

# **Survey Methodology**

## **Fast Response Survey System**

The Fast Response Survey System (FRSS) was established in 1975 by the National Center for Education Statistics (NCES), U.S. Department of Education. FRSS is designed to collect small amounts of issue-oriented data with minimal burden on respondents and within a relatively short timeframe. Surveys are generally limited to three pages of questions, with a response burden of about 30 minutes per respondent. Sample sizes are relatively small (usually about 1,000 to 1,500 respondents per survey) so that data collection can be completed quickly. Data are weighted to produce national estimates of the sampled education sector. The sample size permits limited breakouts by classification variables. However, as the number of categories within the classification variables increases, the sample size within categories decreases, which results in larger sampling errors for the breakouts by classification variables. FRSS collects data from state education agencies, local education agencies, public and private elementary and secondary schools, public school teachers, and public libraries.

## **Sample Selection**

The sample for the FRSS survey on the condition of public school facilities consisted of 1,004 regular public elementary, middle, and high schools in the 50 states and the District of Columbia. The sample was selected from the 1996-97 NCES Common Core of Data (CCD) School Universe File. The sampling frame constructed consisted of 80,238 regular public schools. Excluded from the sampling frame were special education, vocational, and alternative/other schools, schools in the territories, and schools with a high grade lower than one or ungraded. The frame contained 49,266 regular elementary schools, 14,808 regular middle schools, and 16,164 regular high/combined schools. A school was defined as an elementary school if the lowest grade was less than or equal to grade 3 and the highest grade was less than or equal to grade 8. A middle school was defined as having a lowest grade greater than or equal to grade 4 and a highest grade less than or equal to grade 9. A school was considered a high school if its lowest grade was less than or equal to grade 9 and the highest grade was greater than or equal to grade 10. Combined schools were defined as having a lowest grade less than or equal to grade 3 and a highest grade greater than or equal to grade 9 *or* the lowest grade is in grades 4 through 8 and the highest grade is in grades 10 through 12. High schools and combined schools were combined into one category for sampling.

The public school sampling frame was stratified by instructional level (elementary, middle, and high school/combined), locale (city, urban fringe, town, rural), and school size (less than 300, 300 to 499, 500 to 999, and 1,500 or more). Within the primary strata, schools were also sorted by geographic region and percent minority enrollment in the school to produce additional implicit stratification. Within each primary stratum, the specified sample size was then allocated to size classes in rough proportion to the aggregate square root of the enrollment of the schools in the class. After the stratum sample sizes were determined, a sample of 1,004 schools was then selected systematically from the sorted file using independent random starts. The sample contained 401 elementary schools, 301 middle schools, and 302 high/combined schools. The 1,004 schools were located in 838 school districts.

## **Respondent and Response Rates**

Questionnaires and cover letters were mailed in early July 1999. While individual elementary, middle, and high schools were sampled, the questionnaires were mailed to the districts with which the schools were associated. A separate questionnaire was enclosed for each sampled school. This is the same approach used by the U.S. General Accounting Office (GAO) to conduct their study of school facilities in 1994. The cover letter indicated that the survey was designed to be completed by district-level personnel

who were very familiar with the school facilities in the district. Often this was a district facilities coordinator (although the title of the position varied). The letter indicated that the respondent might want to consult with other district-level personnel or with school-level personnel, such as the principal of the selected school, in answering some of the questions. The respondent section on the front of the questionnaire indicated that while most questionnaires were completed by district-level respondents, some were completed by school-level respondents (usually the school principal). To maintain the focus on schools, which are the sampled unit, the report refers to schools indicating or reporting various findings, even though respondents were primarily district-level personnel reporting about the sampled school.

Telephone followup was conducted from late July through September 1999 with districts that did not respond to the initial questionnaire mailing. Of the 1,004 schools selected for the sample, 14 were found to be out of the scope of the survey, usually because the school was no longer in existence. This left a total of 990 eligible schools in the sample. Completed questionnaires were received for 903 schools, or 91 percent of the eligible schools. The weighted response rate was also 91 percent. Weighted item nonresponse rates for individual questionnaire items ranged from 0 percent to 0.7 percent. Because the item nonresponse rate was so low, imputation for item nonresponse was not implemented.

