

7. WEIGHTING AND VARIANCE ESTIMATION

7.1 Weighting Methodology

The objective of the National Household Education Surveys Program (NHES:2007) surveys is to make inferences about the entire civilian, noninstitutionalized population for the domains of interest. Weighting is necessary to account for differential probabilities of selection and to reduce potential bias due to nonresponse and differential coverage of subpopulations. Although weighting adjustments are aimed at reducing bias, these adjustments typically introduce variation in the weights, which increases the variances of survey estimates. These aspects of weighting are addressed in Kish (1965). Care was taken in the development and implementation of the weighting methodology to balance the bias reductions against the potential increases in variance.

Although only telephone households were sampled, the estimates were adjusted to totals of persons living in both telephone and nontelephone households derived from the October 2005 and March 2006 Current Population Survey (CPS) files to achieve this goal. The March 2006 CPS weights were adjusted to population totals based on the 2000 Decennial Census. Any additional undercoverage in the census of special subpopulations, such as the homeless, remains in the totals obtained from the CPS.

The full sample weight to be used for analysis of the School Readiness Survey (SR) file is FRWT, and for the Parent and Family Involvement in Education Survey (PFI) file the full sample weight is FPWT. The weighting procedures described below were used to develop the weights available for analysis of the SR and PFI files, while the weights for the AEW file were developed to enable the analysis of nonresponse bias discussed in Chapter 8.

7.2 Household-Level Weights

The primary purpose of the Screener in NHES:2007 was to provide information required to assess the eligibility of household members for an extended interview. Household-level information that is of analytic interest was also collected during the extended interview. Since no data intended for analyses were collected at the household level only, household-level weights were calculated solely for use as a basis for computing person-level weights for the analysis of the extended interview data.

The household-level weight was the product of five factors:

- The weight associated with the differential sampling of telephone numbers based on the minority stratum of the exchange and the mailable status of the telephone number (A_j);
- An adjustment for subsampling of cases for nonresponse followup (B_j);
- An adjustment for Screener nonresponse (C_j);
- An adjustment for the number of telephone numbers in a household (D_j); and
- A poststratification adjustment to compensate for the fact that only landline telephone households were eligible for the NHES:2007 surveys (E_j).

The procedures for computing the household-level weights follow.

1. The random digit dialing (RDD) sampling method used for NHES:2007 is a list-assisted method described by Brick et al. (1995). This basic method was also used in NHES:1995, NHES:1996, NHES:1999, NHES:2001, NHES:2003, and NHES:2005. For NHES:2007, as in NHES:2001, NHES:2003, and NHES:2005, a two-phase approach was used. In the first phase, a single-stage sample of telephone numbers was selected from strata defined by minority status of the exchange. Telephone numbers in high-minority exchanges were sampled at a rate approximately twice that of those in low-minority exchanges. In particular, in the high-minority stratum, 134,789 telephone numbers were selected from the 1,035,202 eligible 100-banks; in the low-minority stratum, 117,037 telephone numbers were selected from the 1,797,115 eligible 100-banks.⁵³ An attempt was made to match each telephone number selected in the first phase to an address listing. In the second phase, telephone numbers were subsampled differentially within each minority stratum based on mailable status (i.e., whether a mailing address was obtained for the telephone number). Table 7-1 gives the numbers of telephone numbers selected at each phase of selection and the weighting factors associated with the sampling at each phase. The telephone number level base weight, A_j , is the product of the two weighting factors given in table 7-1.

⁵³A 100-bank is a set of telephone numbers with the same first eight digits.

Table 7-1. Weighting factors for the sampling of telephone numbers: 2007

Minority stratum	Phase 1 sample			Phase 2 sample			
	Number of telephone numbers in frame	Number of telephone numbers sampled	Weighting factor	Mailable status	Number of telephone numbers in Phase 1 sample	Number of telephone numbers sampled	Weighting factor
High minority	103,520,200	134,789	768.02	Mailable	83,876	82,366	1.02
				Not mailable	180,497	66,695	2.71
Low minority	179,711,500	117,037	1,535.51	Mailable	69,895	69,895	1.00
				Not mailable	141,899	59,534	2.38

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Surveys Program (NHES), 2007.

- During data collection, Screener nonresponse cases were subsampled for followup attempts. Sixty percent of the sampled telephone numbers were designated for these additional attempts. The second weighting factor adjusts for the subsampling of Screener nonresponse cases. Cases that were selected for additional attempts were given a weighting factor of

$$B_j = \frac{\sum_{h \in NF} A_h}{\sum_{h \in NC} A_h},$$

where *NF* is the set of all Screener nonresponse cases and *NC* is the set of Screener nonresponse cases designated for additional attempts.

The nonresponse cases that were subsampled out were given a weighting factor $B_j = 0$, and cases not eligible for the nonresponse followup subsampling (e.g. cases completed on the first attempt) were given a weighting factor $B_j = 1$. For each sampled telephone number *j*, the unadjusted weight, UHW_j , can be written as $UHW_j = A_j \cdot B_j$.

- The third weighting factor adjusts for households that did not respond to the NHES:2007 Screener. Each telephone number in the NHES sample was classified as either a respondent (*R*), a nonrespondent (*NR*),⁵⁴ or an ineligible case (*I*). The base weights of the nonrespondent cases were distributed to the base weights of the respondent cases within a nonresponse adjustment cell. A Chi-Square Automatic Interaction Detection (CHAID) analysis (described in chapter 5) was used to identify

⁵⁴The residency status of telephone numbers that finalized with Screener dispositions of no answer or no answer-answering machine was unresolved. Based on the vendor-assisted method of response rate estimation (described in chapter 5), 38 percent of these cases were assumed to be residential; thus for these cases, in the calculation of the nonresponse adjustment factor $C_{j(e)}$, 38 percent of the weight per case was retained and these cases were treated as nonrespondents.

characteristics most associated with Screener nonresponse.⁵⁵ These characteristics, which were primarily geographic characteristics associated with the telephone exchange, were used to form the cells for nonresponse adjustment of the household weights.⁵⁶ Table 7-2 contains the cells used for Screener nonresponse adjustment in NHES:2007, along with the estimated Screener unit response rate for each cell. The nonresponse adjustment factor, $C_{j(c)}$, applied to each responding household j in adjustment cell c is

$$C_{j(c)} = \frac{\sum_{h \in R_c \cup NR_c} UHW_h}{\sum_{h \in R_c} UHW_h}.$$

4. A weighting factor of one was assigned to households reporting one telephone number in the household. An adjustment factor of one-half was assigned to households with exactly two residential telephone numbers, and an adjustment factor of one-third was assigned to households with three or more residential telephone numbers. Technically, if the other telephone numbers of households with multiple residential telephone numbers is in the zero-listed stratum, the household should get a weight adjustment of one. However, looking up the other numbers to determine whether each is in the zero-listed stratum is impractical, and the percent of such numbers in the zero-listed stratum is small. Let

$D_j = 1$ if household j has one residential telephone number,

$D_j = \frac{1}{2}$ if household j has exactly two residential telephone numbers, and

$D_j = \frac{1}{3}$ if household j has three or more residential telephone numbers.

⁵⁵Characteristics used in household nonresponse adjustment included percentage White in the telephone exchange, whether an answering machine message was ever left, percentage Hispanic in the telephone exchange, median home value in the telephone exchange, percent high school graduates in the telephone exchange, percentage Asian in the telephone exchange, Census division, whether an address match was obtained for the telephone number, percentage Black in the telephone exchange, MSA status, percentage renters in the telephone exchange, median income, and Census region.

⁵⁶As noted in the discussion in chapter 5, little information is available about nonresponding units in an RDD survey. Measures are selected from among the limited items that are available for both respondents and nonrespondents.

