CHAPTER 11

RESPONSE RATES AND NONRESPONSE BIAS ANALYSIS

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This chapter provides weighted response rates and a systematic analysis of the potential for nonresponse bias for the household sample and the prison sample of the National Assessment of Adult Literacy (NAAL), separately. The analyses focus on the impact of nonresponse on survey results.

Total survey error has two components: variable error (measured through the calculation of variances) and bias. The variance is the first term in the following equation for total survey error in a survey estimate:

$$\text{Total survey error} = \text{variance} + \text{bias}^2. \tag{1}$$

Bias, the second term in the equation, contains all sources of error other than variable error. A major component of bias is nonresponse, that is, the bias owing to the failure of some selected persons in the sample to respond to the survey. Nonresponse bias can be substantial when two conditions hold: (1) the response rate is relatively low and (2) the difference between the characteristics of respondents and nonrespondents is relatively large.

An estimate for nonresponse bias, assuming that nonresponse is the only source of bias, is expressed in Cochran (1977) as

$$Bias(\overline{y}_R) = (1 - W_R)(\overline{Y}_R - \overline{Y}_N), \tag{2}$$

where W_R is the response rate and $\overline{Y}_R$ and $\overline{Y}_N$ are the mean values of the survey items estimated among the respondents and nonrespondents, respectively. Thus, the estimates from any survey are subject to bias when some selected persons fail to participate in the survey. Because we do not have survey values for nonrespondents, nonresponse bias is not known and can only be estimated.

The following sections provide insights into the effects of nonresponse on the NAAL survey. The unweighted and weighted unit and item response rates are provided for the household study (section 11.1) and the correctional institution sample, known as the prison study (section 11.2). Unweighted response rates are indicators of the success of the data collection effort. Weighted response rates are more appropriate in examining the potential effect of nonresponse on population parameters. Bivariate and

multivariate analyses of the potential for nonresponse bias are provided for both the household study and the prison study.

11.1 HOUSEHOLD LITERACY STUDY

Data from respondents were collected through a screener, a background questionnaire, an assessment, and an oral module. In the nonresponse follow-up strategies, efforts were made to reduce the potential for nonresponse bias by targeting interviewer resources in areas with low response rates. To identify target areas, a multivariate analysis was conducted using a Chi-Squared Automatic Interaction Detector (CHAID) analysis (for more information on CHAID, refer to section 11.1.4.1.2). The resulting classification tree revealed the domains, as defined by combinations of variables, with the most differential response rates, thereby leading to domains with a high potential for nonresponse bias. Overall, the results of the analysis showed acceptable response rates for most of the cells identified by the CHAID program. The analysis, which was conducted for both the screener and the combined background questionnaire/assessment response rates, identified the primary sampling units (PSUs) that included the domains with less than a 70 percent response rate. Field activities and resources were focused on these PSUs in the remaining weeks of the data collection.

After data had been collected and weights produced, a systematic analysis was conducted to examine the impact of bias owing to the remaining nonresponding dwelling units and persons in the household sample. The sections that follow report on the nonresponse bias analysis. Section 11.1.1 gives an overview of the analysis weights. Section 11.1.2 provides unweighted and weighted response rates at the unit level. Section 11.1.3 summarizes response rates at the item level. Section 11.1.4 provides a detailed nonresponse bias analysis for the household study.

11.1.1 Analysis Weights

The systematic analysis of nonresponse bias in the household sample, which includes the computation of weighted response rates, used survey weights that were specially created for this analysis. The remainder of this section provides a brief overview of the weighting process for the household study, followed by a brief overview of the nonresponse bias weights used in this analysis.

In the NAAL household study, the nonresponse-adjusted weights were created separately for each of the seven independent samples (NAAL and the six State Assessment of Adult Literacy [SAAL] states). A composite weighting procedure was conducted to combine the NAAL and SAAL samples to improve the survey estimates for the nation and the six SAAL states. More details are provided in section 12.1.

National Center for Education Statistics (NCES) standards for a nonresponse bias analysis require the use of base weights. Because composited screener (dwelling unit-level) and background questionnaire base weights were not created as part of the NAAL household study weighting process, composited base weights were created for this nonresponse bias analysis. An objective of the weight modification process used in the nonresponse bias analysis (as required by the standards) was to minimize the effects of the nonresponse adjustments carried out for the final NAAL weights. For the nonresponse bias analysis, a minor adjustment was made to the NAAL and SAAL screener base weights and replicate weights for sample persons whose eligibility status was unknown (e.g., those who were unavailable after multiple attempts during the field period), in order to represent the eligible population only. Next, the weights were poststratified to one number for each sample (six SAAL states and all other states combined), and then compositing factors from the NAAL household study weighting process were applied to the screener weights to combine the state samples. The resulting composited screener weights were used in the nonresponse bias analysis at the screener level. The background questionnaire base weights for the nonresponse bias analysis were computed by applying the within-household sampling fraction to the nonresponse bias screener base weights.

11.1.2 Unit Response Rates

NAAL had four stages of data collection where unit nonresponse occurred: the screener, background questionnaire, assessment, and oral module. Both unweighted and weighted response rates were computed for each stage. Screener composited base weights (discussed in section 11.1.1) were used in the screener response rate calculations, and background questionnaire composited base weights were used for the background questionnaire, assessment, and oral module calculations.

Response rates were calculated as follows:

$$RR = \frac{\sum_{i \in SR} W_i}{\sum_{i \in SR \cup SNR} W_i},$$

where

W_i = the weight of unit i;

SR = the set of participating units; and

SNR = the set of eligible nonparticipating units.

Table 11-1 contains response rates for each stage and for the survey overall. The weighted response rates are 82 percent, 76 percent, 97 percent, and 95 percent for the screener, background questionnaire, assessment, and oral module, respectively. The overall weighted response rate—the product of the screener, background questionnaire, and assessment response rates—is 60 percent. Table 11-1 also shows response rates by selected analysis variable domains (defined later in table 11-14). As the table shows, there are differential response rates among subgroups. For instance, the weighted overall survey response rate in the Northeast is 55 percent, compared with 60 to 62 percent in the other census regions.

11.1.3 Item Nonresponse

Item response rates were computed for all 361 items in the background questionnaire. There were numerous reasons for item nonresponse: The respondent did not know the answer to the item or did not wish to respond, or the interview was terminated before completion and items in the latter part of the questionnaire were not asked. The numerator of the response rate consists of all item respondents; the denominator contains all unit respondents, excluding those for whom the item was skipped by the computer-assisted personal interviewing (CAPI) instrument because it was not applicable. This approach is consistent with NCES standard 1-3-5 (U.S. Department of Education, National Center for Education Statistics 2002); that is, item response rates were computed among persons who were asked the question. Westat computed both unweighted item response rates and response rates weighted with background questionnaire composited base weights.

Table 11-1. Household Study unweighted (UW) and weighted (W) unit response rates, by analysis variable, in percent: 2003

Analysis variable	Screener		Background questionnaire		Assessment		Oral module		Overall[1]	
	UW	W	UW	W	UW	W	UW	W	UW	W
Total	81.8	82.2	78.1	75.6	97.2	96.7	95.1	94.6	62.1	60.1
Region										
Northeast	74.0	75.6	76.3	74.8	97.4	97.1	95.1	95.2	55.0	54.9
Midwest	82.5	82.9	80.3	78.1	96.5	95.7	94.3	93.8	64.0	62.0
South	84.2	83.4	78.7	74.8	98.0	98.3	96.5	96.6	64.9	61.3
West	85.2	84.7	76.4	74.6	95.2	94.9	92.2	91.9	62.0	60.0
MSA[2] status										
Non-MSA	85.3	85.1	80.6	79.2	97.4	97.0	95.2	94.3	67.0	65.4
MSA	81.1	81.4	77.5	74.6	97.1	96.6	95.1	94.7	61.0	58.7
Average household size										
2.42 or less	80.0	80.5	79.4	77.1	97.5	97.4	95.6	95.3	61.9	60.5
2.43–2.80	81.8	81.8	77.8	75.1	97.3	96.9	95.4	95.1	62.0	59.5
Greater than 2.80	83.8	84.5	77.3	74.7	96.7	95.9	94.4	93.6	62.6	60.5
Percent with less than high school education										
10.4 or less	77.6	78.2	75.5	73.2	97.4	96.6	95.7	94.9	57.0	55.3
10.5–20.3	80.9	81.8	76.8	74.6	96.9	96.7	94.9	94.6	60.2	59.0
20.4–32.0	83.1	84.7	78.7	77.1	97.1	96.7	94.9	94.4	63.5	63.1
Greater than 32.0	86.5	87.3	82.0	79.2	97.3	97.0	94.9	94.5	69.0	67.1
Percent speaking Spanish but not English										
0	80.8	81.0	78.0	75.6	97.3	96.8	95.5	95.0	61.3	59.3
1–28	81.5	81.7	76.8	74.4	97.1	96.6	95.2	94.5	60.7	58.7
Greater than 28	84.0	85.6	80.1	77.4	97.1	96.8	94.4	94.1	65.3	64.2
Percent below 150 percent of poverty										
10.7 or less	78.0	78.6	74.4	72.0	96.9	96.2	95.2	94.6	56.3	54.4
10.8–20.0	79.7	80.8	76.6	75.3	97.1	96.7	95.2	94.8	59.3	58.8
20.1–33.3	83.6	84.9	79.2	77.3	96.9	96.7	94.6	93.9	64.2	63.4
Greater than 33.3	87.0	88.3	82.9	81.0	97.7	97.8	95.5	95.5	70.4	70.0
Median income (in dollars)										
28,400 or less	87.4	88.5	83.5	81.7	97.8	97.7	95.6	95.3	71.3	70.6
28,401–37,850	83.9	84.7	78.9	77.8	97.0	96.9	94.7	94.4	64.2	63.9
37,851–52,100	79.5	80.4	76.7	74.8	97.1	96.7	95.3	94.9	59.2	58.2
Greater than 52,100	77.5	78.4	73.9	71.2	96.8	96.0	94.9	94.2	55.4	53.6

See notes at end of table.

Table 11-1. Household Study unweighted (UW) and weighted (W) unit response rates, by analysis variable, in percent: 2003—Continued

Analysis variable	Screener		Background questionnaire		Assessment		Oral Module		Overall[1]	
	UW	W	UW	W	UW	W	UW	W	UW	W
Percent who rent										
16 or less	79.6	80.6	74.8	72.7	96.8	96.0	94.9	94.1	57.6	56.2
17–31	83.2	83.4	77.9	75.9	97.0	97.0	95.0	94.8	62.9	61.4
32–59	83.6	82.6	79.7	76.9	97.6	97.4	95.8	95.6	65.0	61.9
Greater than 59	81.2	82.5	81.0	79.3	97.3	96.8	94.8	94.3	63.9	63.3
Age (years)										
16–29	—	—	82.3	80.5	98.0	97.8	96.8	96.6	—	—
30–49	—	—	77.1	73.9	97.1	96.6	95.2	94.5	—	—
50–69	—	—	77.0	73.9	96.7	96.3	94.6	94.1	—	—
70+	—	—	75.4	74.2	96.3	95.5	91.8	91.3	—	—
Gender										
Male	—	—	75.3	72.7	96.5	96.0	94.2	93.6	—	—
Female	—	—	80.4	78.2	97.7	97.4	95.9	95.5	—	—
Race/ethnicity										
Hispanic	—	—	81.0	79.4	96.9	96.6	94.4	94.2	—	—
Non-Hispanic Black only	—	—	81.0	79.3	97.9	98.0	96.0	96.3	—	—
Other[3]	—	—	76.6	74.3	97.0	96.5	95.1	94.5	—	—

— Not available.
[1] Overall response rate is the product of the screener, background questionnaire, and assessment response rates.
[2] Metropolitan Statistical Area.
[3] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: The following are segment-level variables derived from block group data from Census 2000: average household size, percent with less than high school education, percent speaking Spanish but not English, percent below 150% of poverty, median income, and percent who rent. The following are person-level variables captured during the screening: age, gender, race/ethnicity.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

In the background questionnaire, the interviewer asked income items in several formats, first asking for income in 1 of 13 categories and then, if the sample person refused, asking a series of questions involving broader income classifications, with the goal of placing the sample person in one of eight income categories. For the computation of response rates, the eight personal income items were combined into one personal income variable, and the eight household income items were combined into one household income variable. A sample person is considered a respondent to the income item if he or she can be put into one of the eight income categories on the basis of the series of questions. The overall personal income weighted response rate is 92.7 percent, and the overall household income weighted response rate is 88.3 percent. Across all background questionnaire items, weighted item response rates range from 87.9 percent to 100 percent, with a median of 99.9 percent.

11.1.4 Nonresponse Bias Analysis

The analysis in this section is in accordance with NCES Standard 4-4. Standard 4-4-1 states that "any survey stage of data collection with a unit or item response rate less than 85 percent must be evaluated for the potential magnitude of nonresponse bias before the data or any analysis using the data may be released." As described in section 11.1.3, all items had a response rate of more than 85 percent, so an item nonresponse bias analysis was not carried out. Two data collection stages had weighted unit response rates below 85 percent: the Screener at 82 percent and the background questionnaire at 76 percent (see section 11.1.2). Section 11.1.4.1 presents the nonresponse bias analysis for the screener, and section 11.1.4.2 provides the nonresponse bias analysis for the background questionnaire.

11.1.4.1 Evaluating Bias Owing to Screener Nonresponse

A comparison of screener respondents and nonrespondents using variables known for both groups provides some indication of the potential for nonresponse bias in resulting survey estimates. The variables selected for the screener nonresponse bias analysis are displayed in table 11-2 and come from two sources: Census 2000 Public Law (PL) 94 county-level data and Census 2000 Summary File 3A (SF3A) block group-level data. The continuous variables from the SF3A were recoded into categories of approximately equal sample size.

Section 11.1.4.1.1 describes chi-square tests that may detect a significant relationship between response indicator and the analysis variable of interest. It also includes calculations of bias used in estimating the distribution of analysis variables. Section 11.1.4.1.2 provides a multivariate analysis of the relationship between response indicator and analysis variables that may reveal the areas with the greatest potential for bias before weighting adjustments. Finally, section 11.1.4.1.3 shows the effect of the weighting adjustments on the potential for nonresponse bias.

Table 11-2. Household Study variables used in screener nonresponse bias analysis, by source and values: 2003

Variable description	Source[1]	Values
Region	PL-94	1: Northeast 2: Midwest 3: South 4: West
MSA[2] status	PL-94	1: MSA 2: Non-MSA
Average household size	SF3A	1: 2.42 or less 2: 2.43–2.80 3: Greater than 2.80
Percent aged 25+ with less than high school education	SF3A	1: 10.4 or less 2: 10.5–20.3 3: 20.4–32.0 4: Greater than 32.0
Percent aged 5–64 speaking Spanish at home and English not well or not at all	SF3A	1: 0 2: 1–28 3: Greater than 28
Percent below 150 percent of poverty	SF3A	1: 10.7 or less 2: 10.8–20.0 3: 20.1–33.3 4: Greater than 33.3
Median income (in dollars)	SF3A	1: 28,400 or less 2: 28,401–37,850 3: 37,851–52,100 4: Greater than 52,100
Percent who rent	SF3A	1: 16 or less 2: 17–31 3: 32–59 4: Greater than 59

[1] The SF3A (Summary File 3A) and PL-94 (county-level Public Law 94) variables provide relevant statistics for the block group or the county of the sampled dwelling unit.
[2] Metropolitan Statistical Area.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy; U.S. Department of Commerce, U.S. Census Bureau, Decennial Census, 2000.

11.1.4.1.1 Screener Bivariate Analysis

The distribution of screener respondents was compared with the distribution of all eligible sampled dwelling units for each of the table 11-2 variables. Weighted percentages and standard errors (SEs) were calculated in the WesVar software, using replicated composite screener base weights. To test the significance of the relationship between response status and each of the table 11-2 variables, a Rao-Scott chi-square (RS3) test of independence (Rao and Scott 1984) was performed. In addition, an estimate of bias was calculated for each domain. Bias was estimated as

$$Bias(\overline{y}_R) = (1 - W_R)(\overline{Y}_R - \overline{Y}_N), \tag{3}$$

where W_R is the weighted unit screener response rate (82.2 percent), $\overline{Y}_R$ is the weighted estimate of the domain percentage for respondents, and $\overline{Y}_N$ is the weighted estimate of the domain percentage for nonrespondents. A *t* test[1] was performed to determine whether the bias was significantly different from 0. In accordance with NCES Guideline 5-1-4A, the *t* tests used a simple Bonferroni adjustment to control the overall α-level (0.05) for each domain variable. The Bonferroni adjustment is appropriate for a small number of comparisons (Miller 1981). The adjustment was computed as $\alpha' = \alpha/g$, where *g* is the number of comparisons. For example, for average household size, three *t* tests were conducted. The Bonferroni adjustment was $\alpha'=0.05/3=0.0166$. Therefore, any *p* values of less than α′ in the table were considered statistically significant.

The results of the Rao-Scott chi-square analysis are presented in table 11-3. At the 5 percent α-level, all analysis variables have a significant relationship to screener response status except the percentage of householders who rent their homes. The results of the *t* tests for bias (shown in table 11-4) are consistent with the chi-square analysis. After the Bonferroni adjustment, the bias in estimating the domain percentages is significantly different from 0 for at least one domain of each variable in table 11-2, with the exception of Metropolitan Statistical Area (MSA) status and the percentage of householders who rent their homes. This finding is supported by the evidence of differential response rates among the subgroup domains shown in table 11-1. For instance, dwelling units in segments with a median income of less than $28,400 had a relatively high weighted screener response rate of 88.5 percent. Using only

respondents, without weighting adjustments, would result in an overestimate of this domain percentage by 1.3 (or 7.68 percent), as shown in table 11-4. For this domain, the bias is fairly minor in relation to the

[1]A *t* test is used to compare the means of two domain-level estimates.

