense of privacy in the interview, CSR does not usually ask respondents to supply their address. Instead, we asked respondents to identify their voting district. Respondents who did not know the name of their voting district (almost 40% of the cases) were asked to report the location of where they go to vote. Respondents who did not know the name of where they go to vote (again, approximately 40% of those who were asked) were asked to supply the neighborhood, subdivision, apartment complex, or community area of the County in which they reside. CSR interviewers looked up the responses on a list of almost 800 area names in the County, developed by CSR from information supplied by the staff of Spotsylvania County and from commercial maps. Respondents who could not supply an area name or who gave a name not on our list (10.8% of those asked) were asked to give the names of the nearest major intersection.

This information allowed us (with the assistance of staff at Spotsylvania County) to code almost all respondents into one of the seven voting districts that we used in our analysis. Whereas this procedure has a satisfactory degree of accuracy for our purposes of comparison, the procedure includes some inevitable inaccuracies due to errors on the part of respondents or occasional inexact matches between the area names used in the community and the formal map boundaries that were used for coding purposes. About 4 percent could not give sufficient information to allow their information to allow their voting district to be coded. They are excluded from any analysis involving comparison of voting districts.

As expected when using telephone survey method, the sample composition did not exactly match the composition of the entire population of households. This is because of random sampling error, differences in rates of refusal between different groups, and differences among households in the amount of time that someone is home to answer the phone. The net result is a sample that somewhat overrepresented women and homeowners and underrepresented men and renters. Caucasians were also very slightly overrepresented, whereas African Americans and Asians were very slightly underrepresented. To correct these imbalances, CSR weighted the sample data by gender, homeownership and race. To correct these imbalances, CSR weighted the sample data. Statistical weighting is larger for those respondents who are in underrepresented groups, and smaller for those who are in overrepresented groups, so that the aggregate result is what we would have obtained from a fully uniform, random sample of the whole population.

directory-listed sample results for Virginia. We estimated $e2$ by dividing households determined to be eligible by the N of households overall (including those not in Spotsylvania County). The estimated $e2$ was applied to housing units where eligibility could not be determined. We derived $e1$ by taking the product of $e2$ and the estimated residency rate. This rate was applied to numbers which were never reached and could not be determined to be residential households. Partial interviews are counted in the numerator of the RR4 formula, which is reported here because partial interviews are included in the data used for this report.

In order to calculate the correct weights, CSR drew upon information from the 2000 US Census in order to get the correct proportions of the adult population. Because the 2000 US Census provides information on homeownership by race, we combined the two demographic variables to create one weight based on homeownership and race together. The proportion of male/females from the population was then a basis for our weight based on gender and the proportion of homeowners/renters, crossed by race, served to determine our weight based on homeownership and race.

Often, when weighting by more than one proportions (in this case gender and homeownership/race), a procedure known as raking is employed to gain parity between the different proportions. Raking is an iterative process which helps the final weight successfully account for all proportions. (There can only be one weight applied at any given time in the dataset). CSR raked the weight through four iterations and then calculated the final weight based on the most recent weights for gender and homeownership/race.

Sampling Error and Statistical Testing

Based on a sample of 813 Spotsylvania respondents, the survey has a sampling error of plus or minus 3.4 percent. This means that in 95 out of 100 samples of this size drawn from Spotsylvania County, the results obtained in the sample would fall in a range of ± 3.4 percentage points of what would have been obtained had every household in the County with a working telephone been interviewed. Larger sampling errors are present when analyzing subgroups of the sample or questions that were not asked of all respondents; smaller sampling errors are present when a lopsided majority gives the same answer (e.g., 80 percent of the sample are satisfied with a given service).

Statistical significance tests were used to verify the existence of satisfaction differences among various subgroups. We used independent-sample t-tests for differences in means and the Pearson Chi-Square test of independence for differences in proportions. In chi-square tests of satisfaction items, the four response categories were collapsed into two, "satisfied" and "dissatisfied". We report in these pages differences that yield a "p-value" of .05 or less. A level of .05 indicates that there is only a 5 percent chance that the difference we find is due to sampling error, rather than reflecting a real relationship within the study population. The statistics for evaluating statistical significance do not measure error from sources other than random sampling error. Such error can occur in any poll or survey.

Final Disposition

Code	Disposition	Total	Group	Group Total
1100	Complete	813	Complete Interview	813
1200	Partial	30	Partial Interview	30
2110	Eligible: Refusal	35		
2120	Eligible: Break-off	11	Refusal and break-off	46
2210	Eligible: Resp Never Available	85		
2221	Eligible: Ans Mach, No Message	1602		
2222	Eligible: Ans Machine, Message	1	Non-contact	1688
2310	Eligible: Dead	0		
2320	Eligible: Phys/Mentally Unable	26		
2330	Eligible: Language Unable	22		
2340	Eligible: Misc Unable	9	Other	57
3120	Busy	167		
3130	No Answer	556		
3140	Ans Mach (Don't Know if HU)	170		
3150	Technical Phone Problems	40	Unknown if household	933
3210	HU, Unknown Eligible: No Scnrn	767		
3220	HU, Unknown Eligible: Other	1	HH: eligibility unknown	768
4100	Out of Sample	57	Not eligible	1392
4200	Fax/Data Line	318	<i>Total attempted</i>	<u>5727</u>
4310	Non-working Number	102	Results:	
4320	Disconnected Number	316	(Estimated 1 = .19)	
4410	Number Changed	51	(Estimated 2 = .94)	
4420	Cell Phone	10	Response Rate 1:	.19
4430	Call Forwarding	2	Response Rate 2:	.19
4510	Business/Government/Other Org	522	Response Rate 3:	.23
4520	Institution	0	Response Rate 4:	.25
4530	Group Quarter	3	Response Rate 5:	.31
4700	No Eligible Respondent	11	Response Rate 6:	.32
4800	Quota Filled	<u>0</u>	Cooperation Rate 1:	.86
			Cooperation Rate 2:	.89
	<i>Total numbers attempted</i>	<i>5727</i>	Cooperation Rate 3:	.92
			Cooperation Rate 4:	.95
			Refusal Rate 1:	.01
			Refusal Rate 2:	.01
			Refusal Rate 3:	.02
			Contact Rate 1:	.22
			Contact Rate 2:	.27
			Contact Rate 3:	.36