Table 7-2. Screener nonresponse adjustment cells: 2007

Cell	Percent White	Answering machine message left	Percent Hispanic	Median home value	Percent high school graduates	Percent Asian	Census division	Mailable	Percent Black	MSA status	Percent renters	Median income	Census region	Estimated response rate (percent) ¹
1	0,1,2,3,4,5	1	†	†	†	†	†	†	†	†	†	†	†	37
2	0,1,2	2	0,1,2,3,4	0	†	†	†	†	†	†	†	†	†	68
3	0,1,2	2	5,6,7,8,9	0	†	†	†	†	†	†	†	†	†	54
4	0,1,2	2	†	1,2,3	†	†	†	†	†	†	†	†	†	52
5	0,1,2	2	†	4,5	0,1	†	†	†	†	†	†	†	†	59
6	0,1,2	2	†	4,5	2	†	†	†	†	†	†	†	†	50
7	0,1,2	2	†	4,5	3,4,5,6,7	†	†	†	†	†	†	†	†	81
8	0,1,2	2	†	6,7,8,9	†	0	†	†	†	†	†	†	†	50
9	0,1,2	2	†	6,7,8,9	†	1	†	†	†	†	†	†	†	54
10	0,1,2	2	†	6,7,8,9	†	2	†	†	†	†	†	†	†	50
11	0,1,2	2	†	6,7,8,9	†	3,4,5,6,7,8	†	†	†	†	†	†	†	42
12	3	2	†	†	†	†	1	†	†	†	†	†	†	79
13	3	2	†	†	†	†	2,9	1	†	†	†	†	†	53
14	3	2	†	†	†	†	2,9	2	†	†	†	†	†	44
15	3	2	†	†	†	†	3,4,5,8	†	0,1,2,3,4,5	†	†	†	†	62
16	3	2	†	†	†	†	3,4,5,8	†	6,7,8,9	†	†	†	†	70
17	3	2	†	†	†	†	6,7	†	†	†	†	†	†	60
18	4,5	2	†	0,1,2	†	†	1	†	†	†	†	†	†	67
19	4,5	2	†	0,1,2	†	†	2	†	†	†	†	†	†	54
20	4,5	2	†	3,4,5,6	†	†	†	†	†	1,2	†	†	†	60
21	4,5	2	†	3,4,5,6	†	†	†	†	†	3,4,5	†	†	†	67
22	4,5	2	†	7,8	†	†	†	†	†	†	0,1,2,3,4,5	†	†	60
23	4,5	2	†	7,8	†	†	†	†	†	†	6,7,8,9	†	†	49
24	4,5	2	†	9	†	†	1	†	†	†	†	†	†	57
25	4,5	2	†	9	†	†	2	†	†	†	†	†	†	37
26	6	1	†	†	†	†	†	†	†	1	†	0,1,2,3	†	39
27	6	1	†	†	†	†	†	†	†	1	†	4,5	†	48
28	6	1	†	†	†	†	†	†	†	1	†	6,7,8,9	†	38
29	6	1	†	†	†	†	†	†	†	2,3,4	†	†	†	38
30	6	1	†	0,1,2	†	†	†	†	†	5	†	†	†	45
31	6	1	†	3,4,5,6,7,8,9	†	†	†	†	†	5	†	†	†	55
32	6	2	†	5,6,7,8	†	†	†	1	†	†	†	†	†	66
33	6	2	†	9	†	†	†	1	†	†	†	†	†	55
34	6	2	†	†	†	†	†	2	†	†	†	†	†	48
35	7	1	†	0,1	†	†	†	†	†	†	†	†	†	55
36	8	1	†	0,1	†	†	†	†	†	†	†	†	†	46
37	7,8	1	†	2,3,4,5,6,7	†	†	†	1	†	†	†	†	†	44
38	7,8	1	†	2,3,4,5,6,7	†	†	†	2	†	†	†	†	†	39
39	7,8	1	†	7	†	†	†	†	†	†	†	†	†	37
40	7,8	1	†	8,9	†	†	†	†	†	†	†	†	1,4	37
41	7,8	2	†	8,9	†	†	1,2	1	†	†	†	†	2,3	47
42	7,8	2	†	†	†	†	3	1	†	†	†	†	†	72
43	7,8	2	†	†	†	†	4,8	1	†	†	†	†	†	77
44	7,8	2	†	†	†	†	5,6,7,9	1	†	†	†	†	†	68
45	7,8	2	†	0,1,2,3	†	†	†	2	†	†	†	†	†	61
46	7,8	2	†	†	†	†	†	2	†	†	†	†	†	45
47	9	1	†	†	†	†	1,2,5,9	1	†	†	†	†	†	44
48	9	1	†	†	†	†	†	2	†	†	†	†	†	38
49	9	1	†	†	†	†	3,6,7,8	1	†	†	†	†	†	50
50	9	1	†	†	†	†	4	1	†	†	†	†	†	55
51	9	2	†	†	†	†	1,2,5,7	1	†	†	†	†	†	70
52	9	2	†	†	†	†	3,6,8,9	1	†	†	†	†	†	75
53	9	2	†	†	†	†	4	1	†	†	†	†	†	79
54	9	2	†	†	†	†	1,3	2	†	†	†	†	†	62
55	9	2	†	†	†	†	2,4,5,6,9	2	†	†	†	†	†	53
56	9	2	†	†	†	†	7,8	2	†	†	†	†	†	73

See notes at end of table.

Table 7-2. Screener nonresponse adjustment cells: 2007—Continued

† Not applicable. In these cases, the cell consisted of all values of the particular variable.

¹ The estimated response rate is the number of completed interviews divided by the sum of the number of completed interviews, nonresponses, and a proportion of the unresolved telephone numbers (described further in section 5.2), weighted by the probability of selection.

NOTE: Category codes were as follows: Answering machine message left: 1 = yes; 2 = no.

Mailable Status: 1 = valid address obtained; 2 = address not obtained.

Percent White, Percent Hispanics, Percent high school graduates, Percent Asian, Percent Black, Percent renters: 0 = less than 10 percent,

1 = 10 to 19 percent, 2 = 20 to 29 percent, 3 = 30 to 39 percent, 4 = 40 to 49 percent, 5 = 50 to 59 percent, 6 = 60 to 69 percent, 7 = 70 to 79 percent, 8 = 80 to 89 percent, 9 = 90 percent or more.

Census Division: 1 = New England; 2 = Middle Atlantic; 3 = East North Central; 4 = West North Central; 5 = South Atlantic; 6 = East South Central; 7 = West South Central; 8 = Mountain; 9 = Pacific (including Alaska and Hawaii).

Census Region: 1=Northeast, 2=Midwest, 3=South, 4=West.

Median Home Value, Median income: 0 = below the 10th percentile in sample, 1 = 10th to 19th percentile in sample, 2 = 20th to 29th percentile in sample, 3 = 30th to 39th percentile in sample, 4 = 40th to 49th percentile in sample, 5 = 50th to 59th percentile in sample, 6 = 60th to 69th percentile in sample, 7 = 70th to 79th percentile in sample, 8 = 80th to 89th percentile in sample, 9 = 90th percentile in sample or higher.

MSA Status: 1 = in county in central city, 2 = in county not in central city, 3 = subcounty of MSA, 4 = MSA is its own county, 5 = non-MSA.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Surveys Program (NHES), 2007.

If a household was sampled twice through two different telephone numbers, only one of the telephone numbers would have been kept in the sample. The telephone number that was not kept would have been assigned a Screener result code indicating that it is a duplicate. The interview that was kept would have had D_j set equal to one, to reflect that it was sampled twice.

Thus, the nonresponse adjusted household weight, adjusted for multiple residential telephone numbers in the household, is

$$UHW'_j = A_j \cdot B_j \cdot C_{j(c)} \cdot D_j.$$

5. The final step in computing the household weight was to adjust UHW'_j to known national control totals in order to account for household-level undercoverage due to sampling only landline telephone households. Poststratification was used to accomplish this task. Poststratification ensures that survey weights sum to known population totals. The characteristics used in poststratification were census region and presence of children under 18 years of age. Table 7-3 presents the control totals used for poststratifying the household-level weights. The variables used in poststratification were chosen to address differences in coverage rates with respect to region in which the household is located and presence of children in the household. The control totals for poststratification were obtained from the March 2006 CPS.

The final household-level weight for household j , HHW_j , is given by

$$HHW_j = UHW_j' \cdot E_{j(d)},$$

where $E_{j(d)}$ is the poststratification adjustment factor described above for adjustment cell d , where household j has the attributes corresponding to poststratification cell d .

Table 7-3. Control totals for poststratifying the 2007 household-level weights: CPS:2006

Census region ¹	Control total ²
Total	114,510,050
Northeast	
No children under 18 in household	13,993,709
Children under 18 in household	7,137,051
South	
No children under 18 in household	27,173,229
Children under 18 in household	14,638,867
Midwest	
No children under 18 in household	17,390,279
Children under 18 in household	8,981,331
West	
No children under 18 in household	15,731,203
Children under 18 in household	9,464,380

¹ The following states and the District of Columbia are in each census region: Northeast: CT, MA, ME, NH, NJ, NY, PA, RI, VT; South: AL, AR, DC, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV; Midwest: IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI; West: AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY.

² The control totals are numbers of households.

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

SOURCE: U.S. Department of Commerce, Bureau of the Census, Current Population Survey (CPS), March 2006.

7.3 Person-Level Weights for the SR, PFI, and AEWI Interviews

As described in chapter 3, a sampling algorithm was used to limit the number of persons sampled in each household while maintaining the sampling rates required to attain the target sample sizes. The sampling was based on information collected in the Screener interview from the adult household member who responded to the Screener. For the SR and PFI Surveys, the eligibility of the sampled child was later verified or updated when the parent/guardian most knowledgeable about the child responded to the SR or PFI interview, provided that person was not the Screener respondent. For the AEWI Survey, an

eligible adult was defined to be a person 16 years of age or older who was not enrolled in grade 12 or below, not institutionalized, and not on active duty in the U.S. Armed Forces. Because sampling eligibility was determined based on the data collected in the Screener, the weighting procedures were developed with possible misclassification (i.e. children sampled for the SR survey who were found to be eligible for the PFI survey and vice versa; and adults sampled for AEW as participants who were found to be nonparticipants, and vice versa) taken into account so that the estimates would not incur bias due to misclassification.

The household-level weight was used to compute the base weight for each of the person-level (SR, PFI and AEW interview) weights. The person-level weight for sampled person k in household j , PW_{jk} , is the product of the household weight and four weight adjustment factors:

- Weight associated with sampling the person's domain in the given household (A_{jk});
- Weight associated with sampling the person from among all eligible persons in the given domain in the household (B_{jk});
- Weight associated with extended interview (SR, PFI or AEW) unit nonresponse (C_{jk}); and
- Adjustment associated with raking⁵⁷ the person-level weights to Census Bureau estimates of the number of persons in the target population (D_{jk}).

The procedures for computing the person-level weight adjustments are described below.

1. The first step in developing the person-level weights was to account for the probability of sampling the person's domain in the given household. For both SR and PFI, if there was an eligible child in the household, then at least one child was selected, however, only one child was sampled for each survey in households with eligible children. Thus, the factor for sampling in both the SR and PFI domain was always equal to 1.

Exhibit 7-1 gives the weighting factors, A_{jk} , used to account for the probability of sampling the adult domains for AEW, based on the household composition. Note that the domain probabilities of selection are given in exhibit 3-2. For example, if there were no eligible children in the household and there were two eligible adults—one adult education participant and one adult education nonparticipant—then the adult education participant was sampled with probability 0.3637 and the adult education nonparticipant was sampled with probability 0.1819. In such an example, if the adult education participant was sampled, then the weighting factor A_{jk} for that adult was

⁵⁷See step 4 below for a definition and detailed discussion of raking.

2.7493, which is the reciprocal of the probability of sampling the adult domain. If the adult education nonparticipant was sampled, then the weighting factor A_{jk} was 5.4985.