Table 11-3. Household Study sample distribution of screener respondents versus eligible dwelling units, by analysis domain: 2003

Analysis domain	Respondents			Eligibles			Chi-square	
	Number of respondents	Domain percent	Standard error	Number of eligibles	Domain percent	Standard error	Statistic	*p* value
Region								
Northeast	4,930	16.1	1.49	6,662	17.5	1.61	20.59	0.000
Midwest	4,612	24.7	1.23	5,587	24.5	1.29		
South	11,134	37.2	1.74	13,226	36.6	1.74		
West	4,447	22.0	0.95	5,219	21.4	0.96		
MSA[1] status								
Non-MSA	4,875	20.8	1.40	5,713	20.0	1.37	4.45	0.035
MSA	20,248	79.3	1.40	24,981	80.0	1.37		
Average household size								
2.42 or less	8,125	33.4	1.58	10,155	34.1	1.48	10.80	0.004
2.43–2.80	8,793	35.1	1.35	10,748	35.3	1.31		
Greater than 2.80	8,205	31.5	1.87	9,791	30.7	1.79		
Percent with less than high school education								
10.4 or less	6,378	31.5	1.70	8,220	33.1	1.66	43.12	0.000
10.5–20.3	6,445	27.8	1.37	7,962	27.9	1.33		
20.4–32.0	6,240	22.9	1.29	7,508	22.2	1.20		
Greater than 32.0	6,060	17.8	1.32	7,004	16.8	1.23		
Percent speaking Spanish but not English								
0	10,021	42.3	2.08	12,403	42.9	2.05	13.42	0.001
1–28	8,439	36.5	1.47	10,359	36.8	1.52		
Greater than 28	6,663	21.2	1.61	7,932	20.4	1.50		
Percent below 150 percent of poverty								
10.7 or less	6,693	32.7	1.42	8,576	34.2	1.39	51.95	0.000
10.8–20.0	6,218	26.8	1.60	7,803	27.2	1.57		
20.1–33.3	5,952	23.2	1.62	7,117	22.4	1.51		
Greater than 33.3	6,260	17.4	1.18	7,198	16.2	1.10		
Median income (in dollars)								
28,400 or less	6,264	18.8	1.41	7,168	17.5	1.31	72.17	0.000
28,401–37,850	6,129	24.4	1.34	7,302	23.6	1.27		
37,851–52,100	6,195	25.6	1.47	7,797	26.2	1.39		
Greater than 52,100	6,535	31.2	1.68	8,427	32.7	1.61		
Percent who rent								
16 or less	6,636	31.8	1.54	8,336	32.4	1.52	6.13	0.084
17–31	6,470	27.5	1.55	7,780	27.0	1.53		
32–59	6,281	22.5	1.24	7,514	22.4	1.25		
Greater than 59	5,736	18.3	0.84	7,064	18.2	0.83		

[1] Metropolitan Statistical Area.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-4. Household Study estimates of screener nonresponse bias, by analysis domain: 2003

Analysis domain	Eligibles: Domain percent (1)	Eligibles: SE[1] (2)	Respondent domain percent (3)	Non-respondent domain percent (4)	Bias: Estimate (5)	Bias: SE[1] (6)	Bias: *p* value (7)	Relative bias (5)/(1)*100	Bias ratio (5)/(2)
Region									
Northeast	17.5	1.61	16.1	24.0	–1.4	0.24	0.000*	–7.93	–0.86
Midwest	24.5	1.29	24.7	23.5	0.2	0.40	0.610	0.86	0.16
South	36.6	1.74	37.2	34.2	0.5	0.41	0.204	1.45	0.30
West	21.4	0.96	22.0	18.3	0.7	0.27	0.016	3.09	0.69
MSA[2] status									
Non-MSA	20.0	1.37	20.8	16.8	0.7	0.34	0.041	3.54	0.52
MSA	80.0	1.37	79.3	83.2	–0.7	0.34	0.041	–0.89	–0.52
Average household size									
2.42 or less	34.1	1.48	33.4	37.4	–0.7	0.29	0.019	–2.08	–0.48
2.43–2.80	35.3	1.31	35.1	35.9	–0.2	0.27	0.588	–0.43	–0.11
Greater than 2.80	30.7	1.79	31.5	26.7	0.9	0.28	0.003*	2.81	0.48
Percent with less than high school education									
10.4 or less	33.1	1.66	31.5	40.6	–1.6	0.32	0.000*	–4.89	–0.98
10.5–20.3	27.9	1.33	27.8	28.5	–0.1	0.20	0.527	–0.47	–0.10
20.4–32	22.2	1.20	22.9	19.0	0.7	0.25	0.006*	3.11	0.58
Greater than 32	16.8	1.23	17.8	11.9	1.1	0.20	0.000*	6.27	0.85
Percent speaking Spanish but not English									
0	42.9	2.05	42.3	45.7	–0.6	0.29	0.036	–1.45	–0.30
1–28	36.8	1.52	36.5	37.8	–0.2	0.29	0.425	–0.63	–0.15
Greater than 28	20.4	1.50	21.2	16.4	0.9	0.22	0.000*	4.18	0.57
Percent below 150 percent of poverty									
10.7 or less	34.2	1.39	32.7	41.1	–1.5	0.31	0.000*	–4.35	–1.07
10.8–20.0	27.2	1.57	26.8	29.3	–0.4	0.25	0.079	–1.65	–0.29
20.1–33.3	22.4	1.51	23.2	19.0	0.7	0.24	0.003*	3.30	0.49
Greater than 33.3	16.2	1.10	17.4	10.6	1.2	0.16	0.000*	7.43	1.09
Median income (in dollars)									
28,400 or less	17.5	1.31	18.8	11.3	1.3	0.17	0.000*	7.68	1.02
28,401–37,850	23.6	1.27	24.4	20.3	0.7	0.23	0.003*	3.09	0.57
37,851–52,100	26.2	1.39	25.6	28.8	–0.6	0.22	0.012*	–2.17	–0.41
Greater than 52,100	32.7	1.61	31.2	39.7	–1.5	0.26	0.000*	–4.62	–0.94
Percent who rent									
16 or less	32.4	1.52	31.8	35.2	–0.6	0.26	0.023	–1.85	–0.39
17–31	27.0	1.53	27.5	25.1	0.4	0.25	0.104	1.55	0.27
32–59	22.4	1.25	22.5	21.8	0.1	0.22	0.596	0.54	0.10
Greater than 59	18.2	0.83	18.3	17.9	0.1	0.16	0.673	0.38	0.08

* Statistically significant with simple Bonferroni adjustment at $\alpha = 0.05$.
[1] Standard error.
[2] Metropolitan Statistical Area.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

standard error; the ratio of bias to the standard error is 1.02. A bias ratio over 1.96 would provide a strong indication of potential bias, since the estimate based on respondents would differ from the estimate based on eligibles by more than 1.96 times the standard error of the estimate.

Although the relationships between response status and the table 11-2 variables are significant, the differences between the distributions of respondents and eligible dwelling units are minor. The absolute bias is less than 2 for all estimated domain percentages. In addition, many of the table 11-2 variables were used in weighting adjustments, and so differences between respondents and eligible dwelling units were reduced through the weighting process (refer to section 11.1.4.1.3). Therefore, the bivariate analysis indicates minimal potential for bias at the screener level, and thus minimal impact of screener nonresponse on literacy scores, assuming that literacy scores are highly correlated with the variables used in the weighting adjustments.

11.1.4.1.2 Screener Multivariate Analysis

The bivariate analysis described in section 11.1.4.1.1 is useful in explaining each variable individually. A multivariate analysis is useful in showing relationships among a number of variables. One approach is to provide a CHAID analysis. CHAID is a classification algorithm that uses chi-square tests to divide a sample into subgroups that best explain differential response rates.

The analysis in CHAID begins by dividing the sample into two or more groups on the basis of the categories of the best predictor. Each of these groups is divided into smaller subgroups on the basis of the best available predictor at each level. The splitting process continues until either no significant predictor remains or the minimum cell size requirement is met. The CHAID software displays the final subgroups in the form of a tree diagram whose branches (nodes) correspond to the groups. The resulting classification tree reveals the domains, as defined by combinations of variables, with the most differential response rates, thereby leading to domains with the highest potential for nonresponse bias.

CHAID was run with screener response status as the dependent variable and the table 11-2 variables as the independent variables. Cell sizes were limited to 300 or more dwelling units (approximately 1 percent of the sample), and up to three-way interactions were allowed (three tree levels). The resulting tree is shown in figure 11-1 and summarized in table 11-5. Twenty-five cells were formed,

Figure 11-1. Household Study multivariate CHAID analysis of screener response indicators: 2003

Median income (in dollars)						
28,400 or less	88.5% (7,168)	Region				
		Northeast	81.1% (1,309)	Cell 1		
		Midwest, South, West	89.8% (5,859)	Household size		
				2.42 or less	87.5% (2,336)	Cell 2
				2.43–2.80	90.5% (1,938)	Cell 3
				Greater than 2.80	93.1% (1,585)	Cell 4
28,401–37,850	84.7% (7,302)	Region				
		Northeast	77.0% (1,251)	Cell 5		
		Midwest, South, West	86.1% (6,051)	Household size		
				2.42 or less	84.6% (2,355)	Cell 6
				Greater than 2.42	87.2% (3,696)	Cell 7
37,851–52,100	80.4% (7,797)	Region				
		Northeast	73.2% (1,652)	Percent who rent		
				59% or less	74.8% (1,235)	Cell 8
				Greater than 59%	64.4% (417)	Cell 9
		Midwest	79.6% (1,677)	Cell 10		
		South	82.1% (3,251)	Percent below poverty		
				10.7% or less	74.3% (491)	Cell 11
				10.8–20.0%	81.7% (2,156)	Cell 12
				Greater than 20.0%	91.3% (604)	Cell 13
		West	84.6% (1,217)	Percent who speak Spanish, not English		
				28% or less	81.6% (674)	Cell 14
				Greater than 28%	91.7% (543)	Cell 15

Overall weighted response rate = 82.2 percent
Total number of eligibles = 30,694

See notes at end of figure.

Figure 11-1. Household Study multivariate CHAID analysis of screener response indicators: 2003—Continued

Median income (in dollars)						
Greater than 52,100	78.4% (8,427)	Household size				
		2.42 or less	72.5% (1,698)	Percent who rent		
				16% or less	74.4% (378)	Cell 16
				17–31%	83.3% (423)	Cell 17
				32–59%	68.0% (581)	Cell 18
				Greater than 59%	59.7% (316)	Cell 19
		2.43–2.80	77.5% (2,694)	Region		
				Northeast, West	77.4% (1,197)	Cell 20
				Midwest	81.7% (622)	Cell 21
				South	72.1% (875)	Cell 22
		Greater than 2.80	81.5% (4,035)	Percent who rent		
				16% or less	81.7% (3,069)	Cell 23
				17–31%	78.1% (601)	Cell 24
				Greater than 31%	88.9% (365)	Cell 25

NOTE: CHAID software uses a classification algorithm to divide the sample into subgroups that best explain differential response rates. All percentages are weighted response rates and the numbers inside the parentheses are sample sizes.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-5. Household Study multivariate CHAID analysis of screener response indicators, by response cell: 2003

Response cell	Number of eligibles	Number of respondents	Unweighted response rate (percent)	Weighted response rate (percent)
Overall	30,694	25,123	81.9	82.2
1	1,309	1,036	79.1	81.1
2	2,336	2,041	87.4	87.5
3	1,938	1,729	89.2	90.5
4	1,585	1,458	92.0	93.1
5	1,251	945	75.5	77.0
6	2,355	1,980	84.1	84.6
7	3,696	3,204	86.7	87.2
8	1,235	915	74.1	74.8
9	417	264	63.3	64.4
10	1,677	1,317	78.5	79.6
11	491	374	76.2	74.3
12	2,156	1,748	81.1	81.7
13	604	534	88.4	91.3
14	674	551	81.8	81.6
15	543	492	90.6	91.7
16	378	276	73.0	74.4
17	423	341	80.6	83.3
18	581	403	69.3	68.0
19	316	187	59.2	59.7
20	1,197	907	75.8	77.4
21	622	493	79.3	81.7
22	875	674	77.0	72.1
23	3,069	2,474	80.6	81.7
24	601	467	77.7	78.1
25	365	313	85.8	88.9

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

with weighted response rates ranging from 59.7 percent to 93.1 percent. The lowest response rate was for the group within segments with high median income (greater than $52,100), small average household size (2.42 or less), and a large proportion of renters (greater than 59 percent). The highest response rate was for the group within segments with low median income ($28,400 or less) and large average household size (greater than 2.8), in the Midwest, South, or West. Median income was the dominant variable in distinguishing response rate groups, which is consistent with the results of the bivariate analysis. Region, household size, percentage of householders who rent, percentage below 150 percent of poverty, and percentage speaking Spanish but not English were also significant contributors to the CHAID tree.

Although the CHAID tree is useful for dissecting the sample into fine groups of dwelling units with response patterns as different as possible, it should be used with caution because CHAID does not take into account the complex design of the sample. Consequently, the significance level of the test may be lower than the 0.05 α-level indicated. If the appropriate significance level could be used, then the tree might have fewer significant response cells. Thus, the tree shown in figure 11-1 is a conservative picture because any indication of nonresponse bias shown by the CHAID results may be overstated.

Logistic regression models are also useful in identifying significant effects on response propensity. Screener response status was used as the binary dependent variable, and the table 11-2 variables were used as the predictors. The main effects model had the form

$$\log\left[\frac{\Pr(\text{Response})}{1-\Pr(\text{Response})}\right] = A + \sum B_i X_{ij} \ ,$$

where the X_{ij}'s are indicator variables for the table 11-2 variables. An F test was performed on each table 11-2 variable to determine whether it was significantly related to response propensity.

The results of the logistic regression analysis are presented in table 11-6. Three variables—region, average household size, and median income—were significantly related to response propensity at the 5 percent α-level. Response propensity is significantly lower in the Northeast than in the West, in segments with small average household sizes compared to those with large average household sizes, and in high median income segments compared to lower median income segments. The results are consistent with the CHAID analysis: The same three variables were selected into the first two levels of the CHAID tree. All three variables were used in adjusting the screener weights for nonresponse for at least one SAAL state or for the NAAL sample. Thus, the potential for nonresponse bias suggested by the multivariate analysis was reduced through the weighting adjustments, as shown in section 11.1.4.1.3.

Table 11-6. Household Study multivariate logistic regression analysis of screener response indicators, by predictor: 2003

Predictor	*F* test				Regression coefficient	
	F statistic	Numerator *df*[1]	Denominator *df*[1]	*p* value	Estimate	*p* value
Overall fit	9.98	20	42	0.000	†	†
Region	14.71	3	59	0.000	†	†
Northeast	†	†	†	†	–0.52	0.000
Midwest	†	†	†	†	–0.07	0.602
South	†	†	†	†	–0.15	0.216
MSA[2] status	0.11	1	61	0.745	†	†
Average household size	12.27	2	60	0.000	†	†
2.42 or less	†	†	†	†	–0.41	0.000
2.43–2.80	†	†	†	†	–0.28	0.001
Percent with less than high school	0.45	3	59	0.718	†	†
Percent speaking Spanish but not	0.06	2	60	0.941	†	†
Percent below 150 percent of	0.10	3	59	0.961	†	†
Median income (in dollars)	5.88	3	59	0.001	†	†
28,400 or less	†	†	†	†	0.74	0.000
28,401–37,850	†	†	†	†	0.43	0.012
37,851–52,100	†	†	†	†	0.12	0.299
Percent who rent	2.01	3	59	0.122	†	†

† Not applicable.
[1] Degrees of freedom.
[2] Metropolitan Statistical Area.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

11.1.4.1.3 Potential for Screener Nonresponse Bias Remaining After Weighting Procedures

As described in section 12.1.3, weighting procedures were implemented to reduce the potential for nonresponse bias by creating nonresponse adjustment classes for which the respondents' literacy-related characteristics are similar to those of nonrespondents. The extent of the reduction in nonresponse bias depends on the correlation of the weighting class variables with literacy scores.

Tables 11-7 through 11-13 show *t* test results for the change in the distribution of sample cases after each screener weighting stage for the national sample and each of the six participating states. The *t* tests were performed to determine whether the change in the estimated domain percentage is significantly different from 0. A simple Bonferroni adjustment was used to control the overall α-level at 0.05 for each domain. The adjustment is computed as $\alpha' = \alpha/g$, where *g* is the number of comparisons. Therefore, any *p* values less than α' in the tables can be considered statistically significant. Calculations of the bias ratio of estimated percentages are also included. Although the *t* test may indicate a statistically significant difference, the difference may not be important. Thus, it is also useful to look at the bias ratio, the ratio of the bias to the standard error of the estimate, to gauge the importance of the potential bias. That is, if the absolute value of the bias to standard error ratio is greater than 1.96, then the ratio provides a strong indication of potential bias.

The checks were performed separately for the national NAAL household sample and each of the six SAAL states to reflect the weighting process. Unlike the results in table 11-3, these comparisons use the actual survey weights, which were processed separately for each household sample. The following comparisons were made for each of the analysis domains in table 11-2:

- Comparison of distributions from screener base weights for the estimated eligible population with those for the screener respondents only, to check for differences owing to screener nonresponse, and
- Comparison of distributions from screener base weights for the estimated eligible population with those from the screener nonresponse-adjusted weights, to check for differences even after the nonresponse adjustment to the screener.

The *p* values resulting from the first set of comparisons indicate a significant difference between the eligible dwelling units and respondents for most of the subgroups when base weights are used. This result is comparable to those obtained for the bivariate and multivariate analyses described in sections 11.1.4.1.1 and 11.1.4.1.2, respectively. A nonresponse adjustment was necessary to reduce the bias in estimates based on data from respondents only.

The *p* values resulting from the second set of comparisons show that for most of the subgroups, there is no significant difference between the weighted distribution of eligible dwelling units and the respondents after the nonresponse adjustment. For the national NAAL sample, the one variable with a significant difference is average household size, but the bias is minor, at less than half the standard error of the estimated percentage. Therefore, the nonresponse adjustment appears to have been effective in reducing the bias owing to screener nonresponse, to the extent that table 11-2 variables are related to literacy. For the state samples, fewer variables were available for use in nonresponse adjustments because of the smaller sample sizes; therefore, the bias estimates are generally higher. However, the bias ratio remains less than 1.00 for all estimates in the tables.

Table 11-7. Household Study screener weighting effects for the national NAAL household sample, by subgroup: 2003

Subgroup	Base weight —eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
Region												
Northeast	19.3	0.51	18.0	–1.3	0.24	0.000*	–2.48	19.3	#	0.04	0.371	–0.06
Midwest	23.3	0.81	23.3	0.1	0.28	0.827	0.09	23.2	#	0.09	0.607	–0.05
South	36.3	0.85	37.0	0.8	0.28	0.006*	0.92	36.4	0.1	0.07	0.148	0.11
West	21.2	0.63	21.6	0.4	0.23	0.070	0.65	21.2	#	0.07	0.806	–0.03
MSA[2] status												
Non-MSA	20.6	0.59	20.8	0.3	0.23	0.226	0.48	20.5	#	0.15	0.931	–0.03
MSA	79.4	0.59	79.2	–0.3	0.23	0.226	–0.48	79.5	#	0.15	0.931	0.03
Average household size												
2.42 or less	33.9	1.63	33.1	–0.8	0.27	0.006*	–0.48	33.3	–0.6	0.21	0.005*	–0.38
2.43–2.80	35.6	1.47	35.5	–0.1	0.23	0.637	–0.08	35.7	0.1	0.20	0.661	0.06
Greater than 2.80	30.5	1.95	31.4	0.9	0.24	0.001*	0.45	31.0	0.5	0.16	0.002*	0.27
Percent with less than high school education												
10.4 or less	33.0	1.64	31.4	–1.6	0.29	0.000*	–0.98	32.7	–0.3	0.21	0.165	–0.18
10.5–20.3	28.2	1.37	28.1	–0.1	0.21	0.511	–0.09	28.2	#	0.19	0.898	0.02
20.4–32.0	22.0	1.12	22.6	0.7	0.19	0.001*	0.59	22.1	0.2	0.14	0.165	0.17
Greater than 32.0	16.8	1.31	17.9	1.1	0.16	0.000*	0.83	16.9	0.1	0.08	0.353	0.05
Percent speaking Spanish but not English												
0	43.4	2.10	42.3	–1.1	0.24	0.000*	–0.53	43.2	–0.2	0.21	0.313	–0.10
1–28	36.6	1.56	36.4	–0.2	0.24	0.371	–0.13	36.7	#	0.22	0.953	0.01
Greater than 28	19.9	1.56	21.2	1.3	0.20	0.000*	0.84	20.1	0.2	0.11	0.081	0.12

See notes at end of table.

Table 11-7. Household Study screener weighting effects for the national NAAL household sample, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Percent below 150 percent of poverty												
10.7 or less	34.4	1.41	32.9	–1.5	0.25	0.000*	–1.06	34.5	#	0.03	0.224	0.03
10.8–20.0	27.2	1.56	26.9	–0.3	0.21	0.218	–0.17	27.1	#	0.03	0.224	–0.03
20.1–33.3	22.0	1.55	22.6	0.6	0.18	0.002*	0.37	22.0	#	0.00	0.917	0.00
Greater than 33.3	16.4	1.14	17.6	1.2	0.14	0.000*	1.04	16.4	#	0.00	0.854	0.00
Median income (in dollars)												
28,400 or less	18.0	1.35	19.1	1.1	0.15	0.000*	0.82	18.1	#	0.07	0.595	0.03
28,401–37,850	23.3	1.31	24.0	0.7	0.22	0.005*	0.50	23.5	0.2	0.15	0.299	0.12
37,851–52,100	25.5	1.48	25.3	–0.2	0.21	0.318	–0.14	25.4	–0.1	0.17	0.663	–0.05
Greater than 52,100	33.2	1.59	31.6	–1.5	0.24	0.000*	–0.96	33.0	–0.1	0.18	0.508	–0.07
Percent who rent												
16 or less	33.1	1.69	32.4	–0.7	0.23	0.003*	–0.42	33.2	0.1	0.21	0.785	0.04
17–31	27.3	1.58	27.4	0.1	0.21	0.696	0.05	27.4	0.1	0.18	0.775	0.03
32–59	22.1	1.40	22.3	0.2	0.20	0.276	0.16	22.1	#	0.18	0.955	0.01
Greater than 59	17.5	0.84	18.0	0.4	0.14	0.005*	0.49	17.4	–0.1	0.11	0.295	–0.14

† Not applicable.
# Rounds to zero.
* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Metropolitan Statistical Area.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-8. Household Study screener weighting effects for Kentucky, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
MSA[2] status												
Non-MSA	52.0	1.34	53.3	1.3	0.60	0.038	0.99	52.4	0.3	0.41	0.429	0.25
MSA	48.0	1.34	46.7	–1.3	0.60	0.038	–0.99	47.6	–0.3	0.41	0.429	–0.25
Average household size												
2.42 or less	34.4	3.68	34.2	–0.1	0.43	0.771	–0.04	33.8	–0.6	0.38	0.150	–0.16
2.43–2.80	53.4	3.82	53.3	–0.1	0.49	0.841	–0.03	53.4	0.1	0.50	0.862	0.02
Greater than 2.80	12.3	3.29	12.5	0.2	0.36	0.538	0.07	12.8	0.5	0.39	0.224	0.15
Percent with less than high school education												
10.4 or less	17.3	3.23	16.4	–0.9	0.47	0.059	–0.29	17.2	–0.1	0.14	0.464	–0.03
10.5–20.3	20.3	3.48	19.5	–0.8	0.42	0.077	–0.23	20.4	0.1	0.18	0.623	0.03
20.4–32.0	36.6	4.53	37.2	0.6	0.39	0.134	0.14	36.6	#	0.12	0.737	0.01
Greater than 32.0	25.8	3.00	26.9	1.1	0.38	0.008*	0.37	25.8	#	0.10	0.843	–0.01
Percent speaking Spanish but not English												
0	61.9	3.95	62.4	0.5	0.61	0.448	0.12	61.9	#	0.00	0.931	0.00
1–28	32.0	3.00	31.9	–0.1	0.50	0.816	–0.04	32.2	0.1	0.19	0.476	0.05
Greater than 28	6.1	1.77	5.7	–0.4	0.23	0.137	–0.20	5.9	–0.1	0.19	0.476	–0.08
Percent below 150 percent of poverty												
10.7 or less	15.7	2.78	14.2	–1.5	0.39	0.001*	–0.54	15.2	–0.5	0.19	0.021	–0.17
10.8–20.0	27.3	2.80	26.8	–0.5	0.50	0.311	–0.19	27.9	0.6	0.36	0.118	0.21
20.1–33.3	26.0	4.38	26.6	0.7	0.33	0.053	0.16	26.0	#	0.35	0.982	0.00
Greater than 33.3	31.0	4.33	32.3	1.3	0.39	0.003*	0.31	30.9	–0.1	0.20	0.592	–0.03

See notes at end of table.

