Definitions of All Subpopulations and Background Variables Reported

Some background variables were included in the analyses in more than one chapter. Those variables are listed under the chapter where they first appeared. For the exact wording of background questions, see http://nces.ed.gov/naal.

Chapter 2

Total Population

The 2003 National Assessment of Adult Literacy included two samples: (1) adults ages 16 and older living in households and (2) inmates ages 16 and older in federal and state prisons. The household sample also included adults in six states that chose to participate in a concurrent State Assessment of Adult Literacy: Kentucky, Maryland, Massachusetts, Missouri, Oklahoma, and New York. Each sample was weighted to represent its share of the total population of the United States (99 percent for the household sample and 1 percent for the prison sample). The household and prison samples were combined to create a nationally representative sample of America’s adults. Household data collection was conducted from March 2003 through February 2004; prison data collection was conducted from March through July 2004.
Gender

Interviewers recorded the gender of each respondent.

Race and Ethnicity

In 2003, all respondents were asked two or three questions about their race and ethnicity. The first question asked them to indicate whether they were Hispanic or Latino.

If a respondent answered that he or she was Hispanic or Latino, the respondent was asked to choose one or more of the following groups to describe his or her Hispanic origin:

- Mexican, Mexican American, or Chicano
- Puerto Rican or Puerto Rican American
- Cuban or Cuban American
- Central or South American
- Other Hispanic or Latino background

Respondents who identified more than one of the groups to describe their Hispanic origin were classified as "Other Hispanic or Latino background."

Then, all respondents, including those who indicated they were Hispanic or Latino, were asked to choose one or more of the following groups to describe themselves:

- White
- Black or African American
- Asian
- American Indian or Alaska Native
- Native Hawaiian or other Pacific Islander

Individuals who responded yes to the first question were coded as Hispanic, regardless of their answer to the second question. Individuals who identified more than one group on the second question were coded as Multiracial. Respondents of Native Hawaiian or Pacific Islander origin were grouped with those of Asian origin. The White, Black, and Hispanic groups are reported separately. The interviewer recorded the race/ethnicity of respondents who refused to answer the question.

In 1992, the race and ethnicity questions were somewhat different. Respondents were first asked to choose one race from among the following:

- White
- Black (African American)
- American Indian
- Alaska Native
- Asian
- Other

They were then asked whether they were of Spanish or Hispanic origin or descent. If they indicated they were, they were asked to choose from among the same groups as on the 2003 survey to describe their Hispanic ethnicity.

Because respondents in 2003 were not offered an "other" category to describe their race and respondents in 1992 were limited to choosing one race, caution should be exercised when comparing 1992 and 2003 results.

Language Spoken Before Starting School

All respondents were asked what language or languages they learned to speak before starting school. Their responses were then used to divide respondents into five groups: English only, English and Spanish, English and other language, Spanish only, Other language(s). The English and Spanish category includes adults who spoke languages in addition to both English and Spanish. The Spanish category includes adults who spoke Spanish and additional non-English languages.
Appendix B: Definitions of All Subpopulations and Background Variables Reported

Chapter 3

Age Learned English

Respondents who spoke a language other than English before starting school were asked their age when they learned to speak English. They were classified into one of the following categories: 10 or younger, 11 to 15, 16 to 20, 21 or older.

Age

All respondents were asked to report their birthdates, and this information was used to calculate their age. Age groups reported are 16 to 18, 19 to 24, 25 to 39, 40 to 49, 50 to 64, and 65 and older. Age groups were selected to correspond to key life stages of many adults:

- 16–18: Completion of secondary education
- 19–24: College or job training
- 25–39: Early career
- 40–49: Mid career
- 50–64: Late career
- 65 and older: Retirement

Learning Disability

Adults were asked if they had ever been diagnosed or identified as having a learning disability.

Household Income

Respondents were asked to provide their family’s total income from all sources, including jobs, investments, Social Security or retirement, and public assistance. Household income categories were developed based on the income categories used by the U.S. Census and were combined as needed to reflect the NAAL’s sample size. Respondents were coded into the following household income categories: less than $10,000, $10,000–$14,999, $15,000–$19,999, $20,000–$29,999, $30,000–$39,999, $40,000–$59,999, $60,000–$99,999, $100,000 or greater.