Exhibit 7-1. Weighting factors to account for domain sampling for adults: 2007

	Number of adults in household, by adult education participation status		Weighting factor associated with domain sampling	
	Adult education participant	Adult education nonparticipant	Adult education participant	Adult education nonparticipant
	Eligible children in household			
No eligible children	0	1 or more	—	3.6657
No eligible children	1 or more	0	1.8328	—
No eligible children	1 or more	1 or more	2.7493	5.4985
Eligible preschoolers or school-age children, but not both	0	1 or more	—	6.8249
Eligible preschoolers or school-age children, but not both	1 or more	0	3.4125	—
Eligible preschoolers or school-age children, but not both	1 or more	1 or more	5.1187	10.2374
Eligible preschoolers and eligible school-age children	0	1 or more	—	14.6628
Eligible preschoolers and eligible school-age children	1 or more	0	7.3314	—
Eligible preschoolers and eligible school-age children	1 or more	1 or more	10.9971	21.9941

— Indicates that factor is not applicable because there are no adults in the given domain in the household.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Surveys Program (NHES: 2007).

- The second adjustment, which accounted for the probability of sampling person k from among all eligible persons in the given domain in household j , is

$$B_{jk} = N_{jk}^{-1},$$

where N_{jk} is the number of persons in household j in the same sampling domain as person k .

For each sampled person k , the unadjusted person-level weight, UPW_k , can be written as the product of the household-level weight and the adjustments for within-household sampling. That is, for sampled person k , the unadjusted person-level weight is

$$UPW_{jk} = HHW_j \cdot A_{jk} \cdot B_{jk}.$$

- The next step was to adjust for persons (most knowledgeable parents/guardians in the case of the SR and PFI interviews, and the sampled adults themselves in the case of the AEWI interview) who did not respond to the extended interview. Each extended interview case was classified as either a respondent (R) or a nonrespondent (NR), depending on whether or not the extended interview was completed for the sampled person. The unadjusted person-level weights (UPW) of the nonrespondents were distributed to the unadjusted person-level weights of the respondents within a

nonresponse adjustment cell. For the SR and PFI Surveys, the nonresponse adjustment cells were created using combinations of home tenure, the four Census regions, and age/grade combinations: unenrolled children age 3 through 6⁵⁸, preschoolers, kindergarteners, and children enrolled in each single grade for grade 1 through grade 12; enrolled children with no grade equivalent were included in the cell containing the modal grade for their age; that is, they were assigned to the grade in which most children their age are enrolled. For PFI, whether the child attended regular school or was home schooled was also used. These variables were used because they are available for all sampled children (both respondents and nonrespondents) and are associated with SR/PFI interview response propensity. (See table 7-4 for a list of SR and PFI nonresponse adjustment cells.)

Table 7-4. SR-NHES:2007 and PFI-NHES:2007 interview nonresponse adjustment cells

Explanatory variables	Number of respondents in cell	Completion rate (percent)
Homeowner/not enrolled, preschooler/homeschooler	84	93
Homeowner/not enrolled, preschooler/ not a homeschooler	1,937	78
Homeowner/grades K-5/homeschooler/Northeast/West	52	96
Homeowner/grades K-5/homeschooler/South/Midwest	73	78
Homeowner/grades K-5/not a homeschooler	3,361	74
Homeowner/grades 6-7	1,227	80
Homeowner/grades 8, 9, 10	2,083	77
Homeowner/grades 11, 12/Northeast/South	818	70
Homeowner/grades 11, 12/Midwest/West	748	78
Rent or other/Northeast	526	63
Rent or other/Midwest/South/homeschooler	52	80
Rent or other/Midwest/South/not a homeschooler/3-4 year olds	244	80
Rent or other/Midwest/South/not a homeschooler/5-20 year olds/not enrolled, preschooler, Kindergartener	159	63
Rent or other/Midwest/South/not a homeschooler/5-20 year olds/grades 1-8	665	70
Rent or other/Midwest/South/not a homeschooler/5-20 year olds/grades 9-12	290	63
Rent or other/West/not enrolled	118	81
Rent or other/West/preschool, grades K-1	209	68
Rent or other/West/grades 2-5	310	78
Rent or other/West/grades 6-12	358	72

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education (PFI) Survey of the National Household Education Surveys Program, 2007.

For the AEWI interview, three variables were used to create the nonresponse adjustment cells. The first was an indicator of whether the sampled adult was the Screener respondent, the second was the adult education participation status of the

⁵⁸For weighting purposes, enrollment status is defined based on the sequence of enrollment and grade questions; the Screener questions SENROLL, SGRADE, and SGRADEQ are used to determine enrollment status and grade for unit nonresponse adjustment, and the SR/PFI survey questions ENROLL, GRADE, and GRADEEQ are used to determine enrollment status and grade for the raking adjustment. To be consistent with the way preschool enrollment is captured in the CPS, the response to the question on center-based participation is not used in the determination of enrollment status for weighting purposes.

adult (as reported by the Screener respondent), and the third was the sex of the adult. These variables were used because they are available for all sampled adults (both respondents and nonrespondents) and are associated with AEWI interview response propensity. (See table 7-5 for a list of the AEWI interview nonresponse adjustment cells.) The nonresponse adjustment factor, $C_{k(c)}$, applied to each respondent k in adjustment cell c is

$$C_{jk(c)} = \frac{\sum_{h \in R_c \cup NR_c} UPW_h}{\sum_{h \in R_c} UPW_h}.$$

Thus, for each sampled person k , the nonresponse-adjusted person-level weight, NPW_{jk} , can be written as

$$NPW_{jk} = UPW_{jk} \cdot C_{jk(c)}.$$

Extreme weights may occasionally result when households or persons are sampled at very different rates. Additionally, the procedures used for nonresponse adjustment, poststratification, and raking may contribute to extreme weights. A few unexpectedly large sampling weights can seriously inflate the variance of the survey estimates. Weight trimming refers to the process of artificially adjusting a few extreme weights (those that are unusually large relative to other weights for members of the same subgroup) to reduce their impact on the weighted estimates.

Table 7-5. AEWI-NHES:2007 interview nonresponse adjustment cells

Explanatory variables	Number of respondents in cell	Completion rate (percent)
Screener respondent/adult education participant	2,580	82.2
Screener respondent/adult education nonparticipant	2,869	75.7
Not Screener respondent/adult education participant/female.....	713	47.9
Not Screener respondent/adult education participant/male.....	559	46.9
Not Screener respondent/adult education nonparticipant/female.....	591	42.9
Not Screener respondent/adult education nonparticipant/male.....	398	46.9

NOTE: The explanatory variables are: Indicator of whether sampled adult was the Screener respondent, adult education participation status (from Screener), and sex.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Surveys Program, 2007.

The variability in the nonresponse adjusted person-level weights was examined by population subgroups to determine whether trimming would be desirable. For the SR, PFI, and AEWI interview weights, the variability was not sufficient to justify trimming.

4. The final stage of person-level weighting involved raking the nonresponse-adjusted person-level weights, *NPW*, to national control totals. Raking was proposed by Deming and Stephan (1940) as a way to ensure consistency between complete counts and sample data from the 1940 U.S. Census of population. The raking procedure typically improves the reliability of survey estimates, and also corrects for the bias due to households or persons not covered by the survey (e.g. households without telephones and households with unlisted telephone numbers belonging to zero-listed telephone banks⁵⁹). Additionally, raking provides the ability to generate population estimates that match external estimates. The raking procedure is carried out in a sequence of adjustments: first, the base weights are adjusted to one marginal distribution (or dimension) and then the second marginal distribution, and so on. One sequence of adjustments to the marginal distributions is known as a cycle or iteration. The procedure is repeated until convergence of weighted totals to all sets of marginal distributions is achieved. (See Deming and Stephan 1940 for further details on raking and the convergence process.)

This additional raking adjustment, following the household-level poststratification adjustment, is required because the extended interviews involve new eligibility criteria and a new level of sampling. That is, although the household-level poststratification adjustment aligned the weighted totals of the household weights with the household level control totals, the raking of the person-level weights is required in order to align the person-level weights with the person-level control totals and adjust for differential coverage rates at the person level.

The raking procedure for the SR and PFI weights involved raking the nonresponse-adjusted person-level weights to national totals obtained using the percentage distributions from the October 2005 CPS and the total number of children from the March 2006 CPS. The October 2005 CPS contains variables not available on the March 2006 CPS, but the totals in the latter are more current. The control total for a raking cell is the proportion in that cell from the October 2005 CPS multiplied by the estimate of the total number of children from the March 2006 CPS.

The three raking dimensions used for the SR and PFI interview weights were a cross between race/ethnicity of the child (Black, non-Hispanic/Hispanic/other) and household income categories (\$10,000 or less/\$10,001–\$25,000/\$25,001 or more), a cross of Census region (Northeast/South/Midwest/West) and urbanicity (urban/rural), and a cross of home tenure (rent/own or other) and enrollment status or grade of child (with those enrolled in school but having no grade equivalent assigned to the modal grade for their age). These raking dimensions were used because they include important analysis variables (e.g., grade) and characteristics that have been shown to be associated with telephone coverage (e.g., race/ethnicity) (Blumberg and Luke, 2007). Tables 7-6 and 7-7 show the control totals used for raking the SR and PFI interview weights, respectively.

The approach of applying age/grade distributions from October to March totals leads to some distortions of the distributions. For example, the proportion of 5-year-olds as

⁵⁹Zero-listed telephone banks are telephone banks (i.e., sets of 100 telephone numbers having the same first 8 digits) with no telephone numbers listed in the white pages directories.

of October who are enrolled in kindergarten is considerably higher than the proportion of 5-year-olds as of March who are enrolled in kindergarten; this is because a substantial proportion of children who are 5 years old in March were 4 years old in October. This distortion is further complicated by the fact that these control totals are applied to weighted totals from NHES based on the child's age as of December 31.