Table 11-8. Household Study screener weighting effects for Kentucky, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Median income (in dollars)												
28,400 or less	30.2	4.13	31.8	1.6	0.35	0.000*	0.38	30.2	#	0.00	0.946	0.00
28,401–37,850	27.6	4.23	28.7	1.0	0.37	0.013	0.24	27.6	#	0.00	0.883	0.00
37,851–52,100	28.3	2.53	26.7	–1.7	0.57	0.009*	–0.66	28.3	#	0.00	0.824	0.00
Greater than 52,100	13.8	2.44	12.9	–0.9	0.52	0.089	–0.38	13.8	#	0.00	0.827	0.00
Percent who rent												
16 or less	28.8	2.93	27.9	–0.9	0.47	0.081	–0.29	28.6	–0.2	0.37	0.605	–0.06
17–31	39.4	3.46	39.3	–0.1	0.47	0.867	–0.02	39.4	#	0.36	0.964	0.00
32–59	22.0	2.40	22.7	0.7	0.34	0.068	0.28	22.2	0.2	0.26	0.534	0.07
Greater than 59	9.8	1.72	10.1	0.3	0.24	0.251	0.17	9.8	#	0.16	0.935	0.01

†Not applicable.
Rounds to zero.
*Statistically significant with Bonferroni adjustment at $\alpha = 0.05$.
[1]Standard error.
[2]Metropolitan Statistical Area.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-9. Household Study screener weighting effects for Maryland, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias					Bias			
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	Bias ratio (3)-(1)/(2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	Bias ratio (4)-(1)/(2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
MSA[2] status												
Non-MSA	6.8	1.30	6.8	#	0.21	0.997	0.00	6.8	#	0.22	0.977	–0.01
MSA	93.2	1.30	93.2	#	0.21	0.997	0.00	93.2	#	0.22	0.977	0.01
Average household size												
2.42 or less	38.7	4.47	38.6	–0.2	0.51	0.772	–0.04	38.4	–0.4	0.49	0.455	–0.08
2.43–2.80	30.0	3.37	30.4	0.4	0.57	0.499	0.12	30.6	0.6	0.42	0.141	0.19
Greater than 2.80	31.3	4.61	31.1	–0.2	0.49	0.624	–0.05	31.0	–0.3	0.58	0.645	–0.06
Percent with less than high school education												
10.4 or less	44.9	3.35	45.2	0.3	0.92	0.740	0.09	44.8	–0.1	0.46	0.814	–0.03
10.5–20.3	28.0	4.35	27.5	–0.6	0.78	0.471	–0.13	27.8	–0.2	0.59	0.707	–0.05
20.4–32.0	19.3	3.93	19.1	–0.3	0.71	0.718	–0.07	19.2	–0.1	0.57	0.874	–0.02
Greater than 32.0	7.7	1.47	8.3	0.5	0.42	0.233	0.36	8.2	0.4	0.25	0.106	0.29
Percent speaking Spanish but not English												
0	56.4	5.48	56.6	0.2	0.68	0.765	0.04	56.4	–0.1	0.64	0.930	–0.01
1–28	35.5	5.32	35.2	–0.4	0.80	0.669	–0.07	35.6	0.1	0.72	0.903	0.02
Greater than 28	8.1	1.49	8.2	0.1	0.48	0.776	0.09	8.0	#	0.42	0.941	–0.02
Percent below 150 percent of poverty												
10.7 or less	59.0	3.68	59.1	0.1	0.77	0.951	0.01	58.6	–0.5	0.56	0.432	–0.12
10.8–20.0	25.2	4.10	24.8	–0.4	0.80	0.600	–0.10	25.2	#	0.68	0.966	–0.01
20.1–33.3	10.3	1.81	10.3	–0.1	0.64	0.945	–0.03	10.4	0.1	0.58	0.861	0.06
Greater than 33.3	5.4	1.31	5.8	0.4	0.18	0.033	0.33	5.8	0.4	0.37	0.324	0.29

See notes at end of table.

Table 11-9. Household Study screener weighting effects for Maryland, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias					Bias			
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	Bias ratio (3)-(1)/(2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	Bias ratio (4)-(1)/(2)
Median income (in dollars)												
28,400 or less	7.9	1.79	8.3	0.4	0.37	0.246	0.25	8.5	0.6	0.32	0.067	0.35
28,401–37,850	13.4	3.76	13.1	–0.4	0.66	0.582	–0.10	13.2	–0.3	0.36	0.460	–0.07
37,851–52,100	22.5	3.06	22.0	–0.5	0.91	0.611	–0.15	22.3	–0.2	0.70	0.765	–0.07
Greater than 52,100	56.2	2.80	56.6	0.4	0.79	0.622	0.14	56.1	–0.1	0.48	0.782	–0.05
Percent who rent												
16 or less	35.2	4.46	35.3	0.1	0.49	0.861	0.02	35.2	#	0.59	0.980	0.00
17–31	25.7	3.27	25.0	–0.7	0.63	0.260	–0.22	25.3	–0.5	0.81	0.588	–0.14
32–59	24.0	4.70	24.1	0.1	0.62	0.865	0.02	24.1	0.1	0.45	0.875	0.01
Greater than 59	15.1	4.12	15.6	0.5	0.48	0.280	0.13	15.5	0.4	0.70	0.611	0.09

† Not applicable.
# Rounds to zero.
[1] Standard error.
[2] Metropolitan Statistical Area.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-10. Household Study screener weighting effects for Massachusetts, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias					Bias			
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	Bias ratio (3)-(1)/(2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	Bias ratio (4)-(1)/(2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
MSA[2] status												
Non-MSA	1.6	0.45	1.5	–0.1	0.20	0.602	–0.24	1.5	#	0.23	0.870	–0.09
MSA	98.4	0.45	98.6	0.1	0.20	0.602	0.24	98.5	#	0.23	0.870	0.09
Average household size												
2.42 or less	37.7	4.66	37.3	–0.5	0.61	0.470	–0.10	37.6	–0.1	0.43	0.787	–0.03
2.43–2.80	33.0	2.93	32.9	–0.1	0.73	0.879	–0.04	33.1	0.1	0.47	0.836	0.03
Greater than 2.80	29.3	4.29	29.9	0.6	0.58	0.346	0.13	29.3	#	0.41	0.960	0.00
Percent with less than high school education												
10.4 or less	45.1	6.09	44.6	–0.5	1.04	0.638	–0.08	45.1	#	0.51	0.998	0.00
10.5–20.3	34.2	5.45	33.8	–0.4	0.98	0.709	–0.07	34.0	–0.2	0.69	0.764	–0.04
20.4–32.0	9.4	2.32	9.5	0.1	0.51	0.875	0.03	9.6	0.2	0.45	0.691	0.08
Greater than 32.0	11.4	1.98	12.1	0.8	0.25	0.005*	0.40	11.4	#	0.13	0.834	0.02
Percent speaking Spanish but not English												
0	61.3	2.78	59.7	–1.6	0.91	0.093	–0.57	60.6	–0.7	0.90	0.435	–0.26
1–28	31.0	2.73	31.4	0.4	0.99	0.704	0.14	31.5	0.5	0.93	0.610	0.18
Greater than 28	7.7	1.70	9.0	1.2	0.34	0.002*	0.72	8.0	0.2	0.16	0.160	0.14
Percent below 150 percent of poverty												
10.7 or less	54.4	5.20	53.4	–1.1	1.08	0.344	–0.20	54.1	–0.4	0.65	0.589	–0.07
10.8–20.0	19.3	5.29	19.3	#	0.60	0.993	0.00	19.4	0.1	0.67	0.859	0.02
20.1–33.3	16.8	3.34	17.4	0.6	0.79	0.446	0.18	17.3	0.5	0.34	0.173	0.14
Greater than 33.3	9.51	1.81	10.0	0.4	0.53	0.413	0.24	9.3	–0.2	0.24	0.340	–0.13

See notes at end of table.

Table 11-10. Household Study screener weighting effects for Massachusetts, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias					Bias			
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	Bias ratio (3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	Bias ratio (4)-(1) / (2)
Median income (in dollars)												
28,400 or less	9.2	2.47	9.6	0.4	0.62	0.470	0.18	9.4	0.2	0.34	0.491	0.09
28,401–37,850	10.0	1.50	10.7	0.7	0.23	0.006*	0.49	10.4	0.4	0.36	0.259	0.28
37,851–52,100	32.4	4.16	31.7	–0.7	0.97	0.451	–0.18	31.8	–0.7	0.34	0.062	–0.16
Greater than 52,100	48.4	3.99	48.0	–0.4	1.07	0.683	–0.11	48.5	#	0.09	0.862	0.00
Percent who rent												
16 or less	34.0	4.07	33.2	–0.9	0.70	0.224	–0.21	33.4	–0.6	0.69	0.404	–0.14
17–31	17.8	1.99	17.9	0.1	0.64	0.946	0.03	18.1	0.3	0.54	0.553	0.17
32–59	21.6	3.71	21.8	0.1	0.65	0.860	0.03	22.0	0.4	0.69	0.589	0.10
Greater than 59	26.5	2.45	27.2	0.7	0.84	0.403	0.29	26.4	–0.1	0.50	0.818	–0.04

† Not applicable.
# Rounds to zero.
* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Metropolitan Statistical Area.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-11. Household Study screener weighting effects for Missouri, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
MSA[2] status												
Non-MSA	32.7	1.86	34.0	1.3	0.45	0.008*	0.72	32.8	0.1	0.26	0.718	0.05
MSA	67.3	1.86	66.0	–1.3	0.45	0.008*	–0.72	67.3	–0.1	0.26	0.718	–0.05
Average household size												
2.42 or less	41.3	3.85	41.8	0.5	0.43	0.233	0.14	41.6	0.3	0.52	0.612	0.07
2.43–2.80	44.4	4.45	43.8	–0.6	0.47	0.216	–0.14	43.8	–0.7	0.49	0.188	–0.15
Greater than 2.80	14.3	2.92	14.4	0.1	0.28	0.781	0.03	14.7	0.4	0.38	0.301	0.14
Percent with less than high school education												
10.4 or less	29.5	6.20	27.8	–1.8	0.58	0.007*	–0.28	29.1	–0.5	0.25	0.070	–0.08
10.5–20.3	31.2	4.04	31.9	0.7	0.37	0.086	0.17	31.7	0.5	0.39	0.208	0.13
20.4–32.0	27.4	3.97	28.1	0.6	0.56	0.260	0.16	27.3	–0.1	0.41	0.738	–0.03
Greater than 32.0	11.9	3.48	12.3	0.4	0.28	0.145	0.12	12.0	0.1	0.22	0.642	0.03
Percent speaking Spanish but not English												
0	56.0	5.07	56.1	0.2	0.41	0.724	0.03	56.1	0.1	0.59	0.831	0.02
1–28	40.0	4.83	39.8	–0.1	0.41	0.754	–0.03	40.0	0.1	0.53	0.922	0.01
Greater than 28	4.1	2.23	4.1	#	0.05	0.698	–0.01	3.90	–0.2	0.12	0.150	–0.08
Percent below 150 percent of poverty												
10.7 or less	27.5	5.14	26.1	1.4	0.72	0.066	–0.28	27.5	#	0.14	0.826	0.01
10.8–20.0	26.3	3.69	26.8	0.5	0.68	0.495	0.13	26.6	0.3	0.39	0.448	0.08
20.1–33.3	29.6	5.25	30.0	0.4	0.37	0.259	0.08	29.1	–0.5	0.42	0.252	–0.10
Greater than 33.3	16.7	2.97	17.2	0.5	0.36	0.171	0.18	16.8	0.2	0.27	0.544	0.06

See notes at end of table.

Table 11-11. Household Study screener weighting effects for Missouri, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Median income (in dollars)												
28,400 or less	25.2	3.55	25.7	0.5	0.26	0.0	0.14	25.2	#	0.00	0.835	0.00
28,401–37,850	25.2	3.30	26.5	1.3	0.35	0.00	0.39	25.2	#	0.00	0.549	0.00
37,851–52,100	28.0	2.69	27.6	–0.4	0.55	0.5	–0.13	28.0	#	0.00	0.660	0.00
Greater than 52,100	21.6	4.81	20.1	–1.5	0.72	0.0	–0.31	21.6	#	0.00	0.818	0.00
Percent who rent												
16 or less	37.1	4.54	35.8	–1.3	0.72	0.0	–0.28	36.7	–0.4	0.33	0.211	–0.10
17–31	25.2	4.13	26.2	0.9	0.56	0.1	0.23	25.4	0.2	0.26	0.395	0.06
32–59	27.8	4.18	28.1	0.3	0.49	0.5	0.07	28.0	0.2	0.40	0.629	0.05
Greater than 59	9.9	1.94	10.0	#	0.31	0.8	0.03	9.9	#	0.25	0.962	0.01

† Not applicable.
# Rounds to zero.
* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Metropolitan Statistical Area.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-12. Household Study screener weighting effects for New York, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1)/(2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1)/(2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
MSA[2] status												
Non-MSA	8.0	2.15	8.6	0.6	1.14	0.607	0.28	7.8	–0.1	0.38	0.771	–0.06
MSA	92.0	2.15	91.5	–0.6	1.14	0.607	–0.28	92.2	0.1	0.38	0.771	0.06
Average household size												
2.42 or less	32.4	3.81	30.4	–2.0	0.70	0.012*	–0.51	30.5	–1.9	0.74	0.019	–0.49
2.43–2.80	29.8	3.87	31.7	2.0	0.89	0.040	0.51	31.9	2.1	0.92	0.036	0.54
Greater than 2.80	37.8	4.82	37.8	#	1.18	0.988	0.00	37.6	–0.2	1.10	0.856	–0.04
Percent with less than high school education												
10.4 or less	36.9	1.91	35.4	–1.5	1.07	0.182	–0.78	36.8	–0.1	0.86	0.903	–0.06
10.5–20.3	20.7	2.94	20.3	–0.4	0.88	0.662	–0.13	20.0	–0.7	0.86	0.456	–0.22
20.4–32.0	21.9	2.25	22.3	0.4	0.90	0.676	0.17	22.0	0.1	0.86	0.883	0.06
Greater than 32.0	20.5	2.36	22.0	1.5	0.91	0.115	0.64	21.2	0.6	0.75	0.405	0.27
Percent speaking Spanish but not English												
0	41.5	4.97	43.0	1.5	1.16	0.202	0.31	42.4	1.0	1.05	0.364	0.20
1–28	32.2	4.90	29.6	–2.6	1.16	0.039	–0.53	30.4	–1.7	1.15	0.148	–0.36
Greater than 28	26.4	3.20	27.4	1.1	0.91	0.264	0.33	27.1	0.8	0.72	0.300	0.24
Percent below 150 percent of poverty												
10.7 or less	40.0	3.57	38.9	–1.1	0.81	0.186	–0.31	40.0	#	0.89	0.986	–0.01
10.8–20.0	21.8	3.62	19.8	–2.0	0.93	0.045	–0.55	20.0	–1.8	0.98	0.091	–0.49
20.1–33.3	18.2	4.56	19.8	1.6	0.77	0.049	0.36	19.0	0.8	0.60	0.197	0.18
Greater than 33.3	20.0	3.68	21.5	1.5	0.80	0.082	0.40	21.0	1.0	0.75	0.212	0.26

See notes at end of table.

Table 11-12. Household Study screener weighting effects for New York, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Median income (in dollars)												
28,400 or less	13.1	2.65	14.6	1.4	0.59	0.027	0.54	14.0	0.9	0.62	0.156	0.34
28,401–37,850	23.4	3.56	24.3	0.9	0.88	0.303	0.26	23.5	0.2	0.69	0.817	0.04
37,851–52,100	19.3	2.77	19.3	#	0.86	0.974	–0.01	18.8	–0.5	0.92	0.593	–0.18
Greater than 52,100	44.2	3.43	41.9	–2.3	1.12	0.051	–0.68	43.7	–0.6	0.95	0.547	–0.17
Percent who rent												
16 or less	32.6	4.05	33.3	0.7	0.93	0.471	0.17	34.3	1.6	1.03	0.125	0.41
17–31	15.4	2.67	15.7	0.3	0.83	0.769	0.09	15.5	0.1	0.65	0.909	0.03
32–59	14.7	3.53	15.0	0.3	1.50	0.841	0.09	14.5	–0.2	1.48	0.888	–0.06
Greater than 59	37.3	3.82	36.0	–1.3	1.35	0.368	–0.33	35.8	–1.5	1.42	0.299	–0.39

† Not applicable.
# Rounds to zero.
* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Metropolitan Statistical Area.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-13. Household Study screener weighting effects for Oklahoma, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias					Bias			
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	Bias ratio (3)-(1)/(2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	Bias ratio (4)-(1)/(2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
MSA[2] status												
Non-MSA	38.3	3.18	38.2	–0.1	0.61	0.937	–0.02	37.7	–0.6	0.22	0.023	–0.17
MSA	61.7	3.18	61.8	0.1	0.61	0.937	0.02	62.3	0.6	0.22	0.023	0.17
Average household size												
2.42 or less	33.8	6.29	33.5	–0.3	0.51	0.586	–0.04	33.7	–0.1	0.32	0.882	–0.01
2.43–2.80	53.3	4.76	53.6	0.4	0.42	0.380	0.08	53.0	–0.3	0.35	0.454	–0.06
Greater than 2.80	13.0	3.39	12.9	–0.1	0.27	0.727	–0.03	13.3	0.3	0.15	0.049	0.09
Percent with less than high school education												
10.4 or less	22.5	2.20	22.0	–0.5	0.42	0.232	–0.24	22.8	0.3	0.22	0.236	0.13
10.5–20.3	26.1	4.31	25.5	–0.5	0.36	0.174	–0.12	26.0	–0.1	0.27	0.773	–0.02
20.4–32.0	31.0	5.48	31.0	#	0.41	0.982	0.00	30.7	–0.3	0.26	0.256	–0.05
Greater than 32.0	20.5	5.93	21.5	1.0	0.40	0.021	0.17	20.6	0.1	0.11	0.352	0.02
Percent speaking Spanish but not English												
0	43.5	4.73	43.2	–0.4	0.52	0.486	–0.08	43.3	0.3	0.36	0.465	–0.06
1–28	45.2	4.94	45.6	0.5	0.42	0.292	0.09	45.6	0.5	0.30	0.160	0.09
Greater than 28	11.3	1.98	11.2	–0.1	0.30	0.784	–0.05	11.1	–0.2	0.18	0.345	–0.09
Percent below 150 percent of poverty												
10.7 or less	16.8	3.20	15.9	–0.9	0.41	0.033	–0.29	16.8	#	0.00	0.832	0.00
10.8–20.0	19.9	3.78	19.8	–0.1	0.34	0.857	–0.02	19.9	#	0.00	0.926	0.00
20.1–33.3	26.1	3.26	25.8	–0.3	0.47	0.497	–0.10	26.1	#	0.00	0.911	0.00
Greater than 33.3	37.3	4.58	38.6	1.3	0.43	0.006	0.29	37.3	#	0.00	0.929	0.00

See notes at end of table.