Highest Educational Attainment

All respondents were asked to indicate the highest level of education they had completed. The following options were provided:

- Still in high school
- Less than high school
- Some high school
- GED or high school equivalency
- High school graduate
- Vocational, trade, or business school after high school
- College: less than 2 years
- College: Associate’s degree (A.A.)
- College: 2 or more years, no degree
- College graduate (B.A. or B.S.)
- Postgraduate, no degree
- Postgraduate degree (M.S., M.A., Ph.D., M.D., etc.)

Respondents who reported less than high school or some high school were asked how many years of education they had completed. For certain analyses, some of these groups were collapsed. For example, respondents who had completed postgraduate studies but had not received a degree were generally combined with those who had completed a postgraduate degree.

Age Obtained High School Diploma/GED

Respondents were asked to provide the year they graduated high school or obtained their GED. Their age was calculated on the basis of their birthday and the assumption that they obtained their degree in June. Respondents were grouped into the following categories: 19 or younger, 20 to 24, 25 or older, did not graduate.
Year Obtained College Degree
Respondents were asked what year they graduated college. Responses were coded into the following categories: 1997 or later, 1992–96, 1977–91, 1962–76, 1961 or earlier.

Participation in English as a Second Language Instruction
Respondents who spoke a language other than English before starting school were asked whether they were currently enrolled in or had ever taken part in an English as a Second Language class in the United States. Respondents were then asked how long ago they last took a class to improve their English: within the last two years, 2 to 5 years ago, more than 5 years ago, currently taking an English as a Second Language class.

Information Technology (IT) Certification
All respondents were asked whether they had received any type of information technology skill certification sponsored by a hardware or software manufacturer or an industry or professional association and whether they had passed a test to get the certification. Those who answered yes to both questions were counted as receiving IT certification.

Chapter 4

Labor Force Participation
Household respondents were asked to report what they were doing during the week before the assessment was administered:
1. working a full-time job for pay or profit (35 hours or more)
2. working for pay or profit part-time (1 to 34 hours)
3. working two or more part-time jobs for pay, totaling 35 or more hours
4. unemployed, laid off, or looking for work
5. with a job but not at work because of temporary illness, vacation, or work stoppage
6. with a job but on family leave (maternity or paternity leave)
7. in school
8. keeping house
9. retired
10. doing volunteer work
For analysis, respondents were divided into four groups: adults working full-time (or working two or more part-time jobs); those working part-time; those unemployed, laid off, or looking for work; those out of the labor force. Adults in categories 1 and 2 were counted as being employed full-time; those in category 3 were counted as being employed part-time; those in category 4 were counted as unemployed; those in categories 5 and 6 were counted as not at work (and therefore omitted from the analyses of labor force participation); and those in categories 7 through 10 were counted as being out of the labor force. Adults in categories 5 and 6 (temporarily not at work) could not be coded into one of the employment categories because they were not asked if they usually worked full-time or part-time. Respondents could pick as many responses as were applicable, but they were coded for analysis on the basis of the response highest in the list (e.g., if they said they were working full-time and also doing volunteer work, they were coded as working full-time; if they said they were unemployed, laid off, or looking for work and also keeping house, they were coded as unemployed).

Occupation
Respondents who had held a job within the past 3 years were asked to provide the title of their occu-
occupation and its most important activities and duties. This information was used to assign each occupation a 2000 Census Bureau code. The occupations were then collapsed into eight major occupational groups:

- Management, business, and financial
- Professional and related
- Service
- Sales and related
- Office and administrative support
- Construction and extraction
- Installation, maintenance, and repair
- Production

The occupational classification system used by the Census Bureau and other government agencies underwent substantial changes with the introduction of the 2000 Standard Occupational Classification (SOC). Therefore, the 1992 occupational codes/groups could not be directly compared with the 2003 occupations/groups. The Census Bureau developed a crosswalk as a way to connect the 1992 and 2003 occupational codes. This crosswalk provides the percentage of people in a 1992 occupation that would be redistributed to various 2003 occupations. For example, 73 percent of the 1992 occupation “Library clerks” would be reclassified in 2003 as “Library Technicians” while 27 percent would be coded into “Library assistants, clerical.”