During the development of weighting procedures for NHES:1999, a new approach for obtaining grade by home tenure control totals from the CPS was proposed. This approach involves "aging" both the October CPS sample and the NHES sample to bring them to March levels.⁶⁰ (Alternatively, the October CPS sample could be "aged" and the March CPS sample "deaged" to December levels.) The "aged" ages and their distributions were derived only for the purposes of raking and comparing NHES age/grade distributions to CPS age/grade distributions; the age delivered on the NHES files will still be the child's age as of December 31.

The advantage of this approach is that each of the NHES subpopulations is consistent with the CPS subpopulation to which the weights are being raked; thus, the large weighting adjustments that could result from inconsistencies in the definitions of the subpopulations were prevented. This *aging* approach was adopted for NHES:2001, NHES:2003, NHES:2005, and was used for NHES:2007.

⁶⁰"Aging" involves recalculating the sampled person's age as of March rather than using the age given at the time of the interview.

Table 7-6. Control totals for raking the SR-NHES:2007 person-level interview weights

Total		8,734,486
Race/ethnicity of child	Household income	Control total ¹
Black, non-Hispanic	\$10,000 or less	325,617
Black, non-Hispanic	\$10,001-\$25,000	320,691
Black, non-Hispanic	\$25,001 or more	672,876
Hispanic	\$10,000 or less	224,156
Hispanic	\$10,001-\$25,000	603,418
Hispanic	\$25,001 or more	1,091,048
Other	\$10,000 or less	278,601
Other	\$10,001-\$25,000	579,151
Other	\$25,001 or more	4,638,928
Census region ¹	Urbanicity	Control total ¹
Northeast	Urban	1,196,428
Northeast	Rural	221,381
South	Urban	2,301,791
South	Rural	858,488
Midwest	Urban	1,539,271
Midwest	Rural	521,193
West	Urban	1,857,958
West	Rural	237,976
Home tenure	Enrollment status of child	Control total ¹
Rent	Unenrolled	1,714,544
Rent	Preschool	1,350,853
Own or other	Unenrolled	2,429,177
Own or other	Preschool	3,239,912

¹ The control totals are numbers of children.

² The following states and the District of Columbia are in each census region: Northeast: CT, MA, ME, NH, NJ, NY, PA, RI, VT; South: AL, AR, DC, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV; Midwest: IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI; West: AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY.

SOURCE: U.S. Department of Commerce, Bureau of the Census, Current Population Survey, March 2006; October 2005.

Table 7-7. Control totals for raking the PFI-NHES:2007 person-level interview weights

Total		53,185,978
Race/ethnicity of child	Household income	Control total ¹
Black, non-Hispanic	\$10,000 or less	1,672,661
Black, non-Hispanic	\$10,001-\$25,000	1,998,302
Black, non-Hispanic	\$25,001 or more	4,226,716
Hispanic	\$10,000 or less	952,408
Hispanic	\$10,001-\$25,000	2,735,705
Hispanic	\$25,001 or more	6,240,396
Other	\$10,000 or less	1,416,805
Other	\$10,001-\$25,000	3,411,705
Other	\$25,001 or more	30,531,280
Census region ²	Urbanicity	Control total ¹
Northeast	Urban	8,046,784
Northeast	Rural	1,488,933
South	Urban	13,986,891
South	Rural	5,216,625
Midwest	Urban	8,749,595
Midwest	Rural	2,962,588
West	Urban	11,288,657
West	Rural	1,445,905
Home tenure	Grade of child	Control total ¹
Rent	Transitional kindergarten/kindergarten/pre-1st grade	1,186,672
Rent	1st grade	1,328,422
Rent	2nd grade	1,166,716
Rent	3rd grade	1,216,608
Rent	4th grade	1,082,817
Rent	5th grade	1,105,484
Rent	6th grade	1,045,527
Rent	7th grade	1,045,227
Rent	8th grade	1,124,203
Rent	9th grade	1,113,763
Rent	10th grade	1,081,231
Rent	11th grade	918,851
Rent	12th grade	757,865
Own or other	Transitional kindergarten/kindergarten/pre-1st grade	2,715,226
Own or other	1st grade	2,806,353
Own or other	2nd grade	2,750,847
Own or other	3rd grade	2,698,323
Own or other	4th grade	2,767,402
Own or other	5th grade	2,941,790
Own or other	6th grade	3,007,403
Own or other	7th grade	3,097,426
Own or other	8th grade	3,115,756
Own or other	9th grade	3,157,928
Own or other	10th grade	3,283,568
Own or other	11th grade	3,496,583
Own or other	12th grade	3,173,987

See notes at end of table.

Table 7-7. Control totals for raking the PFI-NHES:2007 person-level interview weights—Continued

¹The control totals are numbers of children.

²The following states and the District of Columbia are in each census region: Northeast: CT, MA, ME, NH, NJ, NY, PA, RI, VT; South: AL, AR, DC, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV; Midwest: IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI; West: AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY.

SOURCE: U.S. Department of Commerce, Bureau of the Census, Current Population Survey, March 2006; October 2005.

For the AEWR interview, the four dimensions for the raking cells were a cross of the adult's race/ethnicity (black, non-Hispanic/Hispanic/other) and household income (\$10,000 or less/\$10,001-\$25,000/\$25,001 or more); a cross of age (16–29 years/30–49 years/50 years or more), sex, and number of persons in the household (exactly 1/more than 1); a cross of Census region (Northeast/South/Midwest/West) and urbanicity (urban/rural), and a cross of home tenure (rent/own or other) and highest educational attainment (less than high school diploma/high school diploma or equivalent/some college). These raking dimensions were used because they include important analysis variables (e.g., educational attainment) and characteristics that have been shown to be associated with telephone coverage (e.g., race/ethnicity) (Blumberg and Luke, 2007).

The control totals for raking the AEWR interview weights, shown in table 7-8, were obtained from the March 2006 CPS.

The raking iterations for all three surveys were continued until the estimated totals were within 1 of all the control totals.

The final person-level weight for each sampled person k is

$$PW_{jk} = NPW_{jk} \cdot D_{jk(d)},$$

where $D_{k(d)}$ is the raking adjustment factor for raking cell d , where person k has the attributes corresponding to the levels of the dimensions of raking cell d .

Table 7-8. Control totals for raking the AEW-NHES:2007 person-level weights

Characteristics used in raking	Control total ¹
Total	216,827,342
Race/ethnicity by household income	
Black, non-Hispanic	
\$10,000 or less	3,040,804
\$10,001-\$25,000	5,143,163
\$25,001 or more	16,137,645
Hispanic	
\$10,000 or less	1,827,866
\$10,001-\$25,000	5,398,828
\$25,001 or more	20,753,194
Other	
\$10,000 or less	7,481,096
\$10,001-\$25,000	21,434,761
\$25,001 or more	135,609,985
Age by sex by number of persons in household	
16–29 years	
Male	
One person in household	2,017,301
More than one person in household	20,782,347
Female	
One person in household	1,588,871
More than one person in household	21,236,164
30–49 years	
Male	
One person in household	4,790,941
More than one person in household	36,826,881
Female	
One person in household	3,373,354
More than one person in household	39,489,140
50 years or more	
Male	
One person in household	6,302,300
More than one person in household	33,639,094
Female	
One person in household	12,458,473
More than one person in household	34,322,476

See notes at end of table.

Table 7-8. Control totals for raking the AEW-NHES:2007 person-level weights—Continued

Characteristics used in raking	Control total ¹
Census region² by urbanicity	
Northeast	
Urban	34,452,602
Rural	6,374,923
South	
Urban	57,024,617
Rural	21,268,205
Midwest	
Urban	36,023,610
Rural	12,197,491
West	
Urban	43,867,176
Rural	5,618,718
Home tenure by educational attainment	
Rent	
Less than high school diploma	13,341,302
High school diploma or equivalent	30,037,210
Some college	14,598,715
Own or other	
Less than high school diploma	18,474,160
High school diploma or equivalent	81,142,050
Some college	59,233,905

¹ The control totals are numbers of adults.

² The following states and the District of Columbia are in each census region: Northeast: CT, MA, ME, NH, NJ, NY, PA, RI, VT; South: AL, AR, DC, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV; Midwest: IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI; West: AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY.

SOURCE: U.S. Department of Commerce, Bureau of the Census, Current Population Survey, March 2006.

7.4 Methods for Computing Sampling Errors

In surveys with complex sample designs, such as NHES:2007, direct estimates of the sampling errors assuming a simple random sample will typically underestimate the variability in the estimates (Wolter 1985). The NHES:2007 sample design and estimation included procedures that deviate from the assumption of simple random sampling, such as oversampling telephone numbers from exchanges in areas with higher concentrations of minorities, sampling persons within households with differential probabilities, and raking to control totals.

7.4.1 Replication Sampling Errors

One method for computing sampling errors to reflect these aspects of the sample design and estimation is the replication method. Replication involves splitting the entire sample into a set of groups or replicates based on the actual sample design of the survey. The survey estimates can then be computed for each of the replicates by creating replicate weights that mimic the actual sample design and estimation procedures used in the full sample. The variation in the estimates computed from the replicate weights can then be used to estimate the sampling errors of the estimates from the full sample.

As for NHES:1995, NHES:1996, NHES:1999, NHES:2001, NHES:2003, and NHES:2005, a total of 80 replicates were defined for NHES:2007 based on the sampling of telephone numbers. This number was chosen to provide reliable estimates of sampling errors with reasonable data processing time and effort. The specific replication procedure used for NHES:2007 was a jackknife replication method (Wolter 1985). It involved dividing the sample into 80 random subsamples (replicates) for the computation of the replicate weights. The 80 replicates were formed based on the minority status and listed stratum, and the sampling order of the telephone numbers. In each replicate, a replicate weight was developed using the same weighting procedures that were used to develop the full sample weight.