Table 11-13. Household Study screener weighting effects for Oklahoma, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Median income (in dollars)												
28,400 or less	40.2	4.53	41.2	1.0	0.45	0.04	0.22	40.3	0.1	0.06	0.361	0.01
28,401–37,850	25.9	2.83	26.1	0.2	0.40	0.63	0.07	25.8	–0.1	0.08	0.561	–0.02
37,851–52,100	20.3	3.83	20.1	–0.1	0.41	0.79	–0.03	20.2	#	0.04	0.796	0.00
Greater than 52,100	13.7	3.42	12.6	–1.1	0.25	0.001	–0.31	13.7	#	0.00	0.616	0.00
Percent who rent												
16 or less	24.3	4.45	24.0	–0.3	0.30	0.34	–0.07	24.7	0.4	0.19	0.067	0.08
17–31	32.9	5.18	32.6	–0.4	0.39	0.36	–0.07	32.5	–0.5	0.23	0.049	–0.09
32–59	32.1	6.00	32.9	0.7	0.33	0.04	0.12	32.4	0.2	0.18	0.234	0.04
Greater than 59	10.6	2.43	10.6	–0.1	0.19	0.70	–0.03	10.5	–0.1	0.13	0.450	–0.04

† Not applicable.
# Rounds to zero.
* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Metropolitan Statistical Area.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

11.1.4.2 Evaluating Bias Owing to Background Questionnaire Nonresponse

The nonresponse bias potentially resulting from background questionnaire nonresponse was evaluated in the same manner as the analysis of screener nonresponse. Additional variables were available for the analysis. Variables known for both background questionnaire respondents and nonrespondents are shown in table 11-14 and come from three sources: Census 2000 PL-94 county-level data, Census 2000 SF3A block group-level data, and the screener. The SF3A variables were categorized the same as in the screener analysis, with approximately equal sample size in each category.

The bivariate analysis, multivariate analysis, and weighting adjustment effects are presented in sections 11.1.4.2.1 through 11.1.4.2.3, respectively.

11.1.4.2.1 Background Questionnaire Bivariate Analysis

The distribution of background questionnaire respondents was compared with the distribution of all eligible sample persons for each of the table 11-14 variables. Weighted percentages and standard errors were calculated using replicated composite background questionnaire base weights to reflect the complex sample design. To test the significance of the relationship between response status and each of the table 11-14 variables, a Rao-Scott chi-square (RS3) test of independence was performed. In addition, an estimate of bias was calculated for each domain. Bias was estimated as $Bias(\overline{y}_R) = (1 - W_R)(\overline{Y}_R - \overline{Y}_N)$, where W_R is the weighted unit background questionnaire response rate (75.6 percent), $\overline{Y}_R$ is the weighted estimate of the domain percentage for respondents, and $\overline{Y}_N$ is the weighted estimate of the domain percentage for nonrespondents. A *t* test was performed, using a simple Bonferroni adjustment, to determine whether the bias was significantly different from 0.

Table 11-14. Household Study variables used in background questionnaire nonresponse bias analysis, by source and values: 2003

Variable description	Source[1]	Values
Census region	PL-94	1: Northeast 2: Midwest 3: South 4: West
MSA[2] status	PL-94	1: MSA 2: Non-MSA
Average household size	SF3A	1: 2.42 or less 2: 2.43–2.80 3: Greater than 2.80
Percent aged 25+ with less than a high school education	SF3A	1: 10.4 or less 2: 10.5–20.3 3: 20.4–32.0 4: Greater than 32.0
Percent aged 5–64 speaking Spanish at home and English not well or not at all	SF3A	1: 0 2: 1–28 3: Greater than 28
Percent below 150 percent of poverty	SF3A	1: 10.7 or less 2: 10.8–20.0 3: 20.1–33.3 4: Greater than 33.3
Median income (in dollars)	SF3A	1: 28,400 or less 2: 28,401–37,850 3: 37,851–52,100 4: Greater than 52,100
Percent who rent	SF3A	1: 16 or less 2: 17–31 3: 32–59 4: Greater than 59
Age (years)	Screener	1: 16–29 2: 30–49 3: 50–69 4: Greater than 70
Race/ethnicity	Screener	1: Hispanic 2: Non-Hispanic Black only 3: Other[3]
Gender	Screener	1: Male 2: Female

[1] The SF3A (Summary File 3A) and PL-94 (county-level Public Law 94) variables provide relevant statistics for the block group or the county of the sampled dwelling unit.
[2] Metropolitan Statistical Area.
[3] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy; U.S. Department of Commerce, U.S. Census Bureau, Decennial Census, 2000.

The results of the chi-square analysis are presented in table 11-15. At the 5 percent α-level, all analysis variables have a significant relationship to background questionnaire response status except average household size and the percentage of sample persons aged 5 to 64 who speak Spanish at home but English not well or not at all. The results of the *t* tests for bias (shown in table 11-16) are consistent with the chi-square analysis. For the same set of variables, the bias in estimating the domain percentages is significantly different from 0 for at least one domain. There is evidence of differential response rates among subgroups (table 11-1), contributing to the differential distributions of respondents and nonrespondents. For instance, sample persons aged 16 to 29 had a relatively high weighted background questionnaire response rate of 80.5 percent. Using only respondents, without weighting adjustments, would result in an overestimate of this domain percentage by 1.6 (or 6.59 percent), as shown in table 11-16. For this domain, the estimated bias is large in relation to the sampling error; the ratio of bias to the standard error is 3.86. Gender also shows a large bias ratio, with estimates of bias more than twice the standard error of the estimated percentages.

Although the relationships between response status and the table 11-14 variables are significant, the differences between the distributions of respondents and eligible sample persons are minor. The absolute bias is less than 2 for all estimated domain percentages. In addition, many of the table 11-14 variables were used in weighting adjustments (including gender and age, which showed indications of bias), and so differences between respondents and eligible sample persons were reduced through the weighting process (refer to section 11.1.4.2.3). Therefore, the bivariate analysis indicates minimal potential for bias at the background questionnaire level, and thus minimal impact of background questionnaire nonresponse on literacy scores, assuming that literacy scores are highly correlated with the variables used in the weighting adjustments.

11.1.4.2.2 Background Questionnaire Multivariate Analysis

The CHAID software was used in the background questionnaire multivariate analysis to explain differential response rates. For more information on CHAID, refer to section 11.1.4.1.2.

Table 11-15. Household Study sample distribution of background questionnaire respondents versus eligible sample persons, by analysis domain: 2003

Analysis domain	Respondents			Eligibles			Chi-square	
	Number	Domain percent	Standard error	Number	Domain percent	Standard error	Statistic	*p* value
Region								
Northeast	3,765	16.3	1.41	4,936	16.5	1.45	9.11	0.019
Midwest	3,612	25.5	1.37	4,500	24.7	1.31		
South	8,270	36.3	1.76	10,510	36.6	1.71		
West	2,894	21.9	1.02	3,786	22.2	1.02		
MSA[1] status								
Non-MSA	3,897	21.6	1.51	4,835	20.7	1.42	10.44	0.001
MSA	14,644	78.4	1.51	18,897	79.4	1.42		
Average household size								
2.42 or less	5,931	30.5	1.56	7,474	29.9	1.51	3.62	0.149
2.43–2.80	6,589	35.0	1.45	8,465	35.2	1.39		
Greater than 2.80	6,021	34.4	2.08	7,793	34.8	1.99		
Percent with less than high school education								
10.4 or less	4,727	30.9	1.77	6,265	31.8	1.79	17.89	0.000
10.5–20.3	4,656	27.3	1.41	6,066	27.6	1.35		
20.4–32.0	4,511	22.8	1.43	5,731	22.4	1.34		
Greater than 32.0	4,647	19.1	1.54	5,670	18.2	1.41		
Percent speaking Spanish but not English								
0	7,782	41.9	2.16	9,971	41.9	2.09	4.96	0.072
1–28	6,107	35.8	1.60	7,952	36.3	1.56		
Greater than 28	4,652	22.4	1.85	5,809	21.8	1.68		
Percent below 150 percent of poverty								
10.7 or less	4,961	32.9	1.53	6,669	34.5	1.49	53.72	0.000
10.8–20.0	4,379	26.0	1.70	5,713	26.1	1.66		
20.1–33.3	4,355	23.3	1.72	5,502	22.7	1.63		
Greater than 33.3	4,846	17.9	1.24	5,848	16.7	1.18		
Median income (in dollars)								
28,400 or less	4,873	19.0	1.48	5,838	17.6	1.39	59.47	0.000
28,401–37,850	4,475	24.3	1.38	5,675	23.6	1.33		
37,851–52,100	4,451	25.6	1.60	5,800	25.8	1.55		
Greater than 52,100	4,742	31.1	1.82	6,419	33.0	1.79		
Percent who rent								
16 or less	4,984	32.9	1.66	6,662	34.2	1.61	22.37	0.000
17–31	4,857	27.6	1.63	6,231	27.4	1.55		
32–59	4,561	22.4	1.22	5,726	22.0	1.21		
Greater than 59	4,139	17.2	0.86	5,113	16.4	0.78		
Age (years)								
16–29	4,712	26.2	0.49	5,726	24.6	0.42	41.67	0.000
30–49	7,261	39.1	0.64	9,419	40.0	0.56		
50–69	4,571	24.8	0.47	5,940	25.4	0.45		
70+	1,997	9.9	0.40	2,647	10.0	0.34		
Gender								
Male	8,028	46.0	0.51	10,660	47.8	0.36	32.22	0.000
Female	10,513	54.0	0.51	13,072	52.2	0.36		
Race/ethnicity								
Hispanic	3,194	14.1	1.40	3,945	13.4	1.27	19.81	0.000
Non-Hispanic Black only	3,504	11.6	0.95	4,328	11.0	0.92		
Other[2]	11,843	74.4	1.51	15,459	75.6	1.37		

[1] Metropolitan Statistical Area.
[2] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-16. Household Study estimates of background questionnaire nonresponse bias, by analysis domain: 2003

Analysis domain	Eligibles: Domain percent (1)	Eligibles: SE[1] (2)	Respondent domain percent (3)	Nonrespondent domain percent (4)	Bias: Estimate (5)	Bias: SE[1] (6)	Bias: *p* value (7)	Relative bias (5)/(1)*100	Bias ratio (5)/(2)
Region									
Northeast	16.5	1.45	16.3	17.1	–0.2	0.18	0.344	–1.09	–0.12
Midwest	24.7	1.31	25.5	22.2	0.8	0.21	0.000*	3.32	0.63
South	36.6	1.71	36.3	37.7	–0.4	0.34	0.318	–0.96	–0.20
West	22.2	1.02	21.9	23.1	–0.3	0.26	0.254	–1.31	–0.28
MSA[2] status									
Non-MSA	20.7	1.42	21.6	17.6	1.0	0.31	0.002*	4.75	0.69
MSA	79.4	1.42	78.4	82.4	–1.0	0.31	0.002*	–1.24	–0.69
Average household size									
2.42 or less	29.9	1.51	30.5	28.1	0.6	0.32	0.066	1.97	0.39
2.43–2.80	35.2	1.39	35.0	35.9	–0.2	0.28	0.473	–0.57	–0.14
Greater than 2.80	34.8	1.99	34.4	36.0	–0.4	0.35	0.265	–1.12	–0.20
Percent with less than high school education									
10.4 or less	31.8	1.79	30.9	34.9	-1.0	0.33	0.005*	–3.08	–0.55
10.5–20.3	27.6	1.35	27.3	28.7	–0.3	0.29	0.237	–1.23	–0.25
20.4–32.0	22.4	1.34	22.8	21.0	0.5	0.29	0.123	2.01	0.34
Greater than 32.0	18.2	1.41	19.1	15.5	0.9	0.26	0.001*	4.84	0.62
Percent speaking Spanish but not English									
0	41.9	2.09	41.9	41.8	#	0.28	0.969	0.02	0.00
1–28	36.3	1.56	35.8	38.0	–0.6	0.28	0.053	–1.52	–0.35
Greater than 28	21.8	1.68	22.4	20.2	0.5	0.30	0.075	2.47	0.32
Percent below 150 percent of poverty									
10.7 or less	34.5	1.49	32.9	39.6	–1.7	0.28	0.000*	–4.78	–1.11
10.8–20.0	26.1	1.66	26.0	26.3	–0.1	0.24	0.737	–0.31	–0.05
20.1–33.3	22.7	1.63	23.3	21.1	0.5	0.26	0.044	2.33	0.33
Greater than 33.3	16.7	1.18	17.9	13.0	1.2	0.18	0.000*	7.19	1.02
Median income (in dollars)									
28,400 or less	17.6	1.39	19.0	13.2	1.4	0.24	0.000*	8.13	1.03
28,401–37,850	23.6	1.33	24.3	21.4	0.7	0.25	0.007*	3.01	0.53
37,851–52,100	25.8	1.55	25.6	26.6	–0.3	0.29	0.395	–0.97	–0.16
Greater than 52,100	33.0	1.79	31.1	38.9	–1.9	0.32	0.000*	–5.73	–1.06
Percent who rent									
16 or less	34.2	1.61	32.9	38.2	–1.3	0.34	0.000*	–3.80	–0.81
17–31	27.4	1.55	27.6	27.1	0.1	0.30	0.687	0.44	0.08
32–59	22.0	1.21	22.4	20.8	0.4	0.24	0.117	1.73	0.31
Greater than 59	16.4	0.78	17.2	13.9	0.8	0.18	0.000*	4.88	1.03
Age (years)									
16–29	24.6	0.42	26.2	19.6	1.6	0.23	0.000*	6.59	3.86
30–49	40.0	0.56	39.1	42.8	–0.9	0.32	0.006*	–2.23	–1.59
50–69	25.4	0.45	24.8	27.1	–0.6	0.25	0.034	–2.17	–1.22
70+	10.0	0.34	9.9	10.6	–0.2	0.16	0.252	–1.79	–0.53
Gender									
Male	47.8	0.36	46.0	53.3	–1.8	0.32	0.000*	–3.74	–4.97
Female	52.2	0.36	54.0	46.7	1.8	0.32	0.004*	3.43	4.97
Race/ethnicity									
Hispanic	13.4	1.27	14.1	11.3	0.7	0.22	0.003*	5.08	0.54
Non-Hispanic Black only	11.0	0.92	11.6	9.4	0.5	0.18	0.000*	4.90	0.59
Other[3]	75.6	1.37	74.4	79.4	–1.2	0.29	0.000*	–1.61	–0.89

[#] Rounds to zero.
* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Metropolitan Statistical Area.
[3] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

CHAID was run with background questionnaire response status as the dependent variable and the table 11-14 variables as the independent variables. Cell sizes were limited to 230 or more sample persons (approximately 1 percent of the sample), and up to three-way interactions were allowed (three tree levels). The resulting tree is shown in figure 11-2 and summarized in table 11-17. Fifteen cells were formed, with weighted response rates ranging from 67.4 percent to 86.9 percent. The lowest response rate was for males aged 30+ in segments with high median income (greater than $52,100). The highest response rate was for persons aged 16 to 29 in segments with moderately low median income ($28,401 to $37,850) and large average household size (greater than 2.8). Median income was the dominant variable in distinguishing response rate groups, which is consistent with the results of the bivariate analysis. Gender, age, region, household size, and race/ethnicity were also significant contributors to the CHAID tree.

A logistic regression main-effect model was used to identify significant effects on background questionnaire response propensity. Only main effects were included because of limited degrees of freedom and because interactions were identified in the previous CHAID analysis. Background questionnaire response status was used as the binary dependent variable, and the table 11-14 variables were used as the predictors. The results of the logistic regression analysis are presented in table 11-18. Five variables—region, median income, age, gender, and race/ethnicity—were found to be significantly related to response propensity at the 5 percent α-level. The regression coefficient estimates for these five variables are provided in table 11-18 to show the direction of the relationship with response propensity. For instance, the table shows that males are significantly less likely to respond than females. The results are consistent with the CHAID analysis: The five variables were included in the first three levels of the CHAID tree. All variables found to be significantly related to response propensity in the multivariate analysis, including household size from CHAID, were used in the background questionnaire weighting adjustments.[2] Thus, the potential for nonresponse bias suggested by the multivariate analysis should be reduced through the weighting adjustments, as described in the next section.

[2]A more detailed dwelling unit-level household count was used for the background questionnaire weighting adjustments in place of the segment-level variable for average household size included here.

Figure 11-2. Household Study multivariate CHAID analysis of background questionnaire response indicators: 2003

Overall weighted response rate = 75.6 percent
Total number of eligibles = 23,732

Median income (in dollars)						
28,400 or less	81.7% (5,838)	Gender				
		Male	77.7% (2,483)	Region		
				Northeast, Midwest	82.8% (754)	Cell 1
				South, West	75.7% (1,729)	Cell 2
		Female	85.1% (3,355)	Age (years)		
				16–69	86.1% (2,888)	Cell 3
				70 or more	79.3% (467)	Cell 4
28,401–37,850	77.8% (5,675)	Age (years)				
		16–29	82.1% (1,485)	Household size		
				2.80 or less	80.8% (1,084)	Cell 5
				Greater than 2.80	86.9% (401)	Cell 6
		30 or more	76.3% (4,190)	Region		
				Northeast, South	73.5% (2,715)	Cell 7
				Midwest, West	80.0% (1,475)	Cell 8
37,851–52,100	74.8% (5,800)	Age (years)				
		16–29	81.2% (1,431)	Race/ethnicity		
				Hispanic, non-Hispanic Black	85.9% (575)	Cell 9
				Other[1]	79.4% (856)	Cell 10
		30 or more	72.6% (4,369)	Race/ethnicity		
				Hispanic, non-Hispanic Black	77.7% (1,188)	Cell 11
				Other	71.5% (3,181)	Cell 12
Greater than 52,100	71.2% (6,419)	Gender				
		Male	68.6% (3,011)	Age (years)		
				16–29	73.2% (600)	Cell 13
				30 or more	67.4% (2,411)	Cell 14
		Female	73.8% (3,408)	Cell 15		

[1]Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: All percentages are weighted response rates and the numbers inside the parentheses are sample sizes.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-17. Household Study multivariate CHAID analysis of background questionnaire response indicators, by response cell: 2003

Response cell	Number of eligibles	Number of respondents	Unweighted response rate (percent)	Weighted response rate (percent)
Overall	23,732	18,541	78.1	75.6
1	754	626	83.0	82.8
2	1,729	1,365	79.0	75.7
3	2,888	2,515	87.1	86.1
4	467	367	78.6	79.3
5	1,084	885	81.6	80.8
6	401	349	87.0	87.0
7	2,715	2,062	76.0	73.5
8	1,475	1,179	79.9	80.0
9	575	484	84.2	85.9
10	856	689	80.5	79.4
11	1,188	936	78.8	77.7
12	3,181	2,342	73.6	71.5
13	600	452	75.3	73.2
14	2,411	1,689	70.1	67.4
15	3,408	2,601	76.3	73.8

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-18. Household Study multivariate logistic regression analysis of background questionnaire response indicators, by predictor: 2003

	F test				Regression coefficients	
Test	*F* statistic	Numerator *df*[1]	Denominator *df*[1]	*p* value	Estimate	*p* value
Overall fit	6.26	26	36	0.000	†	†
Region	7.64	3	59	0.000	†	†
Northeast	†	†	†	†	0.08	0.305
Midwest	†	†	†	†	0.25	0.001
South	†	†	†	†	–0.02	0.790
MSA[2] status	3.92	1	61	0.052	†	†
Average household size	0.49	2	60	0.615	†	†
Percent with less than high school education	0.49	3	59	0.691	†	†
Percent speaking Spanish but not English	0.36	2	60	0.703	†	†
Percent below 150 percent of poverty	0.12	3	59	0.945	†	†
Median income (in dollars)	4.22	3	59	0.009	†	†
28,400 or less	†	†	†	†	0.58	0.001
28,401–37,850	†	†	†	†	0.33	0.006
37,851–52,100	†	†	†	†	0.16	0.086
Percent who rent	0.33	3	59	0.806	†	†
Age	12.40	3	59	0.000	†	†
16–29	†	†	†	†	0.36	0.000
30–49	†	†	†	†	0.02	0.788
50–69	†	†	†	†	0.03	0.697
Gender	33.99	1	61	0.000	†	†
Male	†	†	†	†	–0.30	0.000
Race/ethnicity	3.41	2	60	0.039	†	†
Hispanic	†	†	†	†	0.22	0.022
Non-Hispanic Black only	†	†	†	†	0.17	0.075

† Not applicable.
# Rounds to zero.
[1] Degrees of freedom.
[2] Metropolitan Statistical Area.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

11.1.4.2.3 Potential for Background Questionnaire Nonresponse Bias Remaining After Weighting Procedures

As described in section 12.1.4, the weighting procedures for the main NAAL background questionnaire were implemented to reduce the potential for nonresponse bias by creating nonresponse adjustment classes for which respondents' literacy-related characteristics are similar to those of nonrespondents. Other background questionnaire weighting steps were conducted to calibrate the weights to known totals from the 2003 Current Population Survey and then combine the NAAL and SAAL samples through composite weighting. Steps performed after the nonresponse adjustment are expected to have little impact on nonresponse bias and thus are not included in this analysis.