Two steps were used to code the 1992 occupations into the 10 occupational groups used for the 2003 data. First, occupations that were at least 90 percent comparable according to the crosswalk were directly coded into the 2003 occupational group. Second, if fewer than 90 percent of the people in a 1992 occupation could be categorized into a single 2003 occupational group, then individuals in that occupation were randomly assigned to groups according to the percentages provided in the crosswalk. For example, for the 1992 occupational group “Insurance adjusters, examiners, and investigators,” 76 percent were classified in 2003 as “Claims adjusters, appraisers, examiners, and investigators” while 24 percent were classified as “Insurance claims and policy processing clerks.” Therefore, the same percentages of the 1992 respondents in this occupation were randomly assigned into two different occupational groups: “Management, business, and financial,” which includes claims adjusters, and “Office and administrative support,” which contains insurance claims clerks.

Weekly Wage or Salary

Respondents who were employed were asked to report their gross weekly wage or salary (before deductions) during the previous week. Some respondents were unable to report their weekly wage or salary before deductions. In these cases, the interviewers asked them to report their take-home pay and noted that fact. Some respondents reported their pay per hour, day, 2-week period, month, or year, rather than per week as requested. This was also noted by the interviewers, who asked a follow-up question to clarify the time frame the respondents were using.

All reported pay was adjusted to approximate gross weekly wages or salaries. For respondents who reported their earnings in units other than weekly (e.g., per hour or per day), information on the number of hours worked per week (collected in a separate question) was used to compute weekly earnings. For respondents who reported take-home pay rather than gross pay, adjustments were made to the wage or salary they reported by adding a FICA adjustment at a flat rate of 7.65 percent and an additional adjustment based on IRS withholding tables for single taxpayers in 2003. An additional 10 percent was added as a proxy for state taxes and miscellaneous deductions.
Extent to Which Reading, Mathematics, and Computer Skills Limit Job Opportunities

Respondents were asked in separate questions how much they thought their reading, mathematics, and computer skills limited their job opportunities—for example, to get a promotion or a (different) job they would like to have. They could respond with a lot, some, a little, or not at all.

Participation in Public Assistance

Respondents were asked whether they or anyone in their household had received Temporary Assistance for Needy Families (TANF), public assistance, or public welfare payments from the state or local welfare office during the previous 12 months or whether they had ever received public assistance in the past. Respondents were identified as never, past, or current participants in welfare.

Time Receiving Public Assistance

Respondents were asked about how long, in total, they had received welfare payments in their lifetime: less than 6 months, 6 months to 1 year, more than 1 year but less than 2 years, 2 to 3 years, more than 3 years.

Participation in Reading-, Mathematics-, and Computer-Related Job Training

Respondents were asked in separate questions whether during the past year they had participated in any training or education, including courses, workshops, formal on-the-job training, or apprenticeships, intended to improve their English reading skills, arithmetic or mathematics skills, or computer skills.

Chapter 5

All respondents were asked how many children under 18 had lived in their household for 10 or more days during the past month. Those respondents who indicated that children had lived in their household were asked how they were related to each of the children. Their responses to these two questions were used to target the family literacy questions to adults with children of the appropriate ages.

Reading to or with Children

Respondents with a child or grandchild living in their home who was under the age of 8 were asked whether or not they had read to the child during the past week. If they answered yes, they were asked to indicate how often they had read to the child: every day, 5 or 6 days, 3 or 4 days, 1 or 2 days.

Teaching Children the Letters of the Alphabet/Child Already Knows Alphabet

Respondents with a child or grandchild living in their home who was under the age of 8 were asked how often they tried to teach their child the letters of the alphabet: every day, a few times a week, once a week, less than once a week, never, or child (children/grandchild/grandchildren) already knows the letters of the alphabet. Results are presented in this report for parents with children ages 3 through 5.

Teaching Children to Read Words

Respondents with a child or grandchild living in their home who was under the age of 8 were asked how often they pointed out words to their child and asked him or her what they said: every day, a few times a week, once a week, less than once a week, never, and child (children/grandchild/grandchildren) already reads well.