The jackknife variance estimator has the form

$$v(\hat{\theta}) = \frac{G-1}{G} \sum_{k=1}^G (\hat{\theta}_{(k)} - \hat{\theta})^2,$$

where θ is the population parameter of interest; $\hat{\theta}$ is the estimate of θ based on the full sample; $\hat{\theta}_{(k)}$ is the estimate of θ based on the observations included in the k th replicate; and G is the total number of replicates. (For NHES:2007, $G = 80$.)

Replicate weights were created for each of the NHES:2007 surveys: the SR, the PFI, and the AEW. ⁶¹ To appropriately reflect the two-phase sampling of telephone numbers, the final replicate base weights were computed in two steps, using the approach described in Kim, Navarro, and Fuller (2000). The procedures for forming the replicate weights for each of these surveys are described below. For further details about the replication methodology used to reflect the two-phase sampling, refer to Kim, Navarro, and Fuller (2000).

⁶¹Replicate weights created for the AEW survey were for the purpose of analysis of the bias study data.

1. The 476,167 sampled telephone numbers in the phase 1 sample were divided into the two minority strata used for the first phase of sampling. Within each of the two strata, the telephone numbers were sorted in the same order as that used in the selection of the phase 1 sample.
2. Eighty replicates were formed using all 476,167 telephone numbers. This was done by assigning the 1st, 81st, 161st, ... telephone numbers in the list to replicate 1; the 2nd, 82nd, 162nd,... telephone numbers in the list to replicate 2; ...; and the 80th, 160th, 240th,... telephone numbers in the list to replicate 80. Thus, there were 5,953 telephone numbers assigned to each of 7 replicates and 5,952 telephone numbers assigned to each of the remaining 73 replicates. Due to the subsampling used in the second phase of selection and to differences in residency and response rates among replicates, however, there is more variation in the number of households per replicate having positive final household weights.
3. The telephone numbers for residential households were then assigned 80 weight variables (REPL1 through REPL80) using the following procedures. The replicate phase 1 base weights were assigned to all 476,167 telephone numbers by multiplying the full-sample base weight by either zero or 80/79. This procedure is the standard jackknife method of dropping one unit (in this case, a group of residential households with the same replicate number) and weighting up the remaining units to account for the dropped unit. For example, to construct replicate 1 base weights, a replicate base weight of 0 is assigned to residential households from REPL1, and the base weights of all residential households in REPL2 through REPL80 are multiplied by a factor of 80/79. Next, the phase 2 sample (the 278,490 telephone numbers that were fielded) was assigned a final base weight by applying an adjustment for subsampling to the replicate phase 1 base weights within each of the phase 2 strata. Specifically, within each phase 2 stratum, the adjustment weights up the replicate base weights of phase 2 units to the total of the replicate base weights of the phase 1 units.
4. Using the exact same weighting procedures described earlier in this chapter⁶² for each of the sets of full sample weights, the other adjustments (i.e., sampling adjustments, nonresponse adjustments, and raking adjustments) were applied to every replicate phase 2 base weight for completed interviews. In other words, the weighting steps were applied 80 times.
5. The difference in the methods used for the full sample and for the replicate weights was that the raking iterations were stopped when the replicate weights converged to within 10 of the control totals rather than 1, which was used in the full sample weighting.

These replicate weights are included in the SR file as FRWT1 through FRWT80; and in the PFI file as FPWT1 through FPWT80. The replication procedure for the NHES:2007 surveys involves the calculation of 81 estimates, including an estimate using the full sample weight and estimates using each

⁶²These steps do not include adjustments to take into account the effect of imputation on the variance of estimates. See chapter 6 for a discussion of this issue.

of the 80 replicate weights. The variation in the estimates computed from the replicate weights can then be used to estimate the sampling errors of the estimates from the full sample.

The computation of the sampling errors using these replicate weights can be done easily using the Windows-based software packages WesVar Complex Samples Software, SUDAAN (Shah et al. 1995), Stata, or AM Statistical Software; in WesVar, SUDAAN, or AM, the replication method should be specified as JK1. The current version of WesVar Complex Samples (version 5) is available from Westat. Information can be obtained at <http://www.westat.com/wesvar>. A previous version of WesVar (version 4) is available free of charge at that web site or by sending an e-mail message to wesvar@westat.com. Information on obtaining SUDAAN can be found at <http://www.rti.org/sudaan>, and the AM software is available at <http://am.air.org>.

7.4.2 Taylor Series Approximation

Another approach to the valid estimation of sampling errors for complex sample designs is to use a Taylor series approximation to compute sampling errors. To produce standard errors using a Taylor series program, such as SUDAAN (Shah et al. 1995), AM, or the survey data analysis procedures (PROC SURVEYMEANS and PROC SURVEYREG) in SAS version 9, two variables are required to identify the stratum and the primary sampling unit (PSU). The stratum-level variable is the indicator of the variance estimation stratum from which the unit (telephone number or sampled person) was selected. The PSU is an arbitrary numeric identification number for the unit within the stratum. For NHES:2007, the stratum variable signifies the minority stratum used in the first phase of sampling; the PSU variable was assigned sequentially based on the selection order of the telephone number within the minority stratum. Software packages that use Taylor series linearization for variance estimation, such as SUDAAN, do not currently have the capability to compute variance estimates that reflect the effect two-phase sampling has on the precision of the estimates. Thus, variance estimates computed using these Taylor series linearization packages are likely to be slight underestimates.

The PSU and stratum variables appear on each of the extended interview files. On the SR interview file, the PSU and stratum variables are called RPSU and RSTRATUM, and on the PFI interview file these variables are PPSU and PSTRATUM, respectively. These variables can be used in SUDAAN to produce standard errors by specifying that the design is a “with replacement” sample (DESIGN = WR) and that the sampling levels are given by the appropriate stratum and PSU variables.

For example, for estimates from the PFI interview file, use PSTRATUM PPSU in the NEST statement. (Information on obtaining SUDAAN can be found at <http://www.rti.org/sudaan>.) In the SAS version 9 or higher survey procedures, the stratum and PSU variables are specified in the STRATA and CLUSTER statements, respectively. (Information on obtaining SAS version 9 or higher can be found at <http://www.sas.com>.) Information on SPSS Complex Samples can be obtained at http://www.spss.com/complex_samples/.

Stata, another software package that uses Taylor series methods, also uses the PSU and stratum variables to define the units needed for computation. (Information on obtaining Stata is available at <http://www.stata.com>.) To specify the stratum, PSU and weight variables in Stata use the svyset strata, svyset psu, and svyset pweight commands. For example, for estimates from the PFI interview file, use the following commands to specify these design parameters:

```
svyset strata pstratum
svyset psu ppsu
svyset pweight fpwt
```

Data users should be aware that the use of different approaches or software packages in the calculation of standard errors may result in slightly different standard errors. Estimates of standard errors computed using the replication method and the Taylor series method are nearly always very similar but not identical. For a discussion of this issue see Broene and Rust (2000).

7.4.3 Approximate Sampling Errors

Although calculating the sampling errors using the methods described earlier is recommended for many applications, simple approximations of the sampling errors may be valuable for some purposes. One such approximation is discussed below.

Most statistical software packages compute standard errors of the estimates based upon simple random sampling assumptions. The standard error from this type of statistical software can be adjusted for the complexity of the sample design to approximate the standard error of the estimate under the actual sample design used in the survey. For example, the variance of an estimated proportion in a simple random sample is typically estimated using the estimated proportion (p) times its complement ($1-p$)

divided by the sample size (n). The standard error is the square root of this quantity. This estimate can be adjusted to more closely approximate the standard error for the estimates from NHES:2007.

A simple approximation of the impact of the sample design on the standard errors of the estimates that has proved useful in previous NHES surveys and in many other surveys is to adjust the simple random sample standard error estimate by the root design effect (DEFT). The DEFT is estimated as the ratio of the standard error of the estimate computed using the replication method discussed earlier to the standard error of the estimate under the assumptions of simple random sampling. An average DEFT is computed by estimating the DEFT for a number of estimates and then averaging. A standard error for an estimate can then be approximated by multiplying the simple random sample standard error estimate by the mean DEFT.

In complex sample designs, like NHES:2007, the DEFT is typically greater than 1 due to the clustering of the sample and the differential weights attached to the observations. In NHES:2007, both of these factors contributed to making the average DEFT greater than 1.

The average DEFT computed for estimates in the SR and PFI surveys ranged from 1.4 to 1.6. For the SR file estimates, the average DEFT was 1.4 overall. For estimates by race/ethnicity, the average DEFT was 1.6 for non-Hispanic Blacks and 1.4 for the other race/ethnicity categories. For estimates by interview path, the average DEFT was 1.4 for unenrolled children and 1.5 for children enrolled in preschool (that is, ALLGRADE = N). Therefore, a DEFT of **1.4** is recommended to approximate the standard error of overall estimates in the SR interview file. For estimates by race/ethnicity or by interview path, and DEFT of **1.4** is recommended, with the exception of estimates of non-Hispanic Blacks (**1.6**) and children enrolled in preschool (**1.5**).

For the PFI file estimates, the average DEFT was 1.4 overall. For estimates by interview path, the average DEFT was 1.5. For estimates by race/ethnicity, the average DEFT was 1.5 for non-Hispanic Blacks and 1.4 for the other race/ethnicity categories. Therefore, a DEFT of **1.4** is recommended to approximate the standard error of overall estimates in the PFI interview file. For estimates by interview path, a DEFT of **1.5** is recommended; and for estimates by race/ethnicity, a DEFT of **1.4** is recommended, with the exception of non-Hispanic Blacks (**1.5**).