Tables 11-19 to 11-25 show and test the change in the distribution of the sample cases before and after the background questionnaire nonresponse adjustment for the national household sample and each of the six participating states. *T* tests were performed using a Bonferroni adjustment to test whether the difference in estimated percentages is significantly different from 0. To help determine whether statistically significant results are also meaningful, calculations of bias ratios are also included. The checks were performed separately for the national NAAL household sample and for each of the six SAAL states, to reflect the weighting process. Unlike the results in table 11-15, these comparisons use the actual survey weights, which were processed separately for each sample and include screener nonresponse adjustments. The following comparisons were made for each of the analysis variables in table 11-14:

- Comparison of distributions from background questionnaire base weights with those for background questionnaire respondents only, to check for differences owing to background questionnaire nonresponse, and
- Comparison of distributions from background questionnaire base weights with those from the background questionnaire nonresponse-adjusted weights, to check for differences remaining after nonresponse adjustment to the background questionnaire.

The *p* values resulting from the first set of comparisons indicate a significant difference between the eligible sample persons and respondents for most of the subgroups when background questionnaire base weights are used. A nonresponse adjustment was necessary to reduce the bias in estimates based on respondents only.

As shown in table 11-19, significant differences between eligible NAAL sample persons and respondents remain for some categories of region, MSA status, and median income after the nonresponse adjustment. However, the absolute bias in the percentage distribution of the majority of table 11-14 variables decreased and is less than 2 percentage points for all domains. In addition, the bias is less than

twice the standard error of the estimated percentage for all statistically significant differences, so the differences appear to be minor. Tables 11-20 to 11-25 show similar results for the six SAAL states. Although the bias remains significantly different from 0 for some domains, after the nonresponse adjustment it is never more than twice the standard error of the estimated percentages. Therefore, the nonresponse adjustment appears to have been effective in reducing the bias owing to background questionnaire nonresponse, to the extent that table 11-14 variables are related to literacy.

11.1.5 Conclusion

The household sample was subject to unit nonresponse from the screener, background questionnaire, assessment, and oral module and to item nonresponse to background questionnaire items. While all background questionnaire items had response rates of more than 85 percent, two stages of data collection—the screener and the background questionnaire—had unit response rates below 85 percent and thus required an analysis of the potential for nonresponse bias.

In bivariate unit-level analyses at the screener and background questionnaire stages, estimated percentages for respondents were compared with those for the total eligible sample to identify any potential bias owing to nonresponse. Although some statistically significant differences exist, the potential for bias is small because the absolute difference between estimated percentages is less than 2 percent for all domains considered. Multivariate analyses were conducted to further explore the potential for nonresponse bias by identifying the domains with the most differential response rates. These analyses revealed that the lowest response rates for the screener were among dwelling units in segments with high median income, small average household size, and a large proportion of renters. The lowest response rates for the background questionnaire were among males aged 30 or older in segments with high median income. However, the variables used to define these areas and other pockets with low response rates were used in weighting adjustments. The analysis showed that weighting adjustments were highly effective in reducing the bias. The general conclusion is that the potential amount of nonresponse bias attributable to unit nonresponse at the screener and background questionnaire stages is likely to be negligible.

Table 11-19. Household Study background questionnaire weighting effects for the national NAAL household sample, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
Region												
Northeast	19.7	0.64	19.7	#	0.23	0.918	0.03	19.7	0.1	0.23	0.791	0.09
Midwest	23.2	0.89	24.0	0.7	0.21	0.001*	0.83	24.3	1.0	0.21	0.000*	1.13
South	35.8	0.88	35.3	–0.5	0.34	0.173	–0.54	35.3	–0.6	0.37	0.139	–0.63
West	21.3	0.66	21.0	–0.3	0.26	0.256	–0.45	20.8	–0.5	0.25	0.036	–0.80
MSA[2] status												
Non-MSA	20.2	0.67	21.1	0.9	0.28	0.002*	1.38	20.9	0.7	0.28	0.013*	1.05
MSA	79.8	0.67	78.9	–0.9	0.28	0.002*	–1.38	79.1	–0.7	0.28	0.013*	–1.05
Average household size												
2.42 or less	29.6	1.61	30.2	0.6	0.31	0.061	0.37	30.0	0.4	0.31	0.190	0.25
2.43–2.80	36.1	1.60	36.0	–0.1	0.29	0.703	–0.07	36.1	#	0.29	0.974	0.01
Greater than 2.80	34.3	2.13	33.8	–0.5	0.37	0.190	–0.23	33.9	–0.4	0.35	0.243	–0.19
Percent with less than high school education												
10.4 or less	33.0	1.76	31.9	–1.0	0.34	0.003*	–0.59	32.9	#	0.25	0.885	–0.02
10.5–20.3	28.1	1.39	27.8	–0.2	0.30	0.430	–0.17	28.1	0.1	0.29	0.884	0.04
20.4–32.0	21.7	1.22	22.2	0.5	0.29	0.099	0.40	21.8	0.1	0.27	0.763	0.07
Greater than 32.0	17.3	1.38	18.1	0.8	0.25	0.003*	0.57	17.2	–0.1	0.18	0.622	–0.07
Percent speaking Spanish but not English												
0	42.7	2.15	42.8	#	0.32	0.977	0.01	43.1	0.3	0.32	0.331	0.14
1–28	36.6	1.63	36.0	–0.6	0.29	0.046	–0.37	36.3	–0.3	0.30	0.347	–0.17
Greater than 28	20.7	1.62	21.3	0.6	0.28	0.037	0.37	20.7	#	0.26	0.916	–0.02

See notes at end of table.

Table 11-19. Household Study background questionnaire weighting effects for the national NAAL household sample, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Percent below 150 percent of poverty												
10.7 or less	36.1	1.46	34.4	–1.7	0.29	0.000*	–1.16	36.1	#	0.00	0.694	0.00
10.8–20.0	26.7	1.57	26.8	0.1	0.25	0.793	0.05	26.5	–0.2	0.21	0.336	–0.13
20.1–33.3	21.6	1.56	22.1	0.5	0.26	0.049	0.33	21.9	0.2	0.21	0.336	0.14
Greater than 33.3	15.6	1.11	16.7	1.1	0.16	0.000*	1.00	15.6	#	0.00	0.882	0.00
Median income (in dollars)												
28,400 or less	16.7	1.30	18.0	1.3	0.22	0.000*	1.01	17.1	0.4	0.14	0.005*	0.32
28,401–37,850	22.8	1.30	23.5	0.7	0.25	0.008*	0.52	23.0	0.2	0.22	0.403	0.15
37,851–52,100	25.6	1.55	25.5	–0.1	0.31	0.740	–0.07	25.5	–0.1	0.29	0.709	–0.07
Greater than 52,100	34.9	1.73	33.0	–1.9	0.35	0.000*	–1.10	34.4	–0.5	0.23	0.035	–0.28
Percent who rent												
16 or less	35.3	1.75	33.9	–1.4	0.35	0.000*	–0.80	34.9	–0.4	0.30	0.188	–0.23
17–31	27.4	1.58	27.6	0.2	0.31	0.465	0.15	27.7	0.3	0.30	0.309	0.20
32–59	21.8	1.37	22.2	0.4	0.24	0.103	0.29	21.8	#	0.24	0.971	0.01
Greater than 59	15.6	0.80	16.3	0.8	0.17	0.000*	0.95	15.6	0.1	0.17	0.609	0.10
Age (years)												
16–29	24.3	0.42	25.9	1.6	0.25	0.000*	3.87	24.3	#	0.03	0.768	–0.02
30–49	40.2	0.61	39.3	–0.9	0.33	0.009*	–1.47	40.3	0.1	0.05	0.259	0.10
50–69	25.4	0.48	24.9	–0.5	0.26	0.055	–1.06	25.4	#	0.02	0.663	–0.02
70+	10.1	0.37	9.9	–0.2	0.17	0.273	–0.52	10.0	#	0.04	0.357	–0.11

See notes at end of table.

Table 11-19. Household Study background questionnaire weighting effects for the national NAAL household sample, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Race/ethnicity												
Hispanic	12.6	1.18	13.2	0.7	0.22	0.004*	0.56	12.9	0.3	0.19	0.137	0.25
Non-Hispanic	10.3	0.83	10.8	0.5	0.18	0.009*	0.58	10.5	0.2	0.16	0.277	0.22
Black only												
Other[3]	77.1	1.34	76.0	–1.1	0.29	0.000*	–0.85	76.6	–0.5	0.24	0.059	–0.35
Gender												
Male	48.2	0.41	46.5	–1.7	0.32	0.000*	–4.25	48.2	#	0.05	0.924	0.03
Female	51.8	0.41	53.6	1.7	0.32	0.000*	4.25	51.8	#	0.05	0.924	–0.03

† Not applicable.
# Rounds to zero.
* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Metropolitan Statistical Area.
[3] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-20. Household Study background questionnaire weighting effects for Kentucky, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
MSA[2] status												
Non-MSA	54.0	1.30	54.0	#	0.76	0.991	–0.01	53.2	–0.8	0.58	0.182	–0.62
MSA	46.0	1.30	46.0	#	0.76	0.991	0.01	46.8	0.8	0.58	0.182	0.62
Average household size												
2.42 or less	32.1	3.74	33.0	0.9	0.53	0.117	0.24	32.8	0.7	0.60	0.273	0.18
2.43–2.80	54.5	4.19	53.4	–1.1	0.55	0.057	–0.27	53.6	–0.9	0.59	0.131	–0.22
Greater than 2.80	13.4	3.67	13.6	0.2	0.37	0.533	0.07	13.7	0.3	0.33	0.452	0.07
Percent with less than high school education												
10.4 or less	16.8	3.14	16.0	–0.8	0.76	0.316	–0.25	16.8	#	0.00	0.890	0.00
10.5–20.3	21.1	3.89	20.9	–0.1	0.58	0.859	–0.03	21.1	#	0.00	0.910	0.00
20.4–32.0	36.6	4.69	35.4	–1.2	0.78	0.136	–0.26	36.6	#	0.00	0.794	0.00
Greater than 32.0	25.6	3.22	27.7	2.1	0.58	0.002*	0.65	25.6	#	0.00	0.745	0.00
Percent speaking Spanish but not English												
0	62.7	4.17	62.9	0.3	1.02	0.808	0.06	63.0	0.3	0.92	0.761	0.07
1–28	31.7	3.42	31.4	–0.4	0.92	0.712	–0.10	31.4	–0.3	0.80	0.722	–0.08
Greater than 28	5.6	1.60	5.7	0.1	0.30	0.760	0.06	5.6	#	0.31	0.986	0.00
Percent below 150 percent of poverty												
10.7 or less	15.3	3.07	14.5	–0.8	0.68	0.259	–0.26	15.0	–0.3	0.62	0.659	–0.09
10.8–20.0	28.7	3.24	27.7	–0.9	0.80	0.264	–0.28	28.6	–0.1	0.78	0.929	–0.02
20.1–33.3	25.7	4.54	25.9	0.2	0.79	0.857	0.03	26.1	0.4	0.68	0.609	0.08
Greater than 33.3	30.3	4.64	31.9	1.6	0.73	0.047	0.34	30.3	#	0.45	0.987	0.00

See notes at end of table.

Table 11-20. Household Study background questionnaire weighting effects for Kentucky, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
	Percent (1)	SE[1] (2)	Percent (3)	Bias: Estimate (3)-(1)	Bias: SE[1]	Bias: *p* value	Bias ratio (3)-(1)/(2)	Percent (4)	Bias: Estimate (4)-(1)	Bias: SE[1]	Bias: *p* value	Bias ratio (4)-(1)/(2)
Median income (in dollars)												
28,400 or less	28.9	4.31	30.4	1.5	0.83	0.08	0.35	28.9	#	0.62	0.932	–0.01
28,401–37,850	27.4	4.42	26.3	–1.1	0.95	0.26	–0.24	26.5	–0.9	0.88	0.305	–0.21
37,851–52,100	29.3	2.74	29.5	0.3	0.61	0.69	0.09	30.5	1.2	0.68	0.089	0.45
Greater than 52,100	14.4	2.52	13.7	–0.7	0.62	0.29	–0.26	14.1	–0.2	0.41	0.562	–0.10
Percent who rent												
16 or less	30.1	3.00	28.4	–1.7	1.06	0.13	–0.56	29.0	–1.2	1.02	0.272	–0.38
17–31	40.2	3.43	40.5	0.3	0.94	0.78	0.08	40.1	–0.1	0.88	0.916	–0.03
32–59	20.8	2.34	22.1	1.3	0.42	0.005	0.56	22.0	1.2	0.42	0.010*	0.51
Greater than 59	8.9	1.72	9.0	0.1	0.37	0.78	0.06	8.9	#	0.35	0.910	0.02
Age (years)												
16–29	24.2	0.99	25.7	1.5	0.42	0.002	1.53	24.2	#	0.00	0.909	0.00
30–49	38.8	1.64	38.8	#	0.63	0.99	0.01	38.8	#	0.00	0.928	0.00
50–69	27.5	1.28	26.5	–1.0	0.67	0.16	–0.76	27.2	–0.3	0.26	0.347	–0.19
70+	9.6	0.70	9.0	–0.5	0.45	0.24	–0.77	9.8	0.3	0.26	0.347	0.36
Race/ethnicity												
Hispanic	1.9	0.53	2.1	0.2	0.10	0.14	0.29	2.0	#	0.15	0.703	0.10
Non-Hispanic Black only	7.4	1.49	7.3	#	0.30	0.91	–0.03	7.2	–0.1	0.35	0.709	–0.09
Other[3]	90.7	1.87	90.6	–0.1	0.33	0.71	–0.06	90.8	0.1	0.37	0.843	0.04
Gender												
Male	43.9	1.57	42.2	–1.7	0.58	0.007	-1.10	43.3	–0.7	0.37	0.096	–0.41
Female	56.1	1.57	57.8	1.7	0.58	0.007	1.10	56.7	0.7	0.37	0.096	0.41

† Not applicable.
# Rounds to zero.
* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Metropolitan Statistical Area.
[3] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-21. Household Study background questionnaire weighting effects for Maryland, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
MSA[2] status												
Non-MSA	7.1	1.21	5.6	–1.5	0.63	0.032	–1.21	7.1	#	0.00	0.942	0.00
MSA	92.9	1.21	94.4	1.5	0.63	0.032	1.21	92.9	#	0.00	1.000	0.00
Average household size												
2.42 or less	34.3	3.99	34.8	0.5	0.93	0.574	0.13	35.3	1.0	1.07	0.354	0.25
2.43–2.80	30.8	3.72	29.6	–1.1	0.92	0.240	–0.30	29.9	–0.9	1.06	0.422	–0.23
Greater than 2.80	34.9	4.82	35.5	0.6	0.59	0.337	0.12	34.8	–0.2	0.66	0.823	–0.03
Percent with less than high school education												
10.4 or less	43.7	3.68	43.2	–0.5	0.77	0.519	–0.14	42.5	–1.2	0.57	0.046	–0.33
10.5–20.3	30.1	4.47	29.6	–0.5	0.96	0.636	–0.11	29.4	–0.6	1.04	0.553	–0.14
20.4–32.0	19.7	4.11	20.2	0.5	0.54	0.335	0.13	20.9	1.2	0.73	0.106	0.30
Greater than 32.0	6.5	1.34	7.0	0.4	0.69	0.532	0.33	7.2	0.6	0.65	0.360	0.45
Percent speaking Spanish but not English												
0	56.6	5.05	57.4	0.8	0.79	0.309	0.16	57.5	0.9	0.89	0.315	0.18
1–28	35.4	4.84	33.9	–1.5	0.70	0.045	–0.31	33.8	–1.5	0.76	0.057	–0.32
Greater than 28	8.1	0.96	8.7	0.7	0.36	0.073	0.70	8.7	0.6	0.41	0.149	0.65
Percent below 150 percent of poverty												
10.7 or less	59.7	3.94	59.9	0.1	0.89	0.864	0.04	58.8	–0.9	0.92	0.341	–0.23
10.8–20.0	25.5	4.34	24.2	–1.3	0.73	0.089	–0.30	24.6	–0.9	0.85	0.307	–0.21
20.1–33.3	10.2	1.76	11.1	0.8	0.39	0.043	0.48	11.5	1.3	0.35	0.002	0.74
Greater than 33.3	4.6	1.32	4.9	0.3	0.54	0.561	0.24	5.1	0.5	0.48	0.311	0.38

See notes at end of table.

