Appendix B. Source and Accuracy of the Estimates

SOURCE OF DATA

Most estimates in this report come from data obtained in March 1990 and 1991 from the Current Population Survey (CPS). Some estimates are based on data obtained from the CPS in earlier years and from decennial censuses. The Bureau of the Census conducts the survey every month, although this report uses only March data for its estimates. The March survey uses two sets of questions, the basic CPS and the supplement.

Basic CPS. The basic CPS collects primarily labor force data about the civilian noninstitutional population. Interviewers ask questions concerning labor force participation about each member 15 years old and over in every sample household.

The March 1991 CPS sample was selected from the 1980 Decennial Census files with coverage in all 50 states and the District of Columbia. The sample is continually updated to account for new residential construction. It is located in 729 areas comprising 1,973 counties, independent cities, and minor civil divisions. About 60,000 occupied households are eligible for interview every month. Interviewers are unable to obtain interviews at about 2,600 of these units because the occupants are not home after repeated calls or are unavailable for some other reason.

Since the introduction of the CPS, the Bureau of the Census has redesigned the CPS sample several times to improve the quality and reliability of the data and to satisfy changing data needs. The most recent changes were completely implemented in July 1985.

The following table summarizes changes in the CPS designs for the years for which data appear in this report.

Description of the March Current Population Survey

Time period	Number of sample areas	Housing units eligible[1]	
		Interviewed	Not interviewed
1990 to 1991	729	57,400	2,600
1989	729	53,600	2,500
1986 to 1988	729	57,000	2,500
1985	[2]629/729	57,000	2,500
1982 to 1984	629	59,000	2,500
1980 to 1981	629	65,500	3,000
1977 to 1979	614	55,000	3,000
1973 to 1976	461	46,500	2,500
1972	449	45,000	2,000
1967 to 1971	449	48,000	2,000
1963 to 1966	357	33,500	1,500
1960 to 1962	333	33,500	1,500
1957 to 1959	330	33,500	1,500
1954 to 1956	230	21,000	500-1,000
1947 to 1953	68	21,000	500-1,000

[1]Excludes about 2,500 Hispanic households added from the previous November sample. (See "March Supplement.")

[2]The CPS was redesigned following the 1980 Decennial Census of Population and Housing. During phase-in of the new design, housing units from the new and old designs were in the sample.

March Supplement. In addition to the basic CPS questions, interviewers asked supplementary questions in March about educational attainment.

To obtain more reliable data for the Hispanic origin population, the March CPS sample was increased by about 2,500 eligible housing units, interviewed the previous November, that contained at least one sample person of Hispanic origin. In addition, the sample included persons in the Armed Forces living off post or with their families on post.

Estimation Procedure. This survey's estimation procedure inflates weighted sample results to independent estimates of the civilian noninstitutional population of the United States by age, sex, race and Hispanic/non-Hispanic categories. The independent estimates were based on statistics from decennial censuses of population; statistics on births, deaths, immigration and emigration and statistics on the size of the Armed Forces. The independent population estimates used for 1981 (1980 for income estimates) to present were based on updates to controls established by the 1980 Decennial Census. Data previous to 1981 were based on independent population estimates from the most recent decennial census. For more details on the change in independent estimates, see the section entitled "Introduction of 1980 Census Population Controls" in an earlier report (Series P-60, No. 133). The estimation procedure for the March supplement included a further adjustment so husband and wife of a household received the same weight.

The estimates in this report for 1985 and later also employ a revised survey weighting procedure for persons of Hispanic origin. In previous years, weighted sample results were inflated to independent estimates of the noninstitutional population by age, sex, and race. There was no specific control of the survey estimates for the Hispanic population. Since then, the Bureau of the Census developed independent population controls for the Hispanic population by sex and detailed age groups. Revised weighting procedures incorporate these new controls. The independent population estimates include some, but not all, undocumented immigrants.