### **Sampling and Nonsampling Errors**

The responses were weighted to produce national estimates (see table A-1). The weights were designed to adjust for the variable probabilities of selection and differential nonresponse. The findings in this report are estimates based on the sample selected and, consequently, are subject to sampling variability.

The survey estimates are also subject to nonsampling errors that can arise because of nonobservation (nonresponse or noncoverage) errors, errors of reporting, and errors made in data collection. These errors can sometimes bias the data. Nonsampling errors may include such problems as misrecording of responses; incorrect editing, coding, and data entry; differences related to the particular time the survey was conducted; or errors in data preparation. While general sampling theory can be used in part to determine how to estimate the sampling variability of a statistic, nonsampling errors are not easy to measure and, for measurement purposes, usually require that an experiment be conducted as part of the data collection procedures or that data external to the study be used.

To minimize the potential for nonsampling errors, the questionnaire was pretested with respondents like those who completed the survey. During the design of the survey and the survey pretest, an effort was made to check for consistency of interpretation of questions and to eliminate ambiguous items. The questionnaire and instructions were extensively reviewed by the National Center for Education Statistics and the Office of the Under Secretary, U.S. Department of Education. Manual and machine editing of the questionnaire responses were conducted to check the data for accuracy and consistency. Cases with missing or inconsistent items were recontacted by telephone. Data were keyed with 100 percent verification.

### **Variances**

The standard error is a measure of the variability of estimates due to sampling. It indicates the variability of a sample estimate that would be obtained from all possible samples of a given design and size. Standard errors are used as a measure of the precision expected from a particular sample. If all possible samples were surveyed under similar conditions, intervals of 1.96 standard errors below to 1.96 standard

**Table A-1. Number and percentage distribution of public schools in the study, and the estimated number and percentage distribution in the nation, by school characteristics: 1999**

| School characteristic   | Respondent sample |         | National estimate |         |
|---|-------------------|---------|-------------------|---------|
|   | Number            | Percent | Number            | Percent |
| All public schools .....  | 903               | 100     | 78,313            | 100     |
| School instructional level  |                   |         |                   |         |
| Elementary school.....  | 580               | 64      | 59,940            | 77      |
| High school.....  | 286               | 32      | 15,505            | 20      |
| Combined.....   | 37                | 4       | 2,867             | 4       |
| School enrollment size  |                   |         |                   |         |
| Less than 300 .....   | 129               | 14      | 18,095            | 23      |
| 300 to 599 .....  | 300               | 33      | 31,942            | 41      |
| 600 or more.....  | 474               | 52      | 28,275            | 36      |
| Locale  |                   |         |                   |         |
| Central city .....  | 250               | 28      | 21,294            | 27      |
| Urban fringe/large town.....  | 349               | 39      | 27,846            | 36      |
| Rural/small town.....   | 304               | 34      | 29,173            | 37      |
| Region  |                   |         |                   |         |
| Northeast.....  | 147               | 16      | 13,210            | 17      |
| Midwest .....   | 244               | 27      | 22,843            | 29      |
| South.....  | 321               | 36      | 26,358            | 34      |
| West.....   | 191               | 21      | 15,901            | 20      |
| Percent minority enrollment   |                   |         |                   |         |
| 5 percent or less .....   | 256               | 28      | 24,676            | 32      |
| 6 to 20 percent .....   | 208               | 23      | 17,831            | 23      |
| 21 to 50 percent .....  | 213               | 24      | 17,025            | 22      |
| More than 50 percent .....  | 226               | 25      | 18,781            | 24      |
| Percent of students in school eligible for free or reduced-price school lunch |                   |         |                   |         |
| Less than 20 percent .....  | 261               | 29      | 21,216            | 27      |
| 20 to 39 percent .....  | 252               | 28      | 20,915            | 27      |
| 40 to 69 percent .....  | 232               | 26      | 20,947            | 27      |
| 70 percent or more .....  | 158               | 17      | 15,234            | 19      |

NOTE: Details may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, Survey on the Condition of Public School Facilities, 1999.

errors above a particular statistic would include the true population parameter being estimated in about 95 percent of the samples. This is a 95 percent confidence interval. For example, the estimated percentage of schools with all building types in adequate or better condition is 76.1 percent, and the estimated standard error is 1.8 percent. The 95 percent confidence interval for the statistic extends from  $[76.1 - (1.8 \text{ times } 1.96)]$  to  $[76.1 + (1.8 \text{ times } 1.96)]$ , or from 72.6 to 79.6 percent.