As stated earlier, the average DEFT can be used to approximate the standard error for an estimate. An example of how to do this on a **percentage** estimate derived using a statistical package like

SAS⁶³ or SPSS is as follows. If a weighted estimate of 23 percent is obtained for some characteristic in the PFI file (suppose that 23 percent of children visited a museum in the past month), then an approximate standard error can be developed in a few steps. First, obtain the simple random sample standard error for the estimate using the weighted estimate in the numerator and the unweighted sample size in the denominator: the standard error for this 23 percent statistic would be 0.41 percent (the square root of $(23 \times 77)/10,681$, where the weighted estimate (p) is 23 percent, 77 is 100 minus the estimated percent ($1-p$), and the unweighted sample size (n) is 10,681). The approximate standard error of the estimate from NHES:2007 is this quantity (the simple random sample standard error) multiplied by the DEFT for the PFI file estimates of 1.4. In this example, the estimated standard error would be $1.4 \times 0.41 = 0.57$ percent.

The approximate standard error for a **mean** can be developed using a related procedure. The three steps required to do so are demonstrated using an example from the PFI file. First, the mean is estimated using the full sample weight and a standard statistical package like SAS or SPSS. Second, the simple random sample standard error is obtained through a similar, but unweighted, analysis. Third, the standard error from the unweighted analysis is multiplied by the mean DEFT for the PFI file estimates of 1.4 to approximate the standard error of the estimate under the NHES:2007 design. For example, suppose the average number of times in this school year the parents/adult household members of children enrolled in grades kindergarten through 12 in regular school have gone to meetings or participated in activities at the child's school is 8.6 and the simple random sampling standard error (unweighted) is 0.11. Then, the approximate standard error for the estimate would be $1.4 \times 0.11 = 0.15$.

Users who wish to adjust the standard errors for estimates of **parameters in regression models** should follow a procedure similar to that discussed for means, above. Specifically, the estimates of the parameter in the model can be estimated using a weighted analysis in a standard statistical software package such as SAS⁶⁴ or SPSS. A similar, but unweighted, analysis will provide the simple random sample standard errors for these parameter estimates. The standard errors can then be multiplied by the DEFT to arrive at the adjusted standard error for the NHES:2007 design. For example, if a given parameter in a model involving items from the SR file has a weighted estimate of 2.33 and an unweighted simple random sample standard error of 0.45, then the adjusted standard error would be $1.4 \times 0.45 = 0.63$.

Alternatively, the final weight can be adjusted to reflect the DEFT before the parameter estimates are calculated in a standard statistical software package such as SAS or SPSS. To do this, first

⁶³Here, the reference to *SAS* applies to SAS version 6.12 or earlier versions, or the nonsurvey procedures in SAS version 9.

⁶⁴Here, the reference to *SAS* applies to SAS version 6.12 or earlier versions, or the nonsurvey procedures in SAS version 9.

sum the values of the final weights for the sample of interest. For instance, for an analysis of all children enrolled in grades kindergarten through 12, sum the final weights for all 10,681 cases on the PFI file. Second, divide this sum by the number of cases to generate an average final weight. (In the earlier example, the number of cases is 10,681). Third, multiply the average final weight by the square of the DEFT for the population of interest. (In the above example, the average final weight would be multiplied by the square of 1.4, or 1.96.) Fourth, divide the final weight by the adjusted average weight and save the quotient as a new final weight. (In the earlier example, the new final weight is equal to the final weight divided by the product of 1.96 and the average final weight.) Finally, weight the analysis by this new final weight. The standard errors generated in the analysis will approximate the standard errors correctly adjusted for design effects. These DEFTs are provided for data users who do not have access to complex sample survey software in order to compute standard errors that are approximately correct. Since there will not be a public-use data file for the AEW survey, the DEFT was not provided here.

It should be noted that direct computation of the standard errors is always recommended when the statistical significance of statements would be affected by small differences in the estimated standard errors.

Exhibit 7-2 contains a summary of weighting and sample variance estimation variables for the NHES:2007 surveys and for all previous NHES surveys. This table also gives, for each survey, the recommended DEFT values for computing approximate sampling errors.

Exhibit 7-2. Summary of weighting and sample variance estimation variables: 1991–2007

NHES data file	Full sample weight	Computing sampling errors					DEFT (Average Root Design Effect) for approximating sampling errors
		Replication method (WesVar, SUDAAN, STATA, AM ¹)			Taylor series method (SUDAAN, Stata, SAS 8 ² , AM, SPSS Complex Samples)		
		Respondent ID	Replicate weights	Jackknife method	Sample design	Nesting variables	
NHES:1991 <i>Early Childhood Education</i>		PERSID					
Primary file	EWGT		EWREPL1 – EWREPL50				
Preprimary file	EWGT		EWREPL1 – EWREPL50	JK1	WR	VSTRAT PSU	1.2
NHES:1991 <i>Adult Education</i>							
Adult file	AEWG	PERSID	AEREPL1-AEREPL50	JK1	WR	VSTRAT PSU	2.1 Full Sample
Course file ³	AEWG	CLASID	AEREPL1-AEREPL50	JK1	WR	VSTRAT PSU	1.5 Participants
							1.7 Nonparticipants
							2.0 Black (non-Hispanic)
							1.8 Hispanic
							1.7 White (non-Hispanic)
							1.6 Other races
NHES:1993 <i>School Readiness</i>	FWGT0	ENUMID	FWGT1 - FWGT60	JK2	WR	STRATUM PSU	1.3
NHES:1993 <i>School Safety & Discipline</i>							
Parent interviews only	FWGT0	BASMID	FWGT1-FWGT60	JK2	WR	STRATUM PSU	1.4
Parent & Emancipated Youth (EY) interviews	FWGT0 (for parents) & PFWGT0	BASMID	FWGT1-FWGT60, PFWGT1-PFWGT60	JK2	WR	STRATUM PSU	1.4
Youth interviews (including Emancipated Youth)	FWGT0	ENUMID	FWGT1-FWGT60	JK2	WR	STRATUM PSU	1.5
NHES:1995 <i>Early Childhood Program Participation</i>	EWEIGHT	ENUMID	ERPL1 - ERPL50	JK1	WR	STRATUM PSU	1.2

See notes at end of exhibit.

Exhibit 7-2. Summary of weighting and sample variance estimation variables: 1991–2007—Continued

NHES data file	Full sample weight	Computing sampling errors					DEFT (Average Root Design Effect) for approximating sampling errors
		Replication method (WesVar, SUDAAN, STATA, AM ¹)			Taylor series method (SUDAAN, Stata, SAS 8 ² , AM, SPSS Complex Samples)		
		Respondent ID	Replicate weights	Jackknife method	Sample design	Nesting variables	
NHES:1995 <i>Adult Education</i> ⁴	AEWEIGHT	BASMID	ARPL1 - ARPL50	JK1	WR	STRATUM PSU	1.3
NHES:1996 <i>Screeners/Household & Library</i>	FHWT	BASEID	FHWTR1-FHWTR80	JK1	WR	HSTRATUM HPSU	1.1
NHES:1996 <i>Parent PFI/CI</i>	FPWT	BASMID	FPWTR1-FPWTR80	JK1	WR	PSTRATUM PPSU	1.3
NHES:1996 Youth CI	FYWT	BASMID	FYWTR1-FYWTR80	JK1	WR	YSTRATUM YPSU	1.4
NHES:1996 Adult CI	FAWT	BASMID	FAWTR1-FAWTR80	JK1	WR	ASTRATUM APSU	1.2
NHES:1999 Parent Interview	FPWT	BASMID	FPWT1-FPWT80	JK1	WR	PSTRATUM PPSU	1.3
NHES:1999 Youth Interview	FYWT	BASMID	FYWT1-FYWT80	JK1	WR	YSTRATUM YPSU	1.3
NHES:1999 Adult Education Interview	FAWT	BASMID	FAWT1-FAWT80	JK1	WR	ASTRATUM APSU	1.3 Full sample 1.4 Participants 1.5 Black, non-Hispanic
NHES:2001 Early Childhood Program Participation	FEWT	BASMID	FEWT1-FEWT80	JK1	WR	ESTRATUM EPSU	1.2 Full sample 1.3 Black, non-Hispanic
NHES:2001 Before- and After-School Programs and Activities	FSWT	BASMID	FSWT1-FSWT80	JK1	WR	SSTRATUM SPSU	1.3 Full sample 1.4 Black, non-Hispanic
NHES:2001 Adult Education	FAWT	BASMID	FAWT1-FAWT80	JK1	WR	ASTRATUM APSU	1.3

See notes at end of exhibit.

Exhibit 7-2. Summary of weighting and sample variance estimation variables: 1991–2007—Continued

NHES data file	Full sample weight	Computing sampling errors					DEFT (Average Root Design Effect) for approximating sampling errors
		Replication method (WesVar, SUDAAN, STATA, AM ¹)			Taylor series method (SUDAAN, Stata, SAS 8 ² , AM, SPSS Complex Samples)		
		Respondent ID	Replicate weights	Jackknife method	Sample design	Nesting variables	
NHES:2003 Parent and Family Involvement in Education	FPWT	BASMID	FPWT1-FPWT80	JK1	WR	PSTRATUM PPSU	1.3 Full sample 1.4 Race/ethnicity subgroups
NHES:2003 Adult Education for Work-Related Reasons	FAWT	BASMID	FAWT1-FAWT80	JK1	WR	ASTRATUM APSU	1.3 Full sample 1.4 Hispanics 1.4 Work-related adult education participants
NHES:2005 Early Childhood Program Participation	FEWT	BASMID	FEWT1-FEWT80	JK1	WR	ESTRATUM EPSU	1.4 Full sample 1.3 Preschoolers
NHES:2005 After-School Programs and Activities	FSWT	BASMID	FSWT1-FSWT80	JK1	WR	SSTRATUM SPSU	1.4 Full sample 1.3 Home schoolers 1.3 White, non-Hispanic 1.5 Black, non-Hispanic
NHES:2005 Adult Education	FAWT	BASMID	FAWT1-FAWT80	JK1	WR	ASTRATUM APSU	1.6 Full sample 1.5 White, non-Hispanic 1.5 Black, non-Hispanic 1.5 Nonparticipants 1.7 Less than high school 1.4 High school diploma/ equiv. 1.4 Bachelors or higher 1.5 Associates degree
NHES:2007 School Readiness	FSWT	BASMID	FSWT1-FSWT80	JK1	WR	RSTRATUM RPSU	1.4 Full sample 1.5 Preschoolers 1.6 Black, non-Hispanic

See notes at end of exhibit.