Rhyming Activities

Respondents with a child or grandchild living in their home who was under the age of 8 were asked how often they sang songs, recited poems or nursery rhymes, or engaged in other activities that included
rhyming words with their child: every day, a few times a week, once a week, less than once a week, never.

**Talking About School**

Respondents with a child or grandchild living in their house who was 5 or older were asked how often during a typical school month they talked to the child about things he or she studied in school: every day, a few times a week, once a week, less than once a week, never.

**Helping or Working with Children on Homework**

Respondents with a child or grandchild living in their house who was 5 or older were asked how often during a typical school month they helped or worked with the child on homework: every day, a few times a week, once a week, less than once a week, never.

**Reading Materials in the Home**

Respondents were asked two true or false questions about reading materials at home: whether they had 25 books or more at home at the time of interview and whether there was a variety of magazines and other reading materials at home. Respondents who answered true to both questions were classified as having many reading materials at home; those who answered true to one of the questions were classified as having some reading materials; and those who answered false to both questions were classified as having no reading materials at home.

**Child Sees Adults Reading**

Respondents were asked a true or false question about whether their child (children/grandchild/grandchildren) over age 2 living in the household often saw them read.

**Child Has Own Books**

Respondents were asked a true or false question about whether their child (children/grandchild/grandchildren) over age 2 living in the household had his or her own books.

**Computer with Word Processor in Home**

Respondents were asked how many computers they had at home that could be used for word processing. They were classified as having at least one computer that could be used for word processing or having no computers that could be used for word processing.

**Computer with Internet Access**

Respondents were asked how many computers they had at home that could access the Internet or World Wide Web. They were classified as having at least one computer that could access the Internet or having no computers that could access the Internet.

**School Involvement**

Respondents were asked four questions to indicate the number of different types of activities they were involved in at their child’s or grandchild’s school. They were asked whether during the past year they had done the following:

- Volunteered to help out at their child’s (one of their children’s/grandchild/grandchildren) school(s), including in the classroom, on a field trip, or at school event such as a party or school fair?
- Gone to a PTA or other type of parent meeting at their child’s (one of their children’s/grandchild/grandchildren) school(s)?
- Spoken individually with their child’s (one of their children’s/grandchild/grandchildren) teacher(s) to see how he or she was doing in school?
Sent food, or other items to share in their child’s (one of their children’s/grandchild/grandchildren) classroom(s)?

Respondents were grouped according to the number of questions that they answered “yes” as none, one, two, three, or four.

Chapter 6

Voting

All respondents who either were born in the United States or indicated in response to a separate question (that was asked only of people not born in the United States) that they were citizens of the United States were asked whether they remembered whether or not they voted in the 2000 presidential election. If they said they remembered whether or not they voted in the election, they were asked whether they voted. Respondents who did not remember whether they voted were treated as missing data for this question.

Sources of Information About Current Events, Public Affairs, and the Government

Respondents were asked how much information about current events, public affairs, and the government they usually got from each of the following sources: newspapers, magazines, the Internet, radio and television, books or brochures, and family members, friends, or coworkers. They were given the following response options: a lot, some, a little, none.

Volunteering

Respondents were asked whether they gave any unpaid time as a volunteer to a group or an organization during the past year.

Online Communities

Respondents were asked about how often they sent or received an e-mail message and found information on the Internet. They were given the following response options: every day, a few times a week, once a week, less than once a week, never.
Technical Notes

This appendix describes the sampling, data collection, weighting and variance estimation, scaling, and statistical testing procedures used to collect and analyze the data for the 2003 National Assessment of Adult Literacy (NAAL). Household data collection was conducted from March 2003 through February 2004; prison data collection was conducted from March through July 2004.

Sampling

The 2003 National Assessment of Adult Literacy included two samples: (1) adults ages 16 and older living in households (99 percent of the sample weighted) and (2) inmates ages 16 and older in federal and state prisons (1 percent of the sample weighted). Each sample was weighted to represent its share of the total population of the United States, and the samples were combined for reporting.