ACCURACY OF THE ESTIMATES

Since the CPS estimates come from a sample, they may differ from figures from a complete census using the same questionnaires, instructions, and enumerators. A sample survey estimate has two possible types of errors: sampling and nonsampling. The accuracy of an estimate depends on both types of errors, but the full extent of the nonsampling error is unknown. Consequently, one should be particularly careful when interpreting results based on a relatively small number of cases or on small differences between estimates. The standard errors for CPS estimates primarily indicate the magnitude of sampling error. They also partially measure the effect of some nonsampling errors in responses and enumeration, but do not measure systematic biases in the data. (Bias is the average over all possible samples of the differences between the sample estimates and the desired value.)

Nonsampling Variability. Nonsampling errors can be attributed to many sources. These sources include the inability to obtain information about all cases in the sample, definitional difficulties, differences in the interpretation of questions, respondents' inability or unwillingness to provide correct information or to recall information, errors made in data collection such as in recording or coding the data, errors made in processing the data, errors made in estimating values for missing data, and failure to represent all units with the sample (undercoverage).

CPS undercoverage results from missed housing units and missed persons within sample households. Compared to the level of the 1980 Decennial Census, overall CPS undercoverage is about 7 percent. CPS undercoverage varies with age, sex, and race. Generally, undercoverage is larger for males than for females and larger for Blacks and other races combined than for Whites. As described previously, ratio estimation to independent age-sex-race-Hispanic population controls partially corrects for the bias due to undercoverage. However, biases exist in the estimates to the extent that missed persons in missed households or missed persons in interviewed households have different characteristics from those of interviewed persons in the same age-sex-race Hispanic group. Furthermore, the independent population controls have not been adjusted for undercoverage in the 1980 census.

For additional information on nonsampling error including the possible impact on CPS data when known, refer to Statistical Policy Working Paper 3, "An Error Profile: Employment as Measured by the Current Population Survey," Office of Federal Statistical Policy and Standards, U.S. Department of Commerce, 1978 and Technical Paper 40, The Current Population Survey: Design and Methodology, Bureau of the Census, U.S. Department of Commerce.

Comparability of Data. Data obtained from the CPS and other sources are not entirely comparable. This results from differences in interviewer training and experience and in differing survey processes. This is an example of nonsampling variability not reflected in the standard errors. Use caution when comparing results from different sources.

Caution should also be used when comparing estimates in this report, which reflect 1980 census-based population controls, with estimates for 1979 (from March 1980 CPS) and earlier years, which reflect 1970 census-based population controls. This change in population controls had relatively little impact on summary measures such as means, medians, and percentage distributions but did have a significant impact on levels. For example, use of 1980 based population controls results in about a 2-percent increase in the civilian noninstitutional population and in the number of families and households. Thus, estimates of levels for data collected in 1981 and later years will differ from those for earlier years by more than what could be attributed to actual changes in the population. These differences could be disproportionately greater for certain subpopulation groups than for the total population.

Since no independent population control totals for persons of Hispanic origin were used before 1985, compare Hispanic estimates over time cautiously.

Note When Using Small Estimates. Summary measures (such as medians and percentage distributions) are shown only when the base is 75,000 or greater. Because of the large standard errors involved, summary measures would probably not reveal useful information when computed on a smaller base. However, estimated numbers are shown even though the relative standard errors of these numbers are larger than those for corresponding percentages. These smaller estimates permit combinations of the categories to suit data users' needs. Take care in the interpretation of small differences. For instance, even a small amount of nonsampling error can cause a borderline difference to appear significant or not, thus distorting a seemingly valid hypothesis test.