Exhibit 7-2. Summary of weighting and sample variance estimation variables: 1991–2007—Continued

NHES data file	Full sample weight	Computing sampling errors					DEFT (Average Root Design Effect) for approximating sampling errors
		Replication method (WesVar, SUDAAN, STATA, AM ¹)			Taylor series method (SUDAAN, Stata, SAS 8 ² , AM, SPSS Complex Samples)		
		Respondent ID	Replicate weights	Jackknife method	Sample design	Nesting variables	
NHES:2007 Parent and Family Involvement in Education	FPWT	BASMID	FPWT1-FPWT80	JK1	WR	PSTRATUM PPSU	1.4 Full sample 1.5 Elementary schoolers 1.5 Middle schoolers 1.5 High schoolers 1.5 Black, non-Hispanic

¹ WesVar Complex Samples software, version 5, is available from Westat (www.westat.com). Information on SUDAAN can be obtained at www.rti.org. SUDAAN performs replication using the JK1 procedure but not the JK2 procedure. Information on Stata can be obtained at www.stata.com. Information on AM can be obtained at www.am.air.org.

² Information on SUDAAN can be obtained at www.rti.org. Information on Stata can be obtained at www.stata.com. Additionally, SAS version 9 includes survey procedures that use the Taylor series method for variance estimation. (See www.sas.com.) Information on AM can be obtained at www.am.air.org. Information on SPSS Complex Samples can be obtained at www.spss.com/complex_samples.

³ Unlike the NHES:1995 Adult Education data file, no course weights are provided in the NHES:1991 course file. The full sample weight and variables for computing sampling errors are provided in the course file for making adult-level estimates. Information as to the total number of courses that adults took is also available, and procedures similar to those described in the NHES:1995 *Adult Education Data File User's Manual* (Collins et al. 1996) could be used to create weights for making course-related estimates. However, it is important to note that the course information collected in the NHES:1991 pertains to the four most recent courses taken, rather than a random sample of courses as was the case in the NHES:1995.

⁴ This data file contains weights for making “person-course” estimates pertaining to work-related and other formal structured courses. A simple way of doing this is to create a new variable that is the product of the course weight and the variable of interest. The standard weight and variance estimation methods are then applied to the new variable. The weight variables are called WRWGT, for adjusting for the courses adults took in work-related classes, and SAWGT, for adjusting for personal development courses. Weights are required for these types of courses because course-related data were collected only for a random subsample of courses. See the NHES:1995 *Adult Education Data File User's Manual* (Collins et al. 1996) for more details.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Surveys Program (NHES), 1991–2007.

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8. NHES:2007 BIAS STUDY

This chapter provides an overview of the data collection procedures for the Bias Study conducted as part of the National Household Education Surveys Program (NHES:2007) surveys. It describes the sample design, telephone interviewing and procedures for Bias Study cases, the recruitment and training of Bias Study interviewers, and in-person procedures designed to increase respondent cooperation. This chapter also presents a summary of the Bias Study findings along with problems that were encountered and recommendations for future studies. See the forthcoming bias study report (Van de Kerckhove et al. forthcoming) for a much more detailed description of all of the aspects of the bias study, including the analyses and results, than that which is provided here.

8.1 Overview of the Bias Study Approach

The purpose of the NHES:2007 Bias Study was to evaluate bias due to both nonresponse and undercoverage and to assess operational feasibility and cost-effectiveness of in-person followup for cases that do not respond to an RDD survey when contacted by telephone. Building on findings from the NHES:2005 Field Test (see Westat 2004 for more details), the Bias Study of NHES:2007 was a comprehensive study of Bias using a national sample. From a sample of 7,500 Bias Study cases, 5,433 cases that were matched to a telephone number were first attempted by telephone using the same calling and follow-up protocol that was used for the RDD sample (e.g., mailing an advance letter on U.S. Department of Education stationery with \$2 cash, an additional letter sent by first class mail with a \$2 cash enclosure for initial refusal cases, another letter by FedEx or Priority mail for second refusals; see chapter 4 for further information on the data collection protocol). Those sent to the field included Bias Study cases not matched with a telephone number (2,067), nonhostile refusals (693), address-telephone mismatch cases, potential address-telephone mismatch cases, and nonworking telephone numbers (1,525), most of the other nonresponse cases (835), and two address cases with telephone numbers that were identical to those sampled in the RDD sample.

Overall, 50 percent of the Screener cases finalized in the field were finalized as completed Screeners. Among cases with no matching telephone number and those with a mismatched telephone number, the percentages finalized in the field as completed Screeners were 52 percent and 54 percent, respectively. Among the telephone maximum call, noncontact, refusal, and language problem cases, the

percentages finalized in the field as completed Screeners were 46 percent, 45 percent, 42 percent, and 23 percent, respectively. After the telephone and field data collection efforts, the overall unit response rate was 54.0 for School Readiness (SR), 51.4 for Parent and Family Involvement in Education (PFI), and 41.0 for Adult Education for Work-Related Reasons (AEWR). The evaluation for bias suggest there is no bias of substantive importance in the NHES:2007 estimates due to nonresponse but the analysis did provide evidence of the potential for noncoverage bias in the NHES:2007 estimates. Details of the procedures and findings are discussed in detail below and in the NHES:2007 Bias Study Report (forthcoming).

8.2 Bias Study Sample Design

8.2.1 PSU Selection

At the first stage of household sample selection, 30 primary sampling units (PSUs), which are defined as single counties or groups of a few contiguous counties, were randomly selected from the 50 states and the District of Columbia with probabilities proportional to size. The measure of size used for PSU selection was the PSU population estimate for July 1, 2004, produced by the Census Bureau's Population Estimates Program. One PSU was sufficiently large that it was identified as a certainty PSU, (i.e., it was brought into the sample with probability 1). The non-certainty PSUs were stratified by metropolitan status and, for metropolitan areas, further by Census division and the proportion of adults having a bachelor's degree or higher. Within each stratum, two PSUs were randomly selected with probabilities proportionate to the measure of size (exhibit 8-1).⁶⁵

8.2.2 Segment Selection

At the second stage, ten area segments were selected within each sampled PSU with probabilities proportional to size. The measure of size for segment selection was the number of occupied housing units in the segment, as reported in the 2000 decennial census. Segments were generally Census blocks or block groups, but small block groups were combined with other contiguous block groups when necessary to form segments of sufficient size. A minimum segment size of 100 was set to ensure the desired number of addresses per segment could be attained and to reduce the effects of clustering.

⁶⁵In one stratum, three PSUs were selected to achieve the total of 30 sampled PSUs (29 non-certainty PSUs and 1 certainty PSU).

Exhibit 8-1. Strata Used for PSU Selection for the NHES:2007 Bias Study

Stratum	Stratum Definition	Total Stratum Measure of size
1	Non-metropolitan	19,767,100
2	Metropolitan; New England, East North Central, and West North Central census divisions; percentage with a bachelor's degree or higher is less than 22.8	29,131,311
3	Metropolitan; New England, East North Central, and West North Central census divisions; percentage with a bachelor's degree or higher is between 22.8 and 29.1	21,981,207
4	Metropolitan; New England, East North Central, and West North Central census divisions; percentage with a bachelor's degree or higher is less than or equal to 29.1	21,835,548
5	Metropolitan; Middle Atlantic census division; percentage with a bachelor's degree or higher is less than 24.3	20,035,322
6	Metropolitan; Middle Atlantic census division; percentage with a bachelor's degree or higher is less than 24.3	19,480,080
7	Metropolitan; South Atlantic, East South Central, and West South Central census divisions; percentage with a bachelor's degree or higher is less than 15.1	19,356,038
8	Metropolitan; South Atlantic, East South Central, and West South Central census divisions; percentage with a bachelor's degree or higher is between 15.1 and 20.8	19,355,261
9	Metropolitan; South Atlantic, East South Central, and West South Central census divisions; percentage with a bachelor's degree or higher is between 20.8 and 25.3	19,726,185
10	Metropolitan; South Atlantic, East South Central, and West South Central census divisions; percentage with a bachelor's degree or higher is between 25.3 and 29.5	18,950,774
11	Metropolitan; South Atlantic, East South Central, and West South Central census divisions; percentage with a bachelor's degree or higher is less than 29.5	19,412,564
12	Metropolitan; Mountain census division	18,336,012
13	Metropolitan; Pacific census division; percentage with a bachelor's degree or higher is less than 26.9	18,460,250
14	Metropolitan; Pacific census division; percentage with a bachelor's degree or higher is less than 26.9	18,564,462

SOURCE: Retrieved from http://www.census.gov/population/estimates/metro_general/List1.txt, (3/3/2006); Census Bureau's Population Estimates Program, 2004.

8.2.3 Address Selection

At the third stage, a two-phase sample was used to select addresses to obtain a final sample size of 250 addresses in each PSU. Lists of residential addresses were purchased from a vendor who maintains address lists based on the U.S. Postal Service delivery files. Since the vendor provides address lists by zip code, addresses were obtained for all zip codes within the sampled segments. The addresses were then geocoded (assigned a latitude-longitude coordinate) and matched back to the sample segments to form the frame for address selection. In the first phase of address selection, a sample of 50 addresses was selected within each of the sampled segments, when possible. If fewer than 50 addresses from the vendor-provided list matched to the sampled segment, then all addresses in the segment were selected for the first phase sample.