Household Sample

The 2003 National Assessment of Adult Literacy household sample included a nationally representative probability sample of 35,365 households. The household sample was selected on the basis of a four-stage, stratified area sample: (1) primary sampling units (PSUs) consisting of counties or groups of contiguous counties; (2) secondary sampling units (referred to as segments) consisting of area blocks; (3) housing units containing households; and (4) eligible persons within households. Person-level data were collected through a screener,
a background questionnaire, the literacy assessment, and the oral module. Of the 35,365 sampled households, 4,671 were either vacant or not a dwelling unit, resulting in a sample of 30,694 households. A total of 25,123 households completed the screener, which was used to select survey respondents. The final screener response rate was 81.2 percent weighted.

On the basis of the screener data, 23,732 respondents ages 16 and older were selected to complete the background questionnaire and the assessment; 18,186 actually completed the background questionnaire. Of the 5,546 respondents who did not complete the background questionnaire, 355 were unable to do so because of a literacy-related barrier, either the inability to communicate in English or Spanish (the two languages in which the background questionnaire was administered) or a mental disability.

The final response rate for the background questionnaire, which included respondents who completed the background questionnaire and respondents who were unable to complete the background questionnaire because of language problems or a mental disability, was 76.6 percent weighted. Of the 18,186 adults ages 16 and older who completed the background questionnaire, 17,178 completed at least one question on each of the three scales—prose, document, and quantitative—measured in the adult literacy assessment. An additional 149 were unable to answer at least one question on each of the three scales for literacy-related reasons. The final response rate for the literacy assessment, which included respondents who answered at least one question on each scale plus the 149 respondents who were unable to do so because of language problems or a mental disability, was 96.6 percent weighted.

Cases were considered complete if the respondent completed the background questionnaire and at least one question on each of the three scales or if the respondent was unable to answer any questions because of language issues (an inability to communicate in English or Spanish) or a mental disability. All other cases that did not include a complete screener, a background questionnaire, and responses to at least one question on each of the three literacy scales were considered incomplete or missing. Before imputation, the overall response rate for the household sample was 60.1 percent weighted.

For respondents who did not complete any literacy tasks on any scale, no information is available about their performance on the literacy scale they were missing. Completely omitting these individuals from the analyses would have resulted in unknown biases in estimates of the literacy skills of the national population because refusals cannot be assumed to have occurred randomly. For 859 respondents who answered the background questionnaire but refused to complete the assessment for reasons other than language issues or a mental disability, regression-based imputation procedures were applied to impute responses to one assessment item on each scale by using the NAAL background data on age, gender, race/ethnicity, education level, country of birth, census region, and metropolitan statistical area status.

On the prose and quantitative scales, a response was imputed for the easiest task on each scale. On the

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1 To increase the number of Black and Hispanic adults in the NAAL sample, segments with moderate to high concentrations of Black and Hispanic adults were given a higher selection probability. Segments in which Blacks or Hispanics accounted for 25 percent or more of the population were oversampled at a rate up to three times that of the remainder of the segments.

2 Of the 149 respondents who were unable to answer at least one question on each of the three scales for literacy-related reasons, 65 respondents answered at least one question on one scale. The remaining 84 respondents did not answer any questions on any scale.

3 Of the 18,186 household respondents who completed the background questionnaire, 17,178 completed at least one question on each of the three scales and 149 were unable to answer at least one question on one or more of the scales for literacy-related reasons. The remaining 859 respondents completed the background questionnaire but refused to complete the assessment.
document scale, a response was imputed for the second easiest task because that task was also included on the health literacy scale. In each of the logistic regression models, the estimated regression coefficients were used to predict missing values of the item to be imputed. For each nonrespondent, the probability of answering the item correctly was computed and then compared with a randomly generated number between 0 and 1. If the probability of getting a correct answer was greater than the random number, the imputed value for the item was 1 (correct). Otherwise it was 0 (wrong). In addition, a wrong response on each scale was imputed for 65 respondents who started to answer the assessment but were unable to answer at least one question on each scale because of language issues or a mental disability.\(^4\)

The final household reporting sample—including the imputed cases—consisted of 18,102 respondents. These 18,102 respondents are the 17,178 respondents who completed the background questionnaire and the assessment, plus the 859 respondents who completed the background questionnaire but refused to do the assessment for non-literacy-related reasons and have imputed responses to one item on each scale, plus the 65 respondents who started to answer the assessment items but were unable to answer at least one question on each scale because of language issues or a mental disability. After including the cases for which responses to the assessment questions were imputed, the weighted response rate for the household sample was 62.1 percent (18,102 cases with complete or imputed data and an additional 439 cases that had no assessment data because of language issues or a mental disability).\(^5\)

The household sample was subject to unit nonresponse from the screener, background questionnaire, literacy assessment, and oral module and to item nonresponse to background questionnaire items. Although 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.