Sampling Variability. Sampling variability is variation that occurred by chance because a sample was surveyed rather than the entire population. Standard errors,

Table B-1. **1991 Standard Errors of Estimated Numbers: Total or White**

(Numbers in Thousands)

Size of Estimate	Total persons in age group									
	100	250	500	1,000	2,500	5,000	10,000	25,000	50,000	100,000
10	4.8	4.9	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20	6.4	6.8	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1
30	7.3	8.2	8.4	8.6	8.7	8.7	8.7	8.7	8.7	8.7
40	7.8	9.2	9.7	9.9	10.0	10.0	10.0	10.1	10.1	10.1
50	8.0	10.1	10.7	11.0	11.1	11.2	11.2	11.2	11.2	11.2
75	6.9	11.5	12.7	13.3	13.6	13.7	13.7	13.8	13.8	13.8
100	(X)	12.3	14.2	15.1	15.6	15.8	15.8	15.9	15.9	15.9
200	(X)	10.1	17.4	20.1	21.6	22.0	22.3	22.4	22.5	22.5
300	(X)	(X)	17.4	23.1	25.9	26.7	27.1	27.4	27.5	27.5
400	(X)	(X)	14.2	24.7	29.2	30.5	31.2	31.6	31.7	31.8
500	(X)	(X)	(X)	25.2	31.8	33.8	34.7	35.2	35.4	35.5
750	(X)	(X)	(X)	21.8	36.5	40.2	41.9	42.9	43.2	43.4
1,000	(X)	(X)	(X)	(X)	39.0	45.0	47.7	49.3	49.8	50.1
2,000	(X)	(X)	(X)	(X)	31.8	55.1	63.6	68.3	69.7	70.4
3,000	(X)	(X)	(X)	(X)	(X)	55.1	72.9	81.8	84.5	85.8
4,000	(X)	(X)	(X)	(X)	(X)	45.0	78.0	92.2	96.5	98.6
5,000	(X)	(X)	(X)	(X)	(X)	(X)	79.6	100.6	106.7	109.7
7,500	(X)	(X)	(X)	(X)	(X)	(X)	68.9	115.3	127.0	132.5
10,000	(X)	(X)	(X)	(X)	(X)	(X)	(X)	123.3	142.3	151.0
20,000	(X)	(X)	(X)	(X)	(X)	(X)	(X)	100.6	174.3	201.3
30,000	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	174.3	230.6
40,000	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	142.3	246.5
50,000	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	251.6

(x) Not applicable.

Note: For a particular characteristic, see table B-4 for the appropriate factor to apply to the above standard errors.

Table B-2. **1991 Standard Errors of Estimated Numbers: Black or Other Races and Hispanic**

(Numbers in Thousands)

Size of Estimate	Total persons in age group						
	100	250	500	1,000	2,500	5,000	10,000
Black or Other Races or Hispanic							
10	5.6	5.7	5.8	5.8	5.8	5.8	5.8
20	7.4	7.9	8.1	8.2	8.2	8.3	8.3
30	8.5	9.5	9.8	10.0	10.1	10.1	10.1
40	9.1	10.7	11.2	11.5	11.6	11.7	11.7
50	9.3	11.7	12.4	12.8	13.0	13.0	13.1
75	8.0	13.4	14.8	15.4	15.8	15.9	16.0
100	(X)	14.3	16.6	17.6	18.1	18.3	18.4
200	(X)	11.7	20.3	23.4	25.1	25.6	25.9
300	(X)	(X)	20.3	26.8	30.1	31.1	31.6
400	(X)	(X)	16.6	28.7	33.9	35.5	36.3
500	(X)	(X)	(X)	29.3	37.0	39.3	40.3
750	(X)	(X)	(X)	25.3	42.4	46.7	48.7
1,000	(X)	(X)	(X)	(X)	45.3	52.3	55.5
2,000	(X)	(X)	(X)	(X)	37.0	64.1	74.0
3,000	(X)	(X)	(X)	(X)	(X)	64.1	84.8
4,000	(X)	(X)	(X)	(X)	(X)	52.3	90.7
5,000	(X)	(X)	(X)	(X)	(X)	(X)	92.5
7,500	(X)	(X)	(X)	(X)	(X)	(X)	80.1

(X) Not applicable.

Note: For a particular characteristic, see table B-4 for the appropriate factor to apply to the above standard errors.

as calculated by methods described next in "Standard Errors and Their Use," are primarily measures of sampling variability, although they may include some nonsampling error.