Table 11-21. Household Study background questionnaire weighting effects for Maryland, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias					Bias			
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	Bias ratio (3)-(1)/(2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	Bias ratio (4)-(1)/(2)
Median income (in dollars)												
28,400 or less	7.0	1.48	8.1	1.2	0.49	0.024	0.80	8.3	1.4	0.38	0.002*	0.91
28,401–37,850	12.2	3.55	12.0	–0.1	0.63	0.856	–0.03	13.1	1.0	0.40	0.025	0.27
37,851–52,100	22.5	3.55	21.4	–1.0	0.98	0.309	–0.29	21.3	–1.2	0.82	0.169	–0.33
Greater than 52,100	58.4	3.33	58.4	#	0.98	0.967	–0.01	57.3	–1.1	0.75	0.148	–0.34
Percent who rent												
16 or less	38.4	4.57	37.3	–1.0	1.17	0.399	–0.22	37.1	–1.2	1.03	0.248	–0.27
17–31	25.6	3.49	25.8	0.2	0.74	0.818	0.05	25.7	0.1	0.65	0.821	0.04
32–59	23.3	4.66	23.6	0.3	0.61	0.662	0.06	23.7	0.4	0.63	0.553	0.08
Greater than 59	12.7	3.53	13.3	0.6	0.62	0.374	0.16	13.4	0.7	0.63	0.287	0.20
Age (years)												
16–29	24.8	1.27	26.2	1.4	1.09	0.206	1.13	24.8	0.1	0.22	0.690	0.07
30–49	40.9	1.66	38.0	–3.0	1.00	0.008*	–1.79	41.3	0.3	0.18	0.086	0.20
50–69	25.5	1.94	26.4	0.9	0.59	0.166	0.44	25.0	–0.5	0.17	0.013	–0.24
70+	8.8	1.38	9.5	0.7	0.47	0.170	0.48	8.9	#	0.14	0.776	0.03
Race/ethnicity												
Hispanic	4.7	0.47	5.0	0.4	0.35	0.313	0.79	5.0	0.3	0.38	0.429	0.66
Non-Hispanic Black only	26.3	1.76	27.0	0.7	0.95	0.475	0.40	26.7	0.4	1.06	0.712	0.23
Other[3]	69.0	1.63	68.0	–1.1	0.86	0.234	–0.65	68.3	–0.7	0.93	0.458	–0.43
Gender												
Male	44.5	1.24	43.4	–1.1	1.02	0.300	–0.87	43.3	–1.2	0.96	0.230	–0.96
Female	55.5	1.24	56.6	1.1	1.02	0.300	0.87	56.7	1.2	0.96	0.230	0.96

† Not applicable.
# Rounds to zero.
* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Metropolitan Statistical Area.
[3] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-22. Household Study background questionnaire weighting effects for Massachusetts, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
MSA[2] status												
Non-MSA	1.4	0.64	1.2	–0.2	0.06	0.008	–0.30	1.1	–0.2	0.21	0.29	–0.36
MSA	98.6	0.64	98.8	0.2	0.06	0.008	0.30	98.9	0.2	0.21	0.29	0.36
Average household size												
2.42 or less	34.1	4.41	33.8	–0.3	1.15	0.80	–0.06	34.6	0.6	1.19	0.65	0.12
2.43–2.80	34.2	2.98	32.7	–1.4	1.37	0.30	–0.48	33.3	–0.9	1.19	0.46	–0.30
Greater than 2.80	31.7	4.50	33.5	1.7	0.86	0.06	0.38	32.1	0.3	0.56	0.55	0.07
Percent with less than high school education												
10.4 or less	46.5	6.33	48.9	2.4	1.02	0.02	0.38	47.9	1.4	0.47	0.007	0.23
10.5–20.3	32.9	6.01	31.9	–1.0	0.87	0.24	–0.17	33.0	0.1	0.61	0.90	0.01
20.4–32.0	9.5	2.44	7.6	–2.0	0.64	0.006	–0.80	8.1	–1.4	0.31	0.000	–0.57
Greater than 32.0	11.1	1.74	11.6	0.6	0.67	0.40	0.33	11.0	–0.1	0.26	0.67	–0.06
Percent speaking Spanish but not English												
0	60.3	2.71	60.6	0.3	1.06	0.78	0.11	60.7	0.5	1.05	0.67	0.17
1–28	31.9	2.83	30.6	–1.3	1.11	0.26	–0.45	31.0	–1.0	1.13	0.41	–0.34
Greater than 28	7.8	1.68	8.8	1.0	0.83	0.24	0.59	8.3	0.5	0.58	0.39	0.30
Percent below 150 percent of poverty												
10.7 or less	55.9	5.32	56.6	0.7	1.09	0.51	0.14	55.7	–0.2	0.58	0.67	–0.05
10.8–20.0	18.1	5.04	16.6	–1.6	1.18	0.20	–0.31	17.5	–0.6	0.97	0.51	–0.13
20.1–33.3	17.2	3.07	16.7	–0.5	0.86	0.58	–0.15	17.6	0.5	0.99	0.64	0.15
Greater than 33.3	8.8	1.69	10.1	1.3	1.03	0.21	0.78	9.2	0.4	0.69	0.54	0.25

See notes at end of table.

Table 11-22. Household Study background questionnaire weighting effects for Massachusetts, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio (3)-(1) / (2)		Bias			Bias ratio (4)-(1) / (2)
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value		Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	
Median income (in dollars)												
28,400 or less	7.8	2.32	8.7	0.8	0.56	0.15(	0.36	7.7	–0.1	0.03	0.002*	–0.05
28,401–37,850	11.5	1.62	11.7	0.2	0.39	0.60:	0.12	11.6	0.1	0.03	0.002*	0.07
37,851–52,100	31.2	3.87	28.0	–3.2	0.94	0.003'	–0.83	31.2	#	0.00	0.988	0.00
Greater than 52,100	49.5	3.97	51.6	2.2	1.13	0.07:	0.54	49.5	#	0.00	0.936	0.00
Percent who rent												
16 or less	34.8	3.93	34.8	#	0.97	0.96:	–0.01	33.9	–1.0	0.97	0.341	–0.24
17–31	19.0	2.17	19.9	0.9	1.06	0.40(	0.42	20.0	1.0	0.98	0.338	0.45
32–59	21.3	3.55	19.6	–1.7	0.88	0.07(	–0.48	20.7	–0.7	0.79	0.422	–0.18
Greater than 59	24.9	2.23	25.7	0.8	0.83	0.33:	0.37	25.5	0.6	0.52	0.235	0.29
Age (years)												
16–29	22.5	1.61	22.6	0.1	0.75	0.90(	0.06	22.8	0.3	0.70	0.675	0.19
30–49	41.6	1.92	41.6	#	0.83	0.97(	–0.02	41.8	0.2	0.90	0.832	0.10
50–69	25.5	2.20	24.9	–0.6	0.94	0.51'	–0.29	24.6	–0.9	0.98	0.350	–0.43
70+	10.4	0.80	11.0	0.6	0.45	0.21'	0.71	10.8	0.4	0.49	0.381	0.55
Race/ethnicity												
Hispanic	7.8	1.21	8.6	0.8	0.46	0.10'	0.65	8.0	0.3	0.47	0.588	0.22
Non-Hispanic Black only	5.7	0.85	5.9	0.3	0.30	0.40'	0.29	6.1	0.4	0.28	0.154	0.49
Other[3]	86.6	1.48	85.5	–1.0	0.48	0.04(	–0.71	85.9	–0.7	0.52	0.210	–0.46
Gender												
Male	46.6	1.41	44.3	–2.3	0.61	0.001'	–1.60	44.4	–2.2	0.71	0.006*	–1.56
Female	53.4	1.41	55.7	2.3	0.61	0.001'	1.60	55.6	2.2	0.71	0.006*	1.56

† Not applicable.
# Rounds to zero.
* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Metropolitan Statistical Area.
[3] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-23. Household Study background questionnaire weighting effects for Missouri, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
MSA[2] status												
Non-MSA	32.9	2.46	33.4	0.5	1.32	0.711	0.20	33.2	0.2	1.24	0.858	0.09
MSA	67.1	2.46	66.6	–0.5	1.32	0.711	–0.20	66.8	–0.2	1.24	0.858	–0.09
Average household size												
2.42 or less	37.4	3.52	38.3	1.0	1.20	0.432	0.27	38.0	0.6	1.03	0.577	0.17
2.43–2.80	46.5	4.22	46.2	–0.3	1.27	0.808	–0.07	46.5	#	1.10	0.993	0.00
Greater than 2.80	16.1	3.31	15.5	–0.7	0.92	0.487	–0.20	15.5	–0.6	0.71	0.428	–0.18
Percent with less than high school education												
10.4 or less	29.1	6.06	28.1	–1.0	1.11	0.383	–0.16	28.5	–0.6	0.85	0.516	–0.09
10.5–20.3	33.5	3.95	33.9	0.4	0.91	0.664	0.10	34.3	0.8	0.82	0.334	0.21
20.4–32.0	26.0	3.75	27.0	1.0	0.88	0.269	0.27	26.5	0.5	0.74	0.510	0.13
Greater than 32.0	11.5	3.52	11.1	–0.4	0.67	0.543	–0.12	10.7	–0.8	0.49	0.142	–0.21
Percent speaking Spanish but not English												
0	56.5	5.53	57.0	0.5	1.06	0.632	0.09	56.7	0.2	0.96	0.814	0.04
1–28	39.6	5.42	39.7	0.1	1.11	0.956	0.01	40.0	0.4	1.01	0.694	0.07
Greater than 28	4.0	2.32	3.4	–0.6	0.42	0.181	–0.25	3.3	–0.6	0.43	0.162	–0.27
Percent below 150 percent of poverty												
10.7 or less	29.1	4.92	28.9	–0.2	1.06	0.835	–0.04	29.4	0.3	0.66	0.689	0.05
10.8–20.0	26.0	3.96	25.1	–1.0	1.30	0.473	–0.24	25.5	–0.5	1.04	0.664	–0.12
20.1–33.3	29.8	5.05	30.8	1.0	0.73	0.191	0.20	30.4	0.6	0.58	0.326	0.11
Greater than 33.3	15.0	2.69	15.2	0.2	0.71	0.797	0.07	14.7	–0.4	0.45	0.397	–0.15

See notes at end of table.

Table 11-23. Household Study background questionnaire weighting effects for Missouri, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Median income (in dollars)												
28,400 or less	23.6	3.43	25.1	1.5	0.93	0.130	0.43	24.3	0.6	0.36	0.094	0.18
28,401–37,850	25.4	3.32	25.1	–0.3	0.57	0.621	–0.08	24.8	–0.6	0.45	0.205	–0.18
37,851–52,100	27.2	2.78	26.4	–0.8	1.27	0.558	–0.27	27.2	#	0.63	0.981	–0.01
Greater than 52,100	23.8	5.09	23.3	–0.4	1.01	0.677	–0.08	23.8	#	0.52	0.974	0.00
Percent who rent												
16 or less	39.7	4.50	38.2	–1.5	0.92	0.119	–0.33	38.8	–0.9	0.88	0.312	–0.20
17–31	25.0	4.00	25.2	0.3	0.60	0.678	0.06	25.1	0.1	0.73	0.839	0.04
32–59	26.6	3.72	27.2	0.7	0.92	0.488	0.17	27.0	0.5	0.84	0.591	0.12
Greater than 59	8.7	1.57	9.3	0.6	0.44	0.190	0.38	9.1	0.3	0.35	0.394	0.20
Age (years)												
16–29	23.6	1.27	24.6	1.0	0.73	0.193	0.78	23.6	#	0.00	0.731	0.00
30–49	40.4	1.60	40.3	–0.1	0.72	0.894	–0.06	40.4	#	0.00	0.665	0.00
50–69	25.6	1.38	24.7	–0.9	0.88	0.344	–0.62	25.6	#	0.00	0.782	0.00
70+	10.4	1.54	10.3	#	0.46	0.925	–0.03	10.4	#	0.00	0.653	0.00
Race/ethnicity												
Hispanic	2.4	0.66	2.6	0.2	0.22	0.381	0.30	2.6	0.1	0.23	0.554	0.21
Non-Hispanic Black only	10.1	1.10	10.4	0.3	1.24	0.841	0.23	10.1	#	1.10	0.977	0.03
Other[3]	87.5	1.28	87.0	–0.5	1.25	0.726	–0.35	87.3	–0.2	1.09	0.878	–0.13
Gender												
Male	46.5	1.88	46.0	–0.4	0.72	0.557	–0.23	46.5	#	0.00	0.940	0.00
Female	53.6	1.88	54.0	0.4	0.72	0.557	0.23	53.6	#	0.00	0.942	0.00

† Not applicable.
# Rounds to zero.
[1] Standard error.
[2] Metropolitan Statistical Area.
[3] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-24. Household Study background questionnaire weighting effects for New York, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
MSA[2] status												
Non-MSA	8.3	2.40	9.8	1.6	0.74	0.049	0.65	10.4	2.2	0.85	0.019*	0.90
MSA	91.7	2.40	90.2	–1.6	0.74	0.049	–0.65	89.6	–2.2	0.85	0.019*	–0.90
Average household size												
2.42 or less	27.2	3.86	27.6	0.5	1.19	0.708	0.12	27.6	0.4	1.22	0.758	0.10
2.43–2.80	32.2	4.88	34.3	2.1	1.60	0.206	0.43	35.2	3.0	176	0.104	0.62
Greater than 2.80	40.7	5.79	38.1	–2.6	1.38	0.08	–0.44	37.3	–3.4	1.58	0.046	–0.58
Percent with less than high school education												
10.4 or less	37.5	2.40	36.2	–1.4	1.27	0.29	–0.57	37.8	0.3	1.00	0.776	0.12
10.5–20.3	21.8	3.40	20.3	–1.5	0.84	0.08	–0.45	21.0	–0.9	0.89	0.346	–0.25
20.4–32.0	21.1	2.30	21.3	0.1	1.01	0.89	0.06	21.3	0.2	1.01	0.847	0.09
Greater than 32.0	19.5	2.61	22.3	2.8	0.96	0.010	1.06	19.9	0.4	0.63	0.562	0.14
Percent speaking Spanish but not English												
0	43.0	5.52	43.3	0.3	1.17	0.80	0.05	45.1	2.1	1.38	0.153	0.37
1–28	31.9	5.58	29.6	–2.3	1.47	0.14	–0.41	29.9	–1.9	1.52	0.217	–0.35
Greater than 28	25.1	2.90	27.1	1.9	0.80	0.02	0.67	25.0	–0.1	0.72	0.887	–0.03
Percent below 150 percent of poverty												
10.7 or less	41.9	4.24	40.8	–1.1	1.41	0.43	–0.27	41.9	#	0.00	0.885	0.00
10.8–20.0	20.1	3.90	18.3	–1.8	1.40	0.20	–0.47	20.1	#	0.00	0.806	0.00
20.1–33.3	18.6	4.45	18.6	0.1	0.87	0.94	0.02	18.6	#	0.00	0.836	0.00
Greater than 33.3	19.4	3.48	22.3	2.9	0.86	0.003	0.83	19.4	#	0.00	0.826	0.00

See notes at end of table.

Table 11-24. Household Study background questionnaire weighting effects for New York, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Median income (in dollars)												
28,400 or less	12.8	2.71	15.1	2.3	0.73	0.005*	0.86	13.3	0.5	0.30	0.112	0.18
28,401–37,850	23.2	3.40	24.2	1.1	0.79	0.188	0.32	23.5	0.4	0.87	0.675	0.11
37,851–52,100	18.5	3.02	19.2	0.8	0.68	0.277	0.25	20.0	1.5	0.72	0.047	0.51
Greater than 52,100	45.6	3.89	41.4	–4.2	1.23	0.003*	–1.07	43.2	–2.4	1.27	0.074	–0.62
Percent who rent												
16 or less	36.5	4.76	37.2	0.7	1.27	0.574	0.15	38.8	2.3	1.03	0.040	0.48
17–31	17.4	3.07	13.4	–4.0	1.45	0.013	–1.30	14.2	–3.2	0.32	0.026	–1.04
32–59	13.2	2.97	13.7	0.6	0.89	0.546	0.19	13.9	0.8	0.93	0.424	0.26
Greater than 59	32.9	3.27	35.7	2.7	0.93	0.009*	0.83	33.1	0.2	0.79	0.851	0.05
Age (years)												
16–29	24.5	1.67	26.0	1.5	0.93	0.116	0.92	25.7	1.2	0.90	0.195	0.73
30–49	37.2	1.73	36.5	–0.7	1.50	0.665	–0.38	36.4	–0.8	1.32	0.571	–0.44
50–69	27.1	2.16	26.5	–0.6	1.12	0.597	–0.28	26.9	–0.2	1.14	0.883	–0.08
70+	11.3	1.08	11.1	–0.3	0.50	0.582	–0.26	11.1	–0.3	0.48	0.576	–0.26
Race/ethnicity												
Hispanic	14.6	2.04	14.9	0.3	0.80	0.742	0.13	13.6	–1.0	0.69	0.150	–0.51
Non-Hispanic												
Black only	10.0	0.76	11.0	1.0	0.35	0.012*	1.28	10.6	0.6	0.42	0.189	0.75
Other[3]	75.4	2.14	74.1	–1.2	1.05	0.257	–0.58	75.9	0.5	0.81	0.574	0.22
Gender												
Male	45.2	1.81	44.5	–0.7	1.29	0.586	–0.40	44.5	–0.7	1.37	0.615	–0.39
Female	54.8	1.81	55.6	0.7	1.29	0.586	0.40	55.5	0.7	1.37	0.615	0.39

† Not applicable.
# Rounds to zero.
* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Metropolitan Statistical Area.
[3] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-25. Household Study background questionnaire weighting effects for Oklahoma, by subgroup: 2003

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio		Bias			Bias ratio
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value	(3)-(1) / (2)	Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	(4)-(1) / (2)
Total	100.0	†	100.0	†	†	†	†	100.0	†	†	†	†
MSA[2] status												
Non-MSA	37.7	3.19	38.9	1.2	0.78	0.145	0.37	37.9	0.2	0.55	0.756	0.05
MSA	62.3	3.19	61.1	–1.2	0.78	0.145	–0.37	62.1	–0.2	0.55	0.756	–0.05
Average household size												
2.42 or less	32.9	6.45	32.9	0.1	1.03	0.936	0.01	33.1	0.2	0.80	0.788	0.03
2.43–2.80	51.2	4.44	51.7	0.6	0.85	0.521	0.13	51.2	#	0.74	0.990	0.00
Greater than 2.80	16.0	4.17	15.3	–0.6	0.67	0.355	–0.15	15.8	–0.2	0.36	0.568	–0.05
Percent with less than high school education												
10.4 or less	24.6	2.21	23.7	–0.9	0.52	0.117	–0.39	25.1	0.5	0.40	0.200	0.24
10.5–20.3	27.1	4.52	26.3	–0.8	0.38	0.041	–0.18	26.7	–0.4	0.43	0.403	–0.08
20.4–32.0	30.2	4.96	30.6	0.4	0.49	0.458	0.07	29.8	–0.4	0.46	0.403	–0.08
Greater than 32.0	18.1	5.06	19.4	1.3	0.46	0.010*	0.26	18.4	0.2	0.28	0.418	0.05
Percent speaking Spanish but not English												
0	43.7	4.45	43.9	0.2	0.71	0.822	0.04	44.1	0.4	0.65	0.534	0.09
1–28	46.0	4.86	45.4	–0.6	0.70	0.442	–0.11	45.5	–0.5	0.64	0.453	–0.10
Greater than 28	10.3	1.95	10.7	0.4	0.37	0.314	1.19	10.4	0.1	0.32	0.816	0.04
Percent below 150 percent of poverty												
10.7 or less	18.8	3.68	18.1	–0.7	0.81	0.432	–0.18	19.4	0.6	0.67	0.354	0.17
10.8–20.0	20.3	4.06	18.8	–1.5	0.84	0.101	–0.36	19.6	–0.7	0.70	0.350	–0.17
20.1–33.3	26.6	3.89	26.9	0.3	0.70	0.695	0.07	26.4	–0.2	0.54	0.726	–0.05
Greater than 33.3	34.3	4.56	36.2	1.8	0.70	0.017	0.40	34.6	0.2	0.47	0.627	0.05

See notes at end of table.

Table 11-25. Household Study background questionnaire weighting effects for Oklahoma, by subgroup: 2003—Continued

Subgroup	Base weight—eligible		Base weight—respondents					Nonresponse-adjusted weight—respondents				
				Bias			Bias ratio (3)-(1) / (2)		Bias			Bias ratio (4)-(1) / (2)
	Percent (1)	SE[1] (2)	Percent (3)	Estimate (3)-(1)	SE[1]	*p* value		Percent (4)	Estimate (4)-(1)	SE[1]	*p* value	
Median income (in dollars)												
28,400 or less	36.7	4.08	38.4	1.7	0.54	0.006*	0.41	36.9	0.2	0.36	0.559	0.05
28,401–37,850	26.3	2.84	26.8	0.5	0.45	0.257	0.19	26.1	–0.2	0.36	0.559	–0.07
37,851–52,100	21.5	4.10	20.1	–1.3	0.60	0.039	–0.32	21.2	–0.2	0.33	0.504	–0.05
Greater than 52,100	15.6	3.96	14.7	–0.9	0.51	0.097	–0.22	15.8	0.2	0.33	0.504	0.06
Percent who rent												
16 or less	27.4	4.93	27.0	–0.4	0.59	0.454	–0.09	27.6	0.2	0.35	0.542	0.04
17–31	33.7	5.08	33.5	–0.2	0.85	0.803	–0.04	33.4	–0.3	0.83	0.770	–0.05
32–59	28.7	5.39	29.8	1.1	0.69	0.138	0.20	29.2	0.5	0.51	0.339	0.09
Greater than 59	10.2	2.75	9.9	–0.4	0.84	0.639	–0.15	9.8	–0.5	0.72	0.516	–0.17
Age (years)												
16–29	27.8	1.33	29.3	1.5	0.68	0.040	1.14	29.2	1.4	0.65	0.041	1.07
30–49	35.2	1.66	34.3	–0.9	0.55	0.122	–0.54	34.2	–1.0	0.55	0.094	–0.59
50–69	25.6	1.58	25.6	#	0.60	0.987	0.01	25.7	0.1	0.51	0.933	0.03
70+	11.4	0.88	10.8	–0.6	0.31	0.056	–0.70	10.9	–0.5	0.34	0.166	–0.54
Race/ethnicity												
Hispanic	5.6	0.85	5.7	0.2	0.36	0.693	0.18	5.6	#	0.36	0.977	–0.01
Non-Hispanic Black only	6.1	0.77	5.9	–0.2	0.39	0.621	–0.26	5.9	–0.1	0.37	0.726	–0.17
Other[3]	88.4	0.96	88.4	0.1	0.64	0.937	0.05	88.5	0.1	0.59	0.815	0.15
Gender												
Male	46.3	1.65	45.8	–0.4	0.75	0.580	–0.26	45.9	–0.4	0.84	0.660	–0.23
Female	53.8	1.65	54.2	1.4	0.75	0.580	0.26	54.1	0.4	0.84	0.660	0.23

† Not applicable.
# Rounds to zero.
* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Metropolitan Statistical Area.
[3] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

11.2 PRISON LITERACY STUDY

As in the household study, the NAAL prison study estimates are subject to potential bias owing to nonresponse at various stages of data collection. Data were collected using a background questionnaire, an assessment, and an oral module, which included multiple components. This section provides a systematic analysis of bias arising from nonparticipating prisons, nonresponding inmates, and item nonresponse. Section 11.2.1 provides unweighted and weighted response rates at the unit level. Section 11.2.2 summarizes the response rates at the item level. Section 11.2.3 provides the nonresponse bias analysis for the prison study.