Table C-1 presents a summary of the household response rate.

<table>
<thead>
<tr>
<th>Survey component</th>
<th>Weighted Response rate (percent)</th>
<th>Unweighted Response rate (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screener</td>
<td>81.2</td>
<td>81.8</td>
</tr>
<tr>
<td>Background questionnaire</td>
<td>76.6</td>
<td>78.1</td>
</tr>
<tr>
<td>Literacy assessment</td>
<td>96.6</td>
<td>97.2</td>
</tr>
<tr>
<td>Overall response rate before imputation</td>
<td>60.1</td>
<td>62.1</td>
</tr>
<tr>
<td>Overall response rate after imputation</td>
<td>62.1</td>
<td>63.9</td>
</tr>
</tbody>
</table>

\(^4\)For a more detailed discussion of imputation see Little and Rubin (2002).

\(^5\)The 439 cases that had no assessment data because of language issues or a mental disability include the 355 respondents who were unable to complete the background questionnaire for one of these reasons, plus the 84 respondents who did not answer any questions on any scale because of language issues or a mental disability.

**Prison Sample**

The 2003 assessment also included a nationally representative probability sample of inmates in federal and state prisons. A total of 114 prisons were selected to participate in the adult literacy assessment. Of these 114 prisons, 107 agreed to participate, 3 refused, and 4 were ineligible. The final prison response rate was 97.3 percent weighted. From among the inmates in those prisons, 1,298 inmates ages 16 and older were randomly selected to complete the background questionnaire and assessment. Of those 1,298 selected inmates, 1,161 completed the background questionnaire. Of the 137 who did not complete the background questionnaire, 12 were unable to do so because of a literacy-related barrier, either the inabil-
itiy to communicate in English or Spanish (the two languages in which the background questionnaire was administered) or a mental disability.

The final response rate for the prison background questionnaire, which included respondents who completed the background questionnaire and respondents who were unable to complete the background questionnaire because of language problems or a mental disability, was 90.6 percent weighted. Of the 1,161 inmates who completed the background questionnaire, 1,125 completed at least one question on each of the three scales—prose, document, and quantitative—measured in the adult literacy assessment. An additional 8 were unable to answer at least one question on each of the three scales for literacy-related reasons. The final response rate for the literacy assessment, which included respondents who answered at least one question on each scale or were unable to do so because of language problems or a mental disability, was 98.9 percent weighted.

The same definition of a complete case used for the household sample was also used for the prison sample, and the same rules were followed for imputation. Before imputation, the final response rate for the prison sample was 87.2 percent weighted.

One response on each scale was imputed on the basis of background characteristics for 28 inmates who completed the background questionnaire but had incomplete or missing assessments for reasons that were not literacy related. The statistical imputation procedures were the same as for the household sample. The background characteristics used for the missing data imputation for the prison sample were prison security level, region of country/prison type, age, gender, educational attainment, country of birth, race/ethnicity, and marital status. A wrong response on each scale was imputed for the 3 inmates who started to answer the assessment but were unable to answer at least one question on each scale because of language issues or a mental disability. The final prison reporting sample—including the imputed cases—consisted of 1,156 respondents. After the cases for which responses to the assessment questions were imputed were included, the weighted response rate for the prison sample was 88.3 percent (1,156 cases with complete or imputed data and an additional 17 cases that had no assessment data because of language issues or a mental disability).

Table C-2 presents a summary of the prison response rate.