Standard Errors and Their Use. A number of approximations are required to derive, at a moderate cost, standard errors applicable to all the estimates in this report. Instead of providing an individual standard error for each estimate, generalized sets of standard errors are provided for various types of characteristics. Thus, the tables show levels of magnitude of standard errors rather than the precise standard errors.

The sample estimate and its standard error enable one to construct a confidence interval, a range that would include the average result of all possible samples with a known probability. For example, if all possible samples were surveyed under essentially the same general conditions and using the same sample design, and if an estimate and its standard error were calculated from each sample, then approximately 90 percent of the intervals from 1.6 standard errors below the estimate to 1.6 standard errors above the estimate would include the average result of all possible samples.

A particular confidence interval may or may not contain the average estimate derived from all possible samples. However, one can say with specified confidence that the interval includes the average estimate calculated from all possible samples.

Some statements in the report may contain estimates followed by a number in parentheses. This number can be added to and subtracted from the estimate to calculate upper and lower bounds of the 90-percent confidence interval. For example, if a statement contains the phrase "grew by 1.7 percent (±1.0)," the 90 percent confidence interval for the estimate, 1.7 percent, is 0.7 percent to 2.7 percent.

Standard errors may also be used to perform hypothesis testing, a procedure for distinguishing between population parameters using sample estimates. The most common type of hypothesis appearing in this report is that the population parameters are different. An example of this would be comparing the educational attainment of Black persons to the educational attainment of White persons.

Tests may be performed at various levels of significance, where a significance level is the probability of concluding that the characteristics are different when, in fact, they are the same. All statements of comparison in the text have passed a hypothesis test at the 0.10 level of significance or better. This means that the absolute value of the estimated difference between characteristics is greater than or equal to 1.6 times the standard error of the difference.

Table B-3. **1991 Standard Errors of Estimated Percentages**

Base of percentage (thousands)	Estimated percentage				
	2 or 98	5 or 95	10 or 90	25 or 75	50
Total or White					
75	2.6	4.0	5.5	8.0	9.2
100	2.2	3.5	4.8	6.9	8.0
250	1.4	2.2	3.0	4.4	5.0
500	1.0	1.6	2.1	3.1	3.6
1,000	0.7	1.1	1.5	2.2	2.5
2,500	0.4	0.7	1.0	1.4	1.6
5,000	0.3	0.5	0.7	1.0	1.1
10,000	0.2	0.3	0.5	0.7	0.8
25,000	0.14	0.2	0.3	0.4	0.5
50,000	0.10	0.2	0.2	0.3	0.4
100,000	0.07	0.11	0.2	0.2	0.3
Black or Other Races or Hispanic					
25	5.2	8.1	11.1	16.0	18.5
50	3.7	5.7	7.9	11.3	13.1
75	3.0	4.7	6.4	9.3	10.7
100	2.6	4.0	5.6	8.0	9.3
250	1.6	2.6	3.5	5.1	5.9
500	1.2	1.8	2.5	3.6	4.1
1,000	0.8	1.3	1.8	2.5	2.9
2,500	0.5	0.8	1.1	1.6	1.9
5,000	0.4	0.6	0.8	1.1	1.3
10,000	0.3	0.4	0.6	0.8	0.9
20,000	0.2	0.3	0.4	0.6	0.7

Note: For a particular characteristic, see table B-4 for the appropriate factor to apply to the above standard errors.

Standard Errors of Estimated Numbers. There are two ways to compute the approximate standard error, s_x, of an estimated number shown in this report. The first uses the formula

$$s_x = fs \quad (1)$$

where f is a factor from Table B-4, and s is the standard error of the estimate obtained by interpolation from Table B-1 or B-2. The second method uses formula (2), from which the standard errors in Tables B-1 and B-2 were calculated. This formula will provide more accurate results than formula (1).

$$s_x = \sqrt{-(b/T)\,x^2 + bx} \quad (2)$$

Here x is the size of the estimate, T is the total number of persons in a specific age group, and b is the parameter in Table B-4 associated with the particular type of characteristic. If T is not known, for Total or White use 100,000,000; for Black and Hispanic use 10,000,000. When calculating standard errors for numbers from cross-tabulations involving different characteristics, use the factor or set of parameters for the characteristic which will give the largest standard error.