11.2.1 Unit Nonresponse

The Prison Study had four stages of data collection where unit nonresponse occurred: (1) prison participation, (2) inmate background questionnaire, (3) inmate assessment, and (4) inmate oral module.

Variables known for both respondents and nonrespondents were used as selected analysis domain variables. The variables came from the following sources:

- Prison-level data from the 2000 Census of State and Federal Adult Correctional Facilities (referred to as the Census in this report);
- Prison-level data from the 2003 American Correctional Association (ACA) Directory;
- Prison-level updates obtained from websites and through telephone calls; and
- Inmate data from the background questionnaire.

Prison-level base weights were used in the weighted prison-level response rate calculations, and background questionnaire base weights were used for the background questionnaire, assessment, and oral module calculations. Response rates were calculated in the same manner as presented in the formula in section 7.1.1. The overall assessment weighted response rate is the product of the weighted response rates from the prison-level, background questionnaire and assessment.

Table 11-26 displays the variables and their sources. Table 11-27 shows the weighted unit response rates (refer to tables 7-13 and 7-14 for unweighted response rates for the prison study). There was a 97.5 percent weighted response rate at the prison level. Among types of prisons, state prisons had the lowest response rate (97.1 percent). Among security levels, prisons with supermaximum and maximum security levels combined had the lowest response rate (96.6 percent). Looking at gender

composition, the only nonparticipating prisons were male-only facilities, with a response rate of 97.3 percent. Among census regions, the Midwest was the only region that experienced nonresponse, with a response rate of 87.9 percent.

Table 11-26. Prison Study variables used to calculate response rates, by source and values: 2003

Variable description	Source[1]	Values
Prison level		
Prison type	Census, ACA	Federal, state, private
Security level	Census, ACA, updates	Supermaximum, maximum, medium, minimum, administrative, other
Gender	ACA, updates	Male, female, mixed
Census region	Census, ACA	Northeast, Midwest, South, West
Inmate level		
Age	Background questionnaire	16-29, 30-49, 50-69, 70+ years
Gender	Background questionnaire	Male, female
Race	Background questionnaire	Hispanic, non-Hispanic Black only, other[2]
Education	Background questionnaire	Less than high school, high school, more than high school

[1] 2000 Census of State and Federal Adult Correctional Facilities (Census), American Correctional Association Directory (ACA), and 2003 NAAL background questionnaire.
[2] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Table 11-27. NAAL Prison Study weighted unit response rates, by domain, in percent: 2003

Domain	Prison level	Background questionnaire	Assessment	Oral module	Overall[1]
Total	97.5	90.6	98.8	96.9	87.2
Prison type					
Federal	100.0	93.4	97.9	95.1	91.4
State	97.1	89.9	98.9	97.1	86.4
Private	100.0	97.3	100.0	100.0	97.3
Prison security level					
Supermaximum/maximum	96.6	84.5	98.5	96.1	80.4
Medium	98.0	92.3	99.4	98.1	90.0
Minimum	97.2	92.5	98.5	95.9	88.6
Administrative	100.0	91.7	90.9	90.9	83.3
Other	100.0	95.8	95.7	95.7	91.7
Prison gender composition					
Male	97.3	90.4	98.7	96.7	86.8
Female	100.0	92.3	100.0	100.0	92.3
Mixed	100.0	100.0	100.0	100.0	100.0
Prison census region					
Northeast	100.0	86.9	98.7	90.9	85.8
Midwest	87.9	93.3	99.0	98.6	81.2
South	100.0	94.4	98.9	98.0	93.4
West	100.0	82.8	98.3	96.6	81.4
Inmate age (years)					
16–29	—	—	99.5	97.7	—
30–49	—	—	98.2	96.2	—
50–69	—	—	100.0	98.2	—
70+	—	—	100.0	100.0	—
Inmate gender					
Male	—	—	98.7	96.7	—
Female	—	—	100.0	100.0	—
Inmate race					
Hispanic	—	—	99.6	93.8	—
Non-Hispanic Black only	—	—	98.2	97.0	—
Other[2]	—	—	99.1	98.4	—
Inmate education					
Less than high school	—	—	98.8	96.6	—
High school	—	—	98.5	97.1	—
More than high school	—	—	99.4	97.7	—

—Not available.
[1] The overall response rate is the product of the response rates from the prison level, background questionnaire, and assessment.
[2] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

At the background questionnaire level, the weighted response rate was 90.6 percent. Across the domains, the West region had the lowest response rate (82.8 percent). For background questionnaire respondents, the weighted response rate was 98.8 percent for the assessment and 96.9 percent for the oral module. Response rates for the assessment and oral module were all above 94 percent, with the exception of relatively low oral module response rates in the Northeast (90.9 percent) and for Hispanic adults (93.8 percent) and relatively low assessment and oral module response rates (90.9 percent) for administrative prisons.

The overall weighted response rate for the prison study was 87.2 percent. The lowest response rate among types of prisons was for state prisons (86.4 percent). Among security levels, prisons classified as either supermaximum or maximum had the lowest response rate (80.4 percent). Looking at gender composition, male-only prisons had the lowest response rate (86.8 percent). Among census regions, the Midwest and West regions had the lowest response rates (81.2 percent and 81.4 percent, respectively).

11.2.2 Item Nonresponse Rates

Response rates were calculated for 280 items on the prison study background questionnaire. Two hundred items had a 100 percent response rate, 78 items had a response rate between 99.0 and 99.9 percent, 1 item had an 80.5 percent response rate, and 1 item had a 71.0 percent response rate. The last two items are shown in table 11-28.

Table 11-28. Prison Study item response rates below 85 percent, by variable: 2003

Variable	Description	Number of eligibles	Unweighted item response rate (percent)	Weighted item response rate (percent)
BQ1830	What was the highest level of education your mother (stepmother, or female guardian) completed?	1,161	80.3	80.5
BQ1840	What was the highest level of education your father (stepfather, or male guardian) completed?	1,161	70.7	71.0

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

The numerator in the item response rate consisted of the item respondents; the denominator contained all unit respondents, excluding those with a valid skip for the item. Unweighted item response rates ranged from 70.7 percent to 100 percent, with a median of 100 percent. Weighted item response rates ranged from 71.0 percent to 100 percent, with a median of 100 percent.

11.2.3 Nonresponse Bias Analysis

As noted in section 11.1.4, NCES Standard 4-4-1 requires an evaluation of the potential magnitude of nonresponse bias for any survey stage with a unit or item response rate of less than 85 percent. The final prison and inmate (for the background questionnaire, assessment, and oral module) weighted response rates were all above 85 percent. Because of the high response rate, the nonresponse bias analysis was not necessary to examine unit nonresponse.

For item nonresponse, only two items on the background questionnaire fell below the 85 percent weighted response rate threshold. These two items are "What was the highest level of education your mother (stepmother, or female guardian) completed?" with an 80.5 percent weighted response rate, and "What was the highest level of education your father (stepfather, or male guardian) completed?" with a 71.0 percent weighted response rate. Because these two items do not meet the NCES nonresponse standard, a bivariate analysis (section 11.2.3.1), an item nonresponse bias estimation (section 11.2.3.2), and a multivariate analysis (section 11.2.3.3) were performed for each item to examine the potential bias owing to nonresponse.

11.2.3.1 Bivariate Analysis

For the two items with a low response rate in table 11-28, the distributions of item respondents and eligibles (i.e., unit respondents) were compared on survey domains such as key characteristics and background questionnaire items with response rates of 100 percent. To test for independence between the response indicators and survey domains, a Rao-Scott (RS3) chi-square test was computed, using WesVar. Final weights were used in the analysis. The results are shown in table 11-29. Replicate weights were used to adequately reflect the effect of two-stage cluster sampling.

Table 11-29. Prison Study sample distribution for item respondents versus eligibles, by survey domain: 2003

Survey domain	Respondents			Eligibles			Chi-square	
	Sample size	Domain percent	Standard error	Sample size	Domain percent	Standard error	Statistic	*p* value
A. BQ1830: What was the highest level of education your mother (stepmother, or female guardian) completed?								
Prison security level								
1: Supermax, maximum	303	34.5	0.67	368	33.5	0.18	4.97	0.077
2: Medium	416	46.9	0.79	536	48.5	0.14		
3: Minimum/other	213	18.5	0.51	257	18.0	0.09		
Region/prison type								
1: Northeast	102	12.0	0.73	132	12.3	0.18	5.09	0.159
2: Midwest	177	18.9	0.39	208	17.7	0.07		
3: South	387	38.7	0.71	480	38.4	0.16		
4: West	161	19.4	0.44	205	19.9	0.10		
5: Federal	105	11.0	0.40	136	11.7	0.03		
Inmate gender								
1: Male	868	93.1	0.22	1,086	93.6	0.07	6.58	0.010
2: Female	64	6.9	0.22	75	6.4	0.07		
Inmate race/ethnicity								
1: Hispanic	158	15.8	0.63	223	17.9	0.13	12.82	0.002
2: Non-Hispanic Black only	403	46.3	0.87	491	45.8	0.14		
3: Other	371	37.9	0.75	447	36.3	0.17		
Inmate age category								
1: 16–29	310	36.9	0.67	388	37.3	0.13	1.39	0.477
2: 30–49	526	55.4	0.64	659	55.4	0.16		
3: 50+	96	7.6	0.31	114	7.3	0.10		
Inmate highest level of education								
1: Less than high school	325	33.3	1.03	458	37.5	0.17	19.36	0.000
2: High school or higher	607	66.7	1.03	703	62.5	0.17		
Inmate marital status								
1: Never married	424	44.1	0.78	530	44.1	0.15	0.00	0.995
0: Other	508	55.9	0.78	631	55.9	0.15		
Inmate country of birth								
0: Born elsewhere	82	9.0	0.49	110	9.5	0.25	1.56	0.212
1: Born in the U.S.	850	91.0	0.49	1,051	90.5	0.25		
BQ1100: Which language do you usually speak now?								
0: Other	57	6.0	0.56	78	6.4	0.53	1.07	0.300
1: English	875	94.0	0.56	1,083	93.6	0.53		
BQ1140: With regard to the English language, how well do you... understand it when it is spoken to you?								
1: Very well	717	77.5	1.68	882	76.8	1.37	3.75	0.143
2: Well	183	19.1	1.72	230	19.2	1.50		
3: Not well, not at all	32	3.3	0.59	49	3.9	0.60		

See notes at end of table.

Table 11-29. Prison Study sample distribution for item respondents versus eligibles, by survey domain: 2003—Continued

Survey domain	Respondents			Eligibles			Chi-square	
	Sample size	Domain percent	Standard error	Sample size	Domain percent	Standard error	Statistic	*p* value
A. BQ1830: What was the highest level of education your mother (stepmother, or female guardian) completed?								
BQ1155: With regard to the English language, how well do you... write it?								
1: Very well	549	59.3	2.00	658	57.4	1.75	6.19	0.100
2: Well	271	29.2	2.04	348	30.0	1.79		
3: Not well	84	8.7	1.00	114	9.4	0.91		
4: Not at all	28	2.9	0.54	41	3.3	0.54		
BQ1208: Since your most recent admission to prison, have you completed any additional education?								
1: Yes	331	35.6	1.72	403	35.0	1.53	0.77	0.381
2: No	601	64.4	1.72	758	65.0	1.53		
BQ1245: Have you ever taken part in a program other than in regular school in order to improve your basic skills, that is, basic reading, writing, and arithmetic skills? The program may have been in prison or it may have been outside of prison.								
1: Yes	224	23.9	1.72	287	24.7	1.64	2.53	0.112
2: No	708	76.1	1.72	874	75.3	1.64		
BQ1500: Have you ever been placed on probation, either as a juvenile or as an adult?								
1: Yes	693	74.8	1.50	859	74.8	1.40	0.00	0.956
2: No	239	25.2	1.50	299	25.2	1.40		
BQ1560: In the year before your incarceration on {BGQ1490}, did you receive income from... unemployment insurance compensation and/or workman's compensation?								
1: Yes	63	6.5	0.73	77	6.4	0.65	0.06	0.808
2: No	869	93.5	0.73	1,083	93.6	0.65		
BQ1785: Do you ever use a computer?								
1: Yes	248	26.3	1.84	292	25.0	1.73	4.92	0.027
2: No	684	73.7	1.84	869	75.0	1.73		
BQ1855: Have you ever received… food stamps?								
1: Yes	266	28.6	1.55	336	28.7	1.48	0.01	0.919
2: No	666	71.4	1.55	823	71.3	1.48		
BQ1945: In general, how would you rate your overall health? Would you say it is…								
1: Excellent	265	28.9	1.86	319	28.0	1.66	14.36	0.005
2: Very Good	335	36.4	2.03	399	35.0	1.79		
3: Good	205	21.3	1.31	259	21.7	1.18		
4: Fair	91	9.7	0.88	132	11.1	0.88		
5: Poor	36	3.6	0.57	51	4.2	0.51		
B. BQ1840: What was the highest level of education your father (stepfather, or male guardian) completed?								
Prison security level								
1:Supermax, maximum	258	33.4	1.06	368	33.5	0.18	0.83	0.642
2: Medium	375	47.9	1.12	536	48.5	0.14		
3: Minimum/other	188	18.7	0.72	257	18.0	0.09		
Region/prison type								
1: Northeast	83	10.9	0.91	132	12.3	0.18	6.87	0.104
2: Midwest	159	19.4	0.65	208	17.7	0.07		
3: South	341	38.8	1.01	480	38.4	0.16		
4: West	147	20.0	0.78	205	19.9	0.10		
5: Federal	91	10.9	0.88	136	11.7	0.03		

See notes at end of table.

Table 11-29. Prison Study sample distribution for item respondents versus eligibles, by survey domain: 2003—Continued

Survey domain	Respondents			Eligibles			Chi-square	
	Sample size	Domain percent	Standard error	Sample size	Domain percent	Standard error	Statistic	*p* value
B. BQ1840: What was the highest level of education your father (stepfather, or male guardian) completed?								
Inmate gender								
1: Male	773	94.1	0.36	1,086	93.6	0.07	1.30	0.254
2: Female	48	5.9	0.36	75	6.4	0.07		
Inmate race/ethnicity								
1: Hispanic	147	16.6	0.72	223	17.9	0.13	14.43	0.001
2: Non-Hispanic Black only	332	43.7	1.02	491	45.8	0.14		
3: Other[1]	342	39.8	0.95	447	36.3	0.17		
Inmate age category								
1: 16–29	274	37.1	0.77	388	37.3	0.13	0.15	0.928
2: 30–49	467	55.7	0.81	659	55.4	0.16		
3: 50+	80	7.3	0.41	114	7.3	0.10		
Inmate highest level of education								
1: Less than high school	297	34.6	0.99	458	37.5	0.17	9.37	0.002
2: High school or higher	524	65.4	0.99	703	62.5	0.17		
Inmate marital status								
1: Never married	380	44.8	1.10	530	44.1	0.15	0.31	0.576
0: Other	441	55.2	1.10	631	55.9	0.15		
Inmate country of birth								
0: Born elsewhere	75	9.3	0.58	110	9.5	0.25	0.14	0.710
1: Born in the U.S.	746	90.7	0.58	1,051	90.5	0.25		
BQ1100: Which language do you usually speak now?								
0: Other	52	6.1	0.65	78	6.4	0.53	0.30	0.584
1: English	769	93.9	0.65	1,083	93.6	0.53		
BQ1140: With regard to the English language, how well do you... understand it when it is spoken to you?								
1: Very well	623	76.6	1.75	882	76.8	1.37	3.89	0.140
2: Well	171	20.2	1.79	230	19.2	1.50		
3: Not well, not at all	27	3.2	0.69	49	3.9	0.60		
BQ1155: With regard to the English language, how well do you... write it?								
1: Very well	481	59.3	2.11	658	57.4	1.75	3.81	0.238
2: Well	241	29.1	2.20	348	30.0	1.79		
3: Not well	76	8.9	1.02	114	9.4	0.91		
4: Not at all	23	2.7	0.61	41	3.3	0.54		
BQ1208: Since your most recent admission to prison, have you completed any additional education?								
1: Yes	287	35.2	1.81	403	35.0	1.53	0.02	0.889
2: No	534	64.8	1.81	758	65.0	1.53		
BQ1245: Have you ever taken part in a program other than in regular school in order to improve your basic skills, that is, basic reading, writing, and arithmetic skills? The program may have been in prison or it may have been outside of prison.								
1: Yes	203	24.7	1.84	287	24.7	1.64	0.00	0.962
2: No	618	75.3	1.84	874	75.3	1.64		

See notes at end of table.

Table 11-29. Prison Study sample distribution for item respondents versus eligibles, by survey domain: 2003—Continued

Survey domain	Respondents			Eligibles			Chi-square	
	Sample size	Domain percent	Standard error	Sample size	Domain percent	Standard error	Statistic	*p* value
B. BQ1840: What was the highest level of education your father (stepfather, or male guardian) completed?								
BQ1500: Have you ever been placed on probation, either as a juvenile or as an adult?								
1: Yes	606	74.5	1.59	859	74.8	1.40	0.10	0.756
2: No	215	25.5	1.59	299	25.2	1.40		
BQ1560: In the year before your incarceration on {BGQ1490}, did you receive income from... unemployment insurance compensation and/or workman's compensation?								
1: Yes	61	7.1	0.84	77	6.4	0.65	2.72	0.099
2: No	760	92.9	0.84	1083	93.6	0.65		
BQ1785: Do you ever use a computer?								
1: Yes	224	27.1	2.07	292	25.0	1.73	7.01	0.008
2: No	597	72.9	2.07	869	75.0	1.73		
BQ1855: Have you ever received… food stamps?								
1: Yes	220	27.0	1.65	336	28.7	1.48	4.25	0.039
2: No	601	73.0	1.65	823	71.3	1.48		
BQ1945: In general, how would you rate your overall health? Would you say it is…								
1: Excellent	238	29.5	1.96	319	28.0	1.66	6.92	0.088
2: Very Good	287	35.5	2.06	399	35.0	1.79		
3: Good	182	21.4	1.17	259	21.7	1.18		
4: Fair	84	10.0	0.87	132	11.1	0.88		
5: Poor	30	3.6	0.59	51	4.2	0.51		

[1] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

The chi-square tests show that there was a significant relationship between the response indicator for "What was the highest level of education your mother (stepmother, or female guardian) completed?" and 5 of the 20 survey domains (gender, race/ethnicity, education, ever used or not used a computer, and health).

The chi-square tests also show a significant relationship between the response indicator for "What was the highest level of education your father (stepfather, or male guardian) completed?" and 4 of the 20 survey domains (race/ethnicity, education, ever used or not used a computer, and ever received food stamps).

11.2.3.2 Item Nonresponse Bias Estimates

To understand the magnitude of the potential bias, estimates of bias were computed (as shown in table 11-30). *T* tests were performed to determine whether the bias was significantly different from 0. The *t* tests used a simple Bonferroni adjustment so that the overall α-level equaled 0.05 for each domain variable. The adjustment was computed as $\alpha' = \alpha/g$, where *g* is the number of comparisons. For example, for prison security level, three *t* tests were conducted. The Bonferroni adjustment is $\alpha' = 0.05/3 = 0.0166$. The results are fairly consistent with the chi-square analysis described in section 11.2.3.1.

With regard to mother's education, the survey domains with statistically significant bias estimates are the Midwest, males, females, Hispanics, levels of education, and having fair health. With regard to father's education, the survey domains with statistically significant bias estimates are the Midwest, race/ethnicity other than Black or Hispanic, levels of education, and ever used or not used a computer.