<table>
<thead>
<tr>
<th>Survey component</th>
<th>Weighted Response rate (percent)</th>
<th>Unweighted Response rate (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prison</td>
<td>97.3</td>
<td>97.3</td>
</tr>
<tr>
<td>Background questionnaire</td>
<td>90.6</td>
<td>90.4</td>
</tr>
<tr>
<td>Literacy assessment</td>
<td>98.9</td>
<td>98.3</td>
</tr>
<tr>
<td>Overall response rate before imputation</td>
<td>87.2</td>
<td>86.8</td>
</tr>
<tr>
<td>Overall response rate after imputation</td>
<td>88.3</td>
<td>87.9</td>
</tr>
</tbody>
</table>

**Table C-2. Weighted and unweighted prison response rate, by survey component: 2003**


**Nonresponse Bias**

NCES statistical standards require a nonresponse bias analysis when the unit response rate for a sample is less than 85 percent. The nonresponse bias analysis of the household sample revealed differences in the background characteristics of respondents who participated in the assessment compared with those who refused.

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 existed, the potential for bias was small because the absolute difference between estimated percentages was less than 2 percent for all domains considered. Multivariate analyses were con-
ducted 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 ages 30 and 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 was highly effective in reducing the bias. The general conclusion was that the potential amount of nonresponse bias attributable to unit nonresponse at the screener and background questionnaire stages was likely to be negligible.

**Data Collection**

Household interviews took place in respondents’ homes; prison interviews generally took place in a classroom or library in the prison. Whenever possible, interviewers administered the background questionnaire and assessment in a private setting. Unless there were security concerns, a guard was not present in the room when inmates were interviewed.

Interviewers used a computer-assisted personal interviewing (CAPI) system programmed into laptop computers. The interviewers read the background questions from the computer screen and entered all responses directly into the computer. Skip patterns and follow-up probes for contradictory or out-of-range responses were programmed into the computer.

After completing the background questionnaire, respondents were handed a booklet with the assessment questions. The interviewers followed a script that introduced the assessment booklet and guided the respondent through the assessment.

Each assessment booklet began with the same seven questions. After the respondent completed those questions, the interviewer asked the respondent for the book and used an algorithm to determine on the basis of the responses to the first seven questions whether the respondent should continue in the main assessment or be placed in the Adult Literacy Supplemental Assessment (ALSA). Three percent of adults weighted (5 percent unweighted) were placed in the ALSA.

ALSA was a performance-based assessment that allowed adults with marginal literacy to demonstrate what they could and could not do when asked to make sense of various forms of print. The ALSA started with simple identification tasks and sight words and moved to connected text, using authentic, highly contextualized material commonly found at home or in the community. Respondents placed in the ALSA are included in the NAAL sample based on their responses to the seven questions. Because the ALSA respondents got most or all of the seven questions at the beginning of the assessment wrong, they would have been classified into the Below Basic level on the health scale.

A respondent who continued in the main assessment was given back the assessment booklet, and the interviewer asked the respondent to complete the tasks in the booklet and guided the respondent through the tasks. The main assessment consisted of 12 blocks of tasks with approximately 11 questions in each block, but each assessment booklet included only 3 blocks of questions. The blocks were spiraled so that across the 26 different configurations of the assessment booklet, each block was paired with every other block and each block appeared in each of the three positions (first, middle, last) in a booklet.

For ALSA interviews, the interviewer read the ALSA script from a printed booklet and classified the respondent’s answers into the response categories in
the printed booklet. ALSA respondents were handed the materials they were asked to read.

Following the main assessment or ALSA, all respondents were administered the oral fluency assessment (not discussed in this report). Respondents were handed a booklet with passages, number lists, letter lists, word lists, and pseudoword lists to read orally. Respondents read into a microphone that recorded their responses on the laptop computer.

**Weighting and Variance Estimation**

A complex sample design was used to select assessment respondents. The properties of a sample selected through a complex design could be very different from those of a simple random sample in which every individual in the target population has an equal chance of selection and in which the observations from different sampled individuals can be considered to be statistically independent of one another. Therefore, the properties of the sample for the complex data collection design were taken into account during the analysis of the data. Standard errors calculated as though the data had been collected from a simple random sample would generally underestimate sampling errors. One way of addressing the properties of the sample design was by using sampling weights to account for the fact that the probabilities of selection were not identical for all respondents. All population and subpopulation characteristics based on the NAAL data used sampling weights in their estimation.