Illustration

Table 1 shows there were 4,817,000 young adults (ages 25 to 29 years) who completed four or more years of college and 20,767,000 total persons in that age group in 1991. Using formula (1) with f = 1.0 from Table B-4, and s = 94,000 from Table B-1, the approximate standard error on 4,817,000 is

$$s_x = 1.0x94{,}000 = 94{,}000$$

The value of s was obtained by linear interpolation in two directions. The first interpolation was between 10,000,000 and 25,000,000 total persons for both 4,000,000 and 5,000,000 estimated number of persons. The value fo r 4,000,000 estimated persons was 88.2 and for 5,000,000 estimated persons was 94.7. The second interpolation was between these two values to get the value corresponding to 4,817,000 persons.

Using the second method with b = 2,532 from Table B-4, the approximate standard error is

$$s_x = \sqrt{-\frac{2{,}532}{20{,}767{,}000} x4{,}817{,}000^2 + 2{,}532x4{,}817{,}000} = 97{,}000$$

This means that a 90-percent confidence interval for this estimate is from 4,662,000 to 4,972,000, i.e, 4,817,000 ± 1.6x97,000. Therefore, a conclusion that the average estimate derived from all possible samples lies within a range computed in this way would be correct for roughly 90 percent of all possible samples.

Standard Errors of Estimated Percentages. The reliability of an estimated percentage, computed using sample data for both numerator and denominator, depends on the size of the percentage and its base. Estimated percentages are relatively more reliable than the corresponding estimates of the numerators of the percentages, particularly if the percentages are 50 percent or more. When the numerator and denominator of the percentage are in different categories, use the factor or parameter from Table B-4 indicated by the numerator.

The approximate standard error, $s_{x,p,}$ of an estimated percentage can be obtained by use of the formula

$$s_{x,p} = fs \quad (3)$$

In this formula, f is the appropriate factor from Table B-4, and s is the standard error of the estimate obtained by interpolation from Table B-3.

Alternatively, formula (4) will provide more accurate results. The standard errors in Table B-3 were calculated with this formula.

$$s_{x,p} = \sqrt{\frac{b}{x}\,p(100-p)} \quad (4)$$

Here x is the total number of persons, families, households, or unrelated individuals in the base of the percentage, p is the percentage ($0 \leq p \leq 100$), and b is the parameter in Table B-4 associated with the characteristic in the numerator of the percentage.

Illustration

As shown in Table 1, of the 2,730,000 Black persons aged 25 to 29, 2,229,000 or 81.6 percent were high school graduates in 1991. Using formula (3) with f 1.0, and s 1.4 from Table B-3, the approximate standard error is

$$s_{x,p} = 1.0x1.4 = 1.4$$

Using the alternate method with b = 3,425 from Table B-4, the approximate standard error on an estimate of 81.6 percent is

$$s_{x,p} = \sqrt{\frac{3{,}425}{2{,}730{,}000} x81.6x(100.0-81.6)} = 1.4$$

This means that a 90-percent confidence interval or the estimated percentage of Black persons in 1989 who graduated from high school is from 79.4 to 83.8 percent, i.e., 81.6 ± 1.6x1.4.

Standard Error of a Difference. The standard error of the difference between two sample estimates is approximately equal to

$$s_{x-y} = \sqrt{s_x^2 + s_y^2} \quad (5)$$

where s_x and s_y are the standard errors of the estimates, x and y. The estimates can be numbers, percentages, ratios, etc. This will result in accurate estimates of the standard error of the same characteristic in two different areas, or for the difference between separate and uncorrelated characteristics in the same

TABLE B-4. **1991 Standard Error Parameters and Factors for Educational Attainment**