Even though there are some statistically significant relationships between the response indicators and the survey domains, there do not seem to be important indications of potential bias. Almost all absolute bias estimates are within 2 percentage points. However, among the statistically significant bias estimates, there are exceptions for mother's education, namely, –2.1 percent (–11.73 percent relative bias) for Hispanic inmates, –4.3 percent for inmates with low educational attainment (–11.47 percent relative bias), and 4.3 percent for inmates with high educational attainment (6.88 percent relative bias).

Table 11-30. Prison Study estimate of item nonresponse bias, by survey domain: 2003

Survey domain	Eligibles: Domain percent	Eligibles: SE[1]	Respondent domain percent	Nonrespondent domain percent	Bias: Estimate	Bias: SE[1]	Bias: *p* value	Relative bias	Bias ratio
A. BQ1830: What was the highest level of education your mother (stepmother, or female guardian) completed?									
Prison security level									
1:Supermax, maximum	33.5	0.18	34.5	29.3	1.0	0.64	0.118	2.99	5.56
2: Medium	48.5	0.14	46.9	55.1	–1.6	0.75	0.040	–3.30	–11.43
3: Minimum/ other	18.0	0.09	18.5	15.7	0.6	0.50	0.266	3.33	6.67
Region/prison type									
1: Northeast	12.3	0.18	12.0	13.8	–0.4	0.65	0.588	–3.25	–2.22
2: Midwest	17.7	0.07	18.9	12.9	1.2	0.38	0.003*	6.78	17.14
3: South	38.4	0.16	38.7	37.0	0.3	0.68	0.616	0.78	1.88
4: West	19.9	0.10	19.4	22.0	–0.5	0.47	0.296	–2.51	–5.00
5: Federal	11.7	0.03	11.0	14.4	–0.7	0.40	0.106	–5.98	–23.33
Inmate gender									
1: Male	93.6	0.07	93.1	95.7	–0.5	0.19	0.010*	–0.53	–7.14
2: Female	6.4	0.07	6.9	4.3	0.5	0.19	0.010*	7.81	7.14
Inmate race/ethnicity									
1: Hispanic	17.9	0.13	15.8	26.8	–2.1	0.59	0.001*	–11.73	–16.15
2: Non-Hispanic Black only	45.8	0.14	46.3	43.3	0.6	0.84	0.485	1.31	4.29
3: Other2	36.3	0.17	37.9	29.9	1.5	0.72	0.036	4.13	8.82
Inmate age category									
1: 16–29	37.3	0.13	36.9	39.0	–0.4	0.64	0.538	–1.07	–3.08
2: 30–49	55.4	0.16	55.4	55.2	0.0	0.62	0.943	0.00	0.00
3: 50+	7.3	0.10	7.6	5.8	0.4	0.29	0.226	5.48	4.00
Inmate highest level of education									
1: Less than high school	37.5	0.17	33.3	55.2	–4.3	0.88	0.000*	–11.47	–25.29
2: High school or higher	62.5	0.17	66.7	44.8	4.3	0.88	0.000*	6.88	25.29
Inmate marital status									
1: Never married	44.1	0.15	44.1	44.2	0.0	0.80	0.995	0.00	0.00
0: Other	55.9	0.15	55.9	55.8	0.0	0.80	0.995	0.00	0.00
Inmate country of birth									
0: Born elsewhere	9.5	0.25	9.0	11.8	–0.5	0.44	0.217	–5.26	–2.00
1: Born in the U.S.	90.5	0.25	91.0	88.2	0.5	0.44	0.217	0.55	2.00

See notes at end of table.

Table 11-30. Prison Study estimate of item nonresponse bias, by survey domain: 2003—Continued

Survey domain	Eligibles: Domain percent	Eligibles: SE[1]	Respondent domain percent	Nonrespondent domain percent	Bias: Estimate	Bias: SE[1]	Bias: *p* value	Relative bias	Bias ratio
A. BQ1830: What was the highest level of education your mother (stepmother, or female guardian) completed?									
BQ1100: Which language do you usually speak now?									
0: Other	6.4	0.53	6.0	8.1	–0.4	0.40	0.301	–6.25	–0.75
1: English	93.6	0.53	94.0	91.9	0.4	0.40	0.301	0.43	0.75
BQ1140: With regard to the English language, how well do you... understand it when it is spoken to you?									
1: Very well	76.8	1.37	77.5	73.9	0.7	0.74	0.346	0.91	0.51
2: Well	19.2	1.50	19.1	19.6	–0.1	0.65	0.887	–0.52	–0.07
3:Not well, not at all	3.9	0.60	3.3	6.5	–0.6	0.29	0.041	–15.38	–1.00
BQ1155: With regard to the English language, how well do you... write it?									
1: Very well	57.4	1.75	59.3	49.5	1.9	0.83	0.026	3.31	1.09
2: Well	30.0	1.79	29.2	33.2	–0.8	0.77	0.315	–2.67	–0.45
3: Not well	9.4	0.91	8.7	12.2	–0.7	0.52	0.197	–7.45	–0.77
4: Not at all	3.3	0.54	2.9	5.1	–0.4	0.31	0.165	–12.12	–0.74
BQ1208: Since your most recent admission to prison, have you completed any additional education?									
1: Yes	35.0	1.53	35.6	32.6	0.6	0.65	0.383	1.71	0.39
2: No	65.0	1.53	64.4	67.4	–0.6	0.65	0.383	–0.92	–0.39
BQ1245: Have you ever taken part in a program other than in regular school in order to improve your basic skills, that is, basic reading, writing, and arithmetic skills? The program may have been in prison or it may have been outside of prison.									
1: Yes	24.7	1.64	23.9	28.0	–0.8	0.49	0.117	–3.24	–0.49
2: No	75.3	1.64	76.1	72.0	0.8	0.49	0.117	1.06	0.49
BQ1500: Have you ever been placed on probation, either as a juvenile or as an adult?									
1: Yes	74.8	1.40	74.8	74.6	0.0	0.68	0.957	0.00	0.00
2: No	25.2	1.40	25.2	25.4	0.0	0.68	0.957	0.00	0.00
BQ1560: In the year before your incarceration on {BGQ1490}, did you receive income from... unemployment insurance compensation and/or workman's compensation?									
1: Yes	6.4	0.65	6.5	6.0	0.1	0.35	0.810	1.56	0.15
2: No	93.6	0.65	93.5	94.0	–0.1	0.35	0.810	–0.11	–0.15
BQ1785: Do you ever use a computer?									
1: Yes	25.0	1.73	26.3	19.4	1.3	0.61	0.032	5.20	0.75
2: No	75.0	1.73	73.7	80.6	–1.3	0.61	0.032	–1.73	–0.75
BQ1855: Have you ever received… food stamps?									
1: Yes	28.7	1.48	28.6	28.9	–0.1	0.59	0.919	–0.35	–0.07
2: No	71.3	1.48	71.4	71.1	0.1	0.59	0.919	0.14	0.07
BQ1945: In general, how would you rate your overall health? Would you say it is…									
1: Excellent	28.0	1.66	28.9	24.3	0.9	0.59	0.135	3.21	0.54
2: Very Good	35.0	1.79	36.4	29.1	1.4	0.73	0.057	4.00	0.78
3: Good	21.7	1.18	21.3	23.2	–0.4	0.61	0.543	–1.84	–0.34
4: Fair	11.1	0.88	9.7	17.0	–1.4	0.50	0.007*	–12.61	–1.59
5: Poor	4.2	0.51	3.6	6.4	–0.5	0.29	0.064	–11.90	–0.98

See notes at end of table.

Table 11-30. Prison Study estimate of item nonresponse bias, by survey domain: 2003—Continued

Survey domain	Eligibles: Domain percent	Eligibles: SE[1]	Respondent domain percent	Nonrespondent domain percent	Bias: Estimate	Bias: SE[1]	Bias: *p* value	Relative bias	Bias ratio
B. BQ1840: What was the highest level of education your father (stepfather, or male guardian) completed?									
Prison security level									
1: Supermax, maximum	33.5	0.18	33.4	33.8	–0.1	1.01	0.905	–0.30	–0.56
2: Medium	48.5	0.14	47.9	49.9	–0.6	1.09	0.591	–1.24	–4.29
3: Minimum/ other	18.0	0.09	18.7	16.3	0.7	0.70	0.313	3.89	7.78
Region/prison type									
1: Northeast	12.3	0.18	10.9	15.7	–1.4	0.78	0.075	–11.38	–7.78
2: Midwest	17.7	0.07	19.4	13.6	1.7	0.61	0.008*	9.60	24.29
3: South	38.4	0.16	38.8	37.4	0.4	0.98	0.672	1.04	2.50
4: West	19.9	0.10	20.0	19.8	0.1	0.77	0.927	0.50	1.00
5: Federal	11.7	0.03	10.9	13.5	–0.8	0.88	0.380	–6.84	–26.67
Inmate gender									
1: Male	93.6	0.07	94.1	92.5	0.5	0.40	0.260	0.53	7.14
2: Female	6.4	0.07	5.9	7.5	–0.5	0.40	0.260	–7.81	–7.14
Inmate race/ethnicity									
1: Hispanic	17.9	0.13	16.6	21.2	–1.4	0.71	0.058	–7.82	–10.77
2: Non-Hispanic Black only	45.8	0.14	43.7	50.8	–2.1	0.98	0.037	–4.59	–15.00
3: Other	36.3	0.17	39.8	28.0	3.5	0.88	0.000*	9.64	20.59
Inmate age category									
1: 16–29	37.3	0.13	37.1	38.0	–0.3	0.76	0.714	–0.80	–2.31
2: 30–49	55.4	0.16	55.7	54.7	0.3	0.81	0.719	0.54	1.88
3: 50+	7.3	0.10	7.3	7.3	0.0	0.41	0.979	0.00	0.00
Inmate highest level of education									
1: Less than high school	37.5	0.17	34.6	44.7	–2.9	0.95	0.003*	–7.73	–17.06
2: High school or higher	62.5	0.17	65.4	55.3	2.9	0.95	0.003*	4.64	17.06
Inmate marital status									
1: Never married	44.1	0.15	44.8	42.6	0.6	1.12	0.580	1.36	4.00
0: Other	55.9	0.15	55.2	57.4	–0.6	1.12	0.580	–1.07	–4.00
Inmate country of birth									
0: Born elsewhere	9.5	0.25	9.3	10.0	–0.2	0.54	0.712	–2.11	–0.80
1: Born in the U.S.	90.5	0.25	90.7	90.0	0.2	0.54	0.712	0.22	0.80

See notes at end of table.

Table 11-30. Prison Study estimate of item nonresponse bias, by survey domain: 2003—Continued

Survey domain	Eligibles: Domain percent	Eligibles: SE[1]	Respondent domain percent	Nonrespondent domain percent	Bias: Estimate	Bias: SE[1]	Bias: *p* value	Relative bias	Bias ratio
B. BQ1840: What was the highest level of education your father (stepfather, or male guardian) completed?									
BQ1100: Which language do you usually speak now?									
0: Other	6.4	0.53	6.1	7.0	–0.3	0.47	0.586	–4.69	–0.57
1: English	93.6	0.53	93.9	93.0	0.3	0.47	0.586	0.32	0.57
BQ1140: With regard to the English language, how well do you... understand it when it is spoken to you?									
1: Very well	76.8	1.37	76.6	77.4	–0.2	0.98	0.805	–0.26	–0.15
2: Well	19.2	1.50	20.2	16.8	1.0	0.95	0.287	5.21	0.67
3: Not well, not at all	3.9	0.60	3.2	5.8	–0.8	0.42	0.074	–20.51	–1.33
BQ1155: With regard to the English language, how well do you... write it?									
1: Very well	57.4	1.75	59.3	52.9	1.9	1.21	0.129	3.31	1.09
2: Well	30.0	1.79	29.1	32.0	–0.9	1.14	0.454	–3.00	–0.50
3: Not well	9.4	0.91	8.9	10.4	–0.4	0.53	0.411	–4.26	–0.44
4: Not at all	3.3	0.54	2.7	4.7	–0.6	0.38	0.145	–18.18	–1.11
BQ1208: Since your most recent admission to prison, have you completed any additional education?									
1: Yes	35.0	1.53	35.2	34.7	0.1	0.92	0.890	0.29	0.07
2: No	65.0	1.53	64.8	65.3	–0.1	0.92	0.890	–0.15	–0.07
BQ1245: Have you ever taken part in a program other than in regular school in order to improve your basic skills, that is, basic reading, writing, and arithmetic skills? The program may have been in prison or it may have been outside of prison.									
1: Yes	24.7	1.64	24.7	24.8	0.0	0.67	0.962	0.00	0.00
2: No	75.3	1.64	75.3	75.2	0.0	0.67	0.962	0.00	0.00
BQ1500: Have you ever been placed on probation, either as a juvenile or as an adult?									
1: Yes	74.8	1.40	74.5	75.4	–0.3	0.81	0.758	–0.40	–0.21
2: No	25.2	1.40	25.5	24.6	0.3	0.81	0.758	1.19	0.21
BQ1560: In the year before your incarceration on {BGQ1490}, did you receive income from... unemployment insurance compensation and/ or workman's compensation?									
1: Yes	6.4	0.65	7.1	4.6	0.7	0.45	0.106	10.94	1.08
2: No	93.6	0.65	92.9	95.4	–0.7	0.45	0.106	–0.75	–1.08
BQ1785: Do you ever use a computer?									
1: Yes	25.0	1.73	27.1	19.9	2.1	0.80	0.011*	8.40	1.21
2: No	75.0	1.73	72.9	80.1	–2.1	0.80	0.011*	–2.80	–1.21
BQ1855: Have you ever received… food stamps?									
1: Yes	28.7	1.48	27.0	32.7	–1.7	0.81	0.044	–5.92	–1.15
2: No	71.3	1.48	73.0	67.3	1.7	0.81	0.044	2.38	1.15
BQ1945: In general, how would you rate your overall health? Would you say it is…									
1: Excellent	28.0	1.66	29.5	24.5	1.5	0.77	0.063	5.36	0.90
2: Very Good	35.0	1.79	35.5	33.8	0.5	1.06	0.648	1.43	0.28
3: Good	21.7	1.18	21.4	22.4	–0.3	0.80	0.729	–1.38	–0.25
4: Fair	11.1	0.88	10.0	13.6	–1.1	0.43	0.016	–9.91	–1.25
5: Poor	4.2	0.51	3.6	5.6	–0.6	0.35	0.087	–14.29	–1.18

* Statistically significant with Bonferroni adjustment at α = 0.05.
[1] Standard error.
[2] Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: Details may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

For father's education, there are also exceptions among the statistically significant bias estimates, namely, 3.5 percent absolute bias for race/ethnicity other than Black or Hispanic (9.64 percent relative bias), –2.9 percent for inmates with low educational attainment (–7.73 percent relative bias), and 2.9 percent for inmates with high educational attainment (4.64 percent relative bias), as well as for inmates who either use (2.1 percent, 8.40 percent relative bias) or do not ever use (–2.1 percent, –2.8 percent relative bias) a computer.

11.2.3.3 Multivariate Analysis

The bivariate analysis described in section 11.2.3.2 is useful for explaining each domain variable individually. A multivariate analysis is useful in showing relationships among a number of domain variables for the item (BQ1830, BQ1840) response indicator.

For the multivariate analysis of item nonresponse, CHAID was used to divide the sample into subgroups that best explain differential response rates. The resulting classification trees reveal the survey domains, as defined by combinations of variables with the most differential response rates, thereby leading to survey domains with the highest potential for nonresponse bias. Item response status was used as the dependent variable, and the survey domains indicated in table 11-29 were the predictors.

The trees for the low response rate items are displayed in figures 11-3 and 11-4. For mother's education, the variables used to form the CHAID cells were education, region, "In general, how would you rate your overall health?" and race/ethnicity indicators (figure 11-3). Inmates with low levels of education in the Northeast, South, and West show the greatest potential for nonresponse bias for this item because those inmates have the lowest response rate (69.5 percent). Inmates who had high levels of education, considered themselves to be in excellent or very good health, and were non-Hispanic had the lowest potential for nonresponse bias for this item, with the highest response rate (91.0 percent).

For father's education, the variables race/ethnicity, "Have you ever received food stamps?" "How well do you understand English when it is spoken to you?" "In general, how would you rate your overall health?" "How well do you write English?" and marital status were used to form the response cells (figure 11-4). The last three variables were not significant when considered individually (as shown in table 11-29). However, through interactions with other explanatory variables, they become important

Figure 11-3. Prison Study multivariate analysis of item nonresponse to BQ1830: What was the highest level of education your mother (stepmother, or female guardian) completed?: 2003

Education		Region		Race/ethnicity		
Less than high school	71.5% (458)	Northeast, South, West	69.5% (395)			Cell 1
		Midwest	84.7% (63)			Cell 2
High school or higher	86.1% (703)	BQ1945: Overall health				
		Excellent, very good	88.8% (451)	Hispanic	76.5% (72)	Cell 3
				Non-Hispanic Black only, other[1]	91.0% (379)	Cell 4
		Good, fair, poor	81.2% (252)			Cell 5

Overall weighted response rate = 80.6 percent
Total number of eligibles = 1,161

[1]Includes non-Hispanic White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and multiple races.
NOTE: All percentages are weighted response rates and the numbers inside the parentheses are sample sizes.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

Figure 11-4. Prison Study multivariate analysis of item nonresponse to BQ1840: What was the highest level of education your father (stepfather, or male guardian) completed?: 2003

Overall weighted response rate = 70.7 percent
Total number of eligibles = 1,161

Race/ethnicity						
Hispanic, non-Hispanic Black only	66.8% (714)	BQ1140: Understand English				
		Very well	64.7% (520)	BQ1155: Write English		
				Very well	69.0% (376)	Cell 1
				Well, not well, not at all	53.5% (144)	Cell 2
		Well	77.0% (150)	Marital status		
				Other	67.4% (53)	Cell 3
				Never married	82.3% (97)	Cell 4
		Not well, not at all	58.4% (44)	Cell 5		
Other	77.4% (447)	BQ1945: Overall health				
		Excellent, very good, good	80.8% (361)	Cell 6		
		Fair, poor	62.4% (86)	BQ1855: Received food stamps		
				Yes	48.6% (40)	Cell 7
				No	74.5% (46)	Cell 8

NOTE: All percentages are weighted response rates and the numbers inside the parentheses are sample sizes.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

variables. Inmates who are of other than Black or Hispanic race/ethnicity, are in fair or poor health, and have received food stamps showed the greatest potential for nonresponse bias for this item, with the lowest response rate (48.6 percent). In contrast, Hispanic and non-Hispanic Black inmates who understand English well and have never been married had the lowest potential for nonresponse bias for this item, with the highest response rate (82.3 percent).

11.2.4 Conclusion

Through the systematic analysis described above, several prison study variables that were known for both respondents and nonrespondents were analyzed to see whether there was an important impact of nonresponse bias. At the unit level, concern over nonresponse is minimal because the response rates were acceptably high for each of the data collection stages. Out of the hundreds of background questionnaire items, only two were below NCES standards for response rates.

For the background questionnaire item asking for mother's education, the CHAID analysis shows that the domain with the lowest response rate (69.5 percent) includes inmates with less than a high school education who live in the Northeast, South, or West. Other important domains that may affect the potential for bias, as given in the bias estimates, are Hispanic race/ethnicity and inmate education level. Some other domains showed some significant relationship with the response indicator for mother's education but did not show important levels of bias based on the bias ratio.

For the background questionnaire item asking for father's education, the CHAID analysis shows that the domain with the lowest response rate (48.6 percent) was inmates of non-Black, non-Hispanic race/ethnicity who rated their health as fair or poor and who had received food stamps. Other important domains that may affect the potential for bias as given in the bias estimates are race/ethnicity other than Black or Hispanic, inmate education levels, and levels of computer use. Some domains given in the CHAID tree include not being able to understand English well or not at all, not being able to write English well, and having a marital status other than never married; however, the impact of these CHAID domains is dependent on other variables, as shown in figure 11-4. Some other domains showed some significant relationship with the response indicator for father's education but did not show important levels of bias based on the bias ratio.

The results of the prison study nonresponse bias analysis show very little potential for nonresponse bias. In fact, there is minimal concern for unit-level bias, and there is concern for only two background questionnaire items. Some caution should be used when analyzing parent's education with the variables that showed importance in the CHAID analysis and in the bivariate analysis.

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