The statistics presented in this report are estimates of group and subgroup performance based on a sample of respondents, rather than the values that could be calculated if every person in the nation answered every question on the instrument. It is therefore important to have measures of the degree of uncertainty of the estimates. Accordingly, in addition to providing estimates of percentages of respondents and their average scale score, this report provides information about the uncertainty of each statistic.

Because the assessment used clustered sampling, conventional formulas for estimating sampling variability that assume simple random sampling and hence independence of observations are inappropriate. For this reason, the NAAL assessment uses a Taylor series procedure based on the *sandwich estimator* to estimate standard errors (Binder 1983).

**Scaling**

As discussed above, each respondent to the NAAL received a booklet that included 3 of the 13 assessments blocks. Because each respondent did not answer all of the NAAL items, item response theory (IRT) methods were used to estimate average scores on the prose, document, and quantitative literacy scales; a simple average percent correct would not allow reporting results that are comparable for all respondents. IRT models the probability of answering a question correctly as a mathematical function of proficiency or skill. The main purpose of IRT analysis is to provide a common scale on which performance on some latent trait can be compared across groups, such as those defined by sex, race/ethnicity, or place of birth (Hambleton and Swaminathan 1985).

IRT models assume that an examinee's performance on each item reflects characteristics of the item and characteristics of the examinee. All models assume that all items on a scale measure a common latent ability or proficiency dimension (e.g., prose literacy) and that the probability of a correct response on an item is uncorrelated with the probability of a correct response on another item given fixed values of the latent trait. Items are measured in terms of their difficulty as well as their ability to discriminate among examinees of varying ability.
The assessment used two types of IRT models to estimate scale scores. The two-parameter logistic (2PL) model, which was used for dichotomous items (that is, items that are scored either right or wrong) takes the form

\[ P(x_{ij}=1 | \theta_j, a_i, b_i) = \frac{1}{1 + e^{-1.7a_i(\theta_j - b_i)}} \]

where \( x_{ij} \) is the response of person \( j \) to item \( i \), \( \theta_j \) is the proficiency of person \( j \), \( a_i \) is the slope or discrimination parameter for item \( i \), and \( b_i \) is the location or difficulty parameter for item \( i \).

For the partial credit items, the graded response logistic (GRL) model was used. This model follows the 2PL model for the probability of a score of 1 (at least partially correct):

\[ P(x_{ij}=1 | \theta_j, a_i, b_i) = \frac{1}{1 + e^{-1.7a_i(\theta_j - b_i)}} \]

It also follows the 2PL model for the probability of a score of 2 (completely correct):

\[ P(x_{ij}=2 | \theta_j, a_i, b_i) = \frac{1}{1 + e^{-1.7a_i(\theta_j - b_i)}} \]

In the equations above, \( b_{ij} \) and \( b_{i2} \) are the step parameters corresponding to the response categories of partially or fully correct.

The scale indeterminacy was solved by setting an origin and unit size to the reported scale means and standard deviations from the 1992 assessment. Linear transformation was performed to transform the original scale metric to the final reporting metric.

Levels were set and items were mapped to scales based on the scores corresponding to a 67 percent success rate on the tasks.

### Statistical Testing

The statistical comparisons in this report were based on the \( t \) statistic. Statistical significance was determined by calculating a \( t \) value for the difference between a pair of means, or proportions, and comparing this value with published tables of values at a certain level of significance, called alpha level. The alpha level is an a priori statement of the probability of inferring that a difference exists when, in fact, it does not. The alpha level used in this report is .05, based on a two-tailed test. The formula used to compute the \( t \) statistic was as follows:

\[ t = \frac{(P_1 - P_2)}{\sqrt{(SE_1^2 + SE_2^2)}} \]

where \( P_1 \) and \( P_2 \) are the estimates to be compared and \( SE_1 \) and \( SE_2 \) are their corresponding standard errors.

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6 The means for the 1992 assessment were 276 for prose, 271 for document, and 273 for quantitative. The standard deviations for the 1992 assessment were 61 for prose, 61 for document, and 66 for quantitative. The standard deviations for the 2003 assessment were 59 for prose, 57 for document, and 61 for quantitative.