Characteristics	Total or White		Black or Other Races		Hispanic	
	b	f	b	f	b	f
Educational Attainment	2,532	1.0	3,425	1.0	3,425	1.0
Marital Status	4,786	1.4	6,865	1.4	6,865	1.4
Household Characteristics:						
Head, Wife, or Primary Individual	1,899	0.9	1,716	0.7	1,716	0.7
Child or Other Relative in Primary Family, Secondary Family Member	4,786	1.4	6,865	1.4	6,865	1.4
Income, Earnings	2,485	0.9	2,485	0.9	2,485	0.6
Employment Status, Occupation:						
Both Sexes	2,485	1.0	2,485	0.9	2,485	0.4
Male	2,150	0.9	2,150	0.6	2,150	0.4
Female	1,843	0.9	1,843	0.7	1,843	0.6

Notes: To estimate standard errors for school enrollment prior to 1991 multiply the b parameter for 1991 by the appropriate factor in table B-5. The b parameters should be multiplied by 1.5 for nonmetropolitan residence categories. The b parameters should be multiplied by 1.91 for farm characteristics. The b parameters should be multiplied by the factors in table B-6 or B-7 for regional and state data.

Table B-5. **Factors to Calculate Educational Attainment b Parameters Prior to 1991**

Year	Total or White	Black or Other Races	Hispanic
1990	1.00	1.00	1.00
1988-1989	1.08	1.08	1.30
1985-1987	0.91	0.91	0.93
1982-1984	0.91	0.91	0.77
1977-1981	0.82	0.82	0.68
1967-1976	0.80	0.80	0.67
1957-1966	1.22	1.22	(X)
before 1956	1.83	1.83	(X)

(X) Not applicable

Note: Apply the appropriate factor to the b parameter for 1991.

area. However, if there is a high positive (negative) correlation between the two characteristics, the formula will overestimate (underestimate) the true standard error.

Illustration

Table 1 shows that in 1991 an estimated 86.6 percent of the 8,568,000 White women 25 to 29 years old graduated from high school as compared to 80.1 percent of the 1,460,000 Black women 25 to 29 years old. The apparent difference is 6.5 percent. Using formula (4) and b = 2,532 from table B-4, the standard error on the estimated percentage of White female high school graduates, 25 to 29, is 0.6. Using formula (4) and b = 3,425 from Table B-4, the standard error on the estimated percentage of Black female high school graduates, 25 to 29, is 1.9.

Therefore using formula (5) the standard error of the estimated difference of 6.5 percent is about

$$s_{x-y} = \sqrt{0.6^2 + 1.9^2} = 2.0$$

This means that the 90-percent confidence interval around the difference is from 3.3 to 9.7 percent, i.e.,6.5 ± 1.6x2.0. Therefore a conclusion that the average estimate of the difference derived from all possible samples lies within a range computed in this way would be correct for roughly 90 percent of all possible samples. Since the interval does not contain zero, we can conclude with 90-percent confidence that White females ages 25 to 29 have a greater percentage of high school graduates than Black females of the same age group.

Standard Error of a Median. The sampling variability of an estimated median depends on the form of the distribution and the size of the base. One can approximate the reliability of an estimated median by determining a confidence interval about it. (See the section "Standard Errors and Their Use" for a general discussion of confidence intervals.)

Estimate the 68-percent confidence limits of a median based on sample data using the following procedure.

1. Determine, using formula (4), the standard error of the estimate of 50 percent from the distribution.
2. Add to and subtract from 50 percent the standard error determined in step 1.
3. Using the distribution of the characteristic, determine upper and lower limits of the 68-percent confidence interval by calculating values corresponding to the two points established in step 2.

$$X_{pN} = \frac{pN - N_1}{N_2 - N_1} (A_2 - A_1) + A_1 \qquad (6)$$

where

X_{pN} = estimated upper and lower bounds for the confidence interval ($0 \leq p \leq 1$). For purposes of calculating the confidence interval, p takes on the values determined in step 2. Note that X_{pN} estimates the median when $p = 0.50$.

N = *for distribution of numbers:* the total number of units (persons, households, etc.) for the characteristic in the distribution.

N = *for distribution of percentages:* the value 1.0.

p = the values obtained in step 2.

A_1, A_2 = the lower and upper bounds, respectively, of the interval containing X_{pN}.