Estimates of standard errors were computed using a technique known as jackknife replication. As with any replication method, jackknife replication involves constructing a number of subsamples (replicates) from the full sample and computing the statistic of interest for each replicate. The mean square error of the replicate estimates around the full sample estimate provides an estimate of the variances of the statistics. To construct the replications, 50 stratified subsamples of the full sample were created and then dropped one at a time to define 50 jackknife replicates. A computer program (WesVarPC) was used to calculate the estimates of standard errors. WesVarPC is a stand-alone Windows application that computes sampling errors for a wide variety of statistics (totals, percents, ratios, log-odds ratios, general functions of estimates in tables, linear regression parameters, and logistic regression parameters).

The test statistics used in the analysis were calculated using the jackknife variances and thus appropriately reflected the complex nature of the sample design. In particular, an adjusted chi-square test using Satterthwaite's approximation to the design effect was used in the analysis of the two-way tables. Finally, Bonferroni adjustments were made to control for multiple comparisons where appropriate. For example, for an "experiment-wise" comparison involving  $g$  pairwise comparisons, each difference was tested at the  $0.05/g$  significance level to control for the fact that  $g$  differences were simultaneously tested. The Bonferroni adjustment results in a more conservative critical value being used when judging statistical significance. This means that comparisons that would have been significant with a critical value of 1.96 may not be significant with the more conservative critical value. For example, the critical value for comparisons between any two of the four categories of poverty concentration is 2.64, rather than 1.96. This means that there must be a larger difference between the estimates being compared for there to be a statistically significant difference.

## **Definitions of Analysis Variables**

Categories of the analysis variables are those used by GAO for their 1994 study.

**School instructional level** – Schools were classified according to their grade span in the 1996-97 Common Core of Data (CCD) School Universe File.

**Elementary school** – had grade 6 or lower and no grade higher than grade 8.

**Secondary school** – had no grade lower than grade 7 and had grade 7 or higher.

**Combined school** – had grades higher than grade 8 and lower than grade 7.

**School enrollment size** – total number of students enrolled on October 1, 1998, based on responses to question 17 on the survey questionnaire.

**Less than 300 students**

**300 to 599 students**

**600 or more students**

**Locale** – as defined in the 1996-97 Common Core of Data (CCD).

**Central city** – a large or mid-size central city of a Metropolitan Statistical Area (MSA).

**Urban fringe/large town** – urban fringe is a place within an MSA of a central city, but not primarily its central city; large town is an incorporated place not within an MSA, with a population greater than or equal to 25,000.

**Small town/rural** – small town is an incorporated place not within an MSA, with a population less than 25,000 and greater than or equal to 2,500; rural is a place with a population less than 2,500 and/or a population density of less than 1,000 per square mile, and defined as rural by the U.S. Bureau of the Census.

**Geographic region** –

**Northeast** - Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania

**Midwest** - Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas

**South** - Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, Texas

**West** - Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska, Hawaii

**Percent minority enrollment in the school** – The percent of students enrolled in the school whose race or ethnicity is classified as one of the following: American Indian or Alaskan Native, Asian or Pacific Islander, black, or Hispanic, based on data in the 1996-97 CCD file.

**5 percent or less**

**6 to 20 percent**

**21 to 50 percent**

**More than 50 percent**

**Percent of students at the school eligible for free or reduced-price lunch** – This was based on responses to question 20 on the survey questionnaire; if it was missing from the questionnaire, it was obtained from the 1996-97 CCD file. This item served as the measurement of the concentration of poverty at the school.

**Less than 20 percent**

**20 to 39 percent**

**40 to 69 percent**

**70 percent or more**

It is important to note that many of the school characteristics used for independent analyses may also be related to each other. For example, enrollment size and instructional level of schools are related, with secondary schools typically being larger than elementary schools. Similarly, poverty concentration and minority enrollment are related, with schools with a high minority enrollment also more likely to have a

high concentration of poverty. Other relationships between analysis variables may exist. Because of the relatively small sample size used in this study, it is difficult to separate the independent effects of these variables. Their existence, however, should be considered in the interpretation of the data.