N_1, N_2 = *for distribution of numbers:* the estimated number of units (persons, households, etc.) with values of the characteristic greater than or equal to A_1 and A_2, respectively.

N_1, N_2 = *for distribution of percentages:* the estimated percentage of units (persons, households, etc.) having values of the characteristic greater than or equal to A_1 and A_2, respectively.

4. Divide the difference between the two points determined in step 3 by two to obtain the standard error of the median.

Use of the above procedure could result in standard errors which differ from those given in the detailed tables. The reasons for this discrepancy are the use of a more detailed distribution than that given in the tables in determining the published standard errors, and the rounding of the numbers to thousands in the published tables. Linear interpolation was almost always used to compute the published medians and standard errors. Occasionally, a median may lie in an open-ended interval. To calculate its standard error, the user must call Population Division of the Census Bureau to obtain the methodology.

Illustration

Table 1 shows that in 1991 the median years of school completed by Black persons 25 years old and over was 12.4. Table 1 also shows that the base of the distribution from which this median was determined was 17,096,000 persons.

5. Using formula (4) and b = 3,425 from Table B-4, the standard error of 50 percent on a base of 17,096,000 is about 0.7 percentage points.

6. Adding to and subtracting from 50 percent the standard error found in step 1 to obtain a 68-percent confidence interval on the estimated median yields limits of 49.3 percent and 50.7 percent.

7. From Table 1, in 1991 33.3 percent of Black persons aged 25 years old and over completed less than 12 years of school and 71.0 had completed less than 13 years of school. Using formula (6), the lower limit for the confidence interval of the median is found to be about

$$\frac{0.493 \times 1.0 - 0.333}{0.710 - 0.333}(13.0 - 12.0) + 12.0 = 12.42$$

Similarly, the upper limit is approximately

$$\frac{0.507 \times 1.0 - 0.333}{0.710 - 0.333}(13.0 - 12.0) + 12.0 = 12.46$$

Thus, a 68-percent confidence interval for the median school years completed by Black persons 25 years old and over is from 12.42 to 12.46. 4.

8. Finally, the standard error of the median is

$$(12.46 - 12.42)/2 = 0.02$$

Table B-6. **Regional Factors to Apply to 1991 Standard Errors**

Type of Characteristic	factor
U.S. Totals:	1.00
Census Divisions:	
New England	0.63
Middle Atlantic	0.79
East North Central	1.00
West North Central	1.04
South Atlantic	1.06
East South Central	1.09
West South Central	1.16
Mountain	0.72
Pacific	1.20
Regions:	
Northeast	0.74
Midwest	0.98
South	1.04
West	1.06

Table B-7. **State Factors to Apply to 1991 Standard Errors**

Type of Characteristic	factor	Type of Characteristic	factor
States:		States:	
Alabama	1.15	Montana	0.22
Alaska	0.13	Nebraska	0.41
Arizona	1.06	Nevada	0.36
Arkansas	0.66	New Hamsphire	0.41
California	1.25	New Jersey	0.61
Colorado	1.06	New Mexico	0.41
Connecticut	1.20	New York	0.80
Delaware	0.23	North Carolina	0.49
District of Columbia	0.23	North Dakota	0.16
Florida	0.90	Ohio	0.83
Georgia	1.78	Oklahoma	0.88
Hawaii	0.35	Oregon	0.95
Idaho	0.26	Pennsylvania	0.90
Illinois	0.93	Rhode Island	0.35
Indiana	1.70	South Carolina	0.81
Iowa	0.76	South Dakota	0.16
Kansas	0.66	Tennessee	1.28
Kentucky	1.06	Texas	1.26
Louisianna	1.29	Utah	0.46
Maine	0.37	Vermont	0.20
Maryland	1.52	Virginia	1.39
Massachusetts	0.49	Washington	1.37
Michigan	0.73	West Virginia	0.52
Minnesota	1.31	Wisconsin	1.23
Mississippi	0.66	Wyoming	0.18
Missouri	1.57		

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