The first phase of sampled addresses were sent to a commercial vendor to be matched to white pages telephone directory listings to obtain telephone numbers, where possible. Overall, 59 percent of the first phase sample addresses had matching telephone numbers. This rate varied considerably by segment, ranging from 0 percent to 90 percent. In the second phase, within each sampled segment, addresses with telephone number matches were sampled at twice the rate of addresses without telephone number matches. An equal number of addresses were selected within each segment in the PSU, for a total of 250 addresses per PSU.⁶⁶

8.2.4 Within-Household Sampling and Precision Requirements

For each sampled address, a screening interview was administered to a household respondent age 18 or older.⁶⁷ Demographic information collected in the Screener about household members was used to determine whether anyone was eligible for the SR, PFI, or AEW Survey. The within household sampling algorithm used for the Bias Study is the same as that used for the RDD sample, as described in chapter 4. The SR Survey was administered to the parent or guardian⁶⁸ in the household who was most knowledgeable about the care and education of the sampled child age 3 through age 6, as of December 31,

⁶⁶ In most cases, 25 addresses were selected within each of the 10 segments in the PSU. However, in some instances, the address lists contained fewer than 25 addresses in a particular segment. In this situation, the sample sizes in the other segments in the PSU were increased to achieve the target of 250 sampled addresses per PSU.

⁶⁷ Any household member age 18 or older was eligible to respond to the screening interview. However, if there were no household members age 18 or older, the male or female head of the household completed the Screener. Household members were defined as persons who considered that household as their residence, kept their possessions there, and had no other place to live.

⁶⁸ The respondent for the SR and PFI Surveys was identified by the Screener respondent as the household member most knowledgeable about the care and education of the sampled child. For ease of discussion, the respondent is referred to as the parent/guardian.

2006, who was not yet in kindergarten.⁶⁹ For the PFI Survey, the parent/guardian most knowledgeable about the care and education of the sampled child age 20 or younger who was enrolled in kindergarten through twelfth grade was interviewed.⁷⁰ The SR and PFI Surveys were administered in a single instrument; however, the sample design considerations discussed in this report treat them as separate surveys. The AEW Survey was administered to sampled persons 16 years or older who were not currently enrolled in twelfth grade or below and were not institutionalized or on active duty in the U.S. Armed Forces.

The sample sizes for the Bias Study were set to allow for detection of a 5 percentage point difference (or bias) in key statistics from each of the surveys.⁷¹ For example, if the work-related adult education participation rate from the NHES:2007 RDD survey is 40 percent, and the participation rate from the Bias Study is 45 percent, such a difference would be expected to be statistically significant, and the difference would be attributable to bias. Detection of a bias of 5 percentage points was set as the criterion because smaller differences are generally not substantively important in NHES.

Based on address-telephone number match rates attained in NHES:2005, it was expected that about 60 percent of cases sampled for the Bias Study (or 4,530 of the 7,500 sampled addresses) would be attempted in the field because no matching telephone number would be identified or the case would not be completed through a telephone call initiated by an interviewer in the Telephone Research Center. Among cases attempted in the field, it was expected that Screeners would be completed with about 50 percent based on the experiences in the NHES:2005 Field Test and the study of in-field follow-up conducted in conjunction with NHES:2005 RDD collection. This expectation took into account the longer field period of and the higher incentive used in the Bias Study.

The initial target number of completed extended interviews was 1,144 completed extended interviews (344 SR interviews, 400 PFI interviews, and 400 AEW interviews), assuming unit response rates of 90 percent, 83 percent, and 80 percent for the SR, PFI, and AEW surveys, respectively.⁷² However, these targets would have required changing the sampling algorithm used for the main study

⁶⁹Because the proportion of 7-year-olds who are not enrolled in school is very small (about 1.5 percent), an upper age limit of 6 was used for the SR Survey.

⁷⁰Some SR Survey items were administered about children enrolled in kindergarten through second grade.

⁷¹Key statistics for the SR survey include participation in center-based care arrangements, recognition of all colors, ability to count higher than 10, knowing all letters, and ability to write own name. Key statistics for the PFI survey include parent participation in 3 or more activities in the child's school, parent participation in home learning activities, and parent assessment of school practices. Key statistics for the AEW survey include participation in adult education for work-related reasons and participation in employer supported adult education.

⁷²These expected extended interview unit response rates are slightly higher than the rates attained in recent NHES surveys of the same or similar subpopulations, because in-person interviews generally attain higher unit response rates than telephone interviews.

NHES:2007 surveys substantially to restrict the number of persons sampled for the PFI and AEWB survey for the bias analysis. It was decided to use the same within-household sampling algorithm for the Bias Study that was used in the main RDD survey. These within-household sampling rates were expected to yield 2,682 completed extended interviews (327 SR interviews, 1,108 PFI interviews, and 1,247 AEWB interviews).

Exhibit 8-2 summarizes key design features of the Bias Study.

Exhibit 8-2. Key design features of the NHES:2007 Bias Study

Characteristic	
Type of sample	Address sample
Mode of data collection	CATI (originating in Telephone Research Center) for cases finalized in Telephone Research Center; CATI (via cell phone or home phone) for cases attempted in the field
Instrument	Expanded Screener (see section 4.2) and standard NHES:2007 extended interviews
Respondent	Standard NHES respondents
Cases attempted in the field	Follow-up with telephone nonrespondents and telephone nonmatches
Number of PSUs (sites)	30
Number of screener cases attempted (total across sites)	7,500
Expected number of Screeners completed by Telephone Research Center-initiated call.....	2,970
Expected number of Screeners completed in field.....	2,265
Expected number of completed extended interviews (total across sites).....	2,682

NOTE: Detail may not sum to totals because of rounding.
 SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Surveys Program (NHES), 2007.

8.3 Bias Study Data Collection

As mentioned earlier, all addresses sampled for the Bias Study were sent to a vendor to be matched with a telephone number. Addresses that were matched to a telephone number were sampled at about twice the rate of nonmatched addresses. In all, the sample consisted of 5,433 addresses matched to a telephone number and 2,067 cases that were not matched. The non-telephone matched addresses were sent to the field for in-person efforts without first being tried in the TRC. Cases that were matched with a telephone number were first attempted by phone. These cases followed the same telephone interviewing protocol as NHES:2007 RDD cases. All non-hostile nonresponse cases, cases that were found to be incorrectly matched to a phone number or potentially incorrectly matched⁷³ to a telephone number and nonmatched cases were sent for in-person follow-up.

8.3.1 Telephone Data Collection Efforts and Cases Sent for In-Person Data Collection

Cases with matched telephone numbers were first attempted by telephone, using the standard procedures used in NHES:2007 (described in detail in Chapter 4). Those cases received the full complement of telephone nonresponse followup (e.g., refusal conversion attempts, refielding of maximum call and no answer cases). Prior to calling any of the matched households, a letter was sent on U.S. Department of Education stationery explaining the purpose of the call with a \$2 cash incentive enclosed to draw attention to the importance of the study. The advance letter provided information about the study, its sponsorship, and its purpose. Just as with the RDD sample, telephone data collection for the Bias Study sample began on January 2, 2007 and ended on May 6, 2007.

Of the 5,433 Bias Study cases attempted by the TRC, 2,235 were completed in the TRC. Another 42 cases were coded as hostile refusals and 9 were finalized as other nonresponse (e.g., the only member of the household was suffering from dementia) in the TRC and were not sent for in-person efforts. Also, in 115 cases, respondents gave a slightly different address than the sampled address. A total of 23 of the 115 potential mismatches were initially sent to the field for address-telephone number verification. Later, a decision was made not to send the remaining 92 cases out to the field based on time constraints and the results of the subsample of 23 cases sent to the field; approximately 74 percent (17 out

⁷³For those cases that responded by telephone, respondents were asked to verify their address during the call, because it was necessary to complete the survey with the sampled address. In some instances, the telephone number called was not associated with the sampled address (i.e., there was an incorrectly matched telephone number); these cases were sent to the field for follow-up with the sampled address.

of 23) were verified as correct address-telephone matches and, therefore, were considered to be TRC completes. The other 6 cases sent to the field for address verification were identified as incorrect matches and fielded for in-person followup with the correct address. A total of 2,378 out of 5,433 cases with telephone numbers were not sent for in-person efforts (2,235 completes, 42 hostile refusals, 9 other nonresponse, 92 potential mismatch cases).

The 5,122 cases sent to the field included the remaining 3,055 cases with telephone number matches that were first attempted in the TRC and the 2,067 cases without a telephone match. Table 8-1 presents the distribution of nonmatch, mismatch, nonresponse, and RDD duplicate (discussed in detail below) cases sent for in-person follow-up.

Table 8-1. Distribution of Bias Study cases sent for in-person efforts

Cases sent for in-person data collection	Number	Percent
Nonmatch cases (address not matched to telephone)	2,067	40
Mismatched cases		
Incorrect residential telephone number match	108	2
Nonworking or nonresidential telephone number	1,394	27
Potential address-telephone number mismatch	23	#
Nonresponse cases		
Language problem	48	1
Maximum call	477	9
Noncontact	310	6
Non-hostile refusal	693	14
RDD duplicate cases	2	#
Total	5,122	100

Rounds to zero.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Surveys Program (NHES), 2007.

Cases sent for in-person data collection included four kinds of cases: address cases not matched to a telephone number; address cases incorrectly matched to a telephone number; nonresponse cases such as language problem cases; maximum call cases; noncontact cases; and refusal cases; and a small number of cases that were duplicates RDD sample cases. The following describes each in turn:

Nonmatch cases were those cases for which a telephone number could not be matched to a sampled telephone number (2,067 cases);

Mismatched cases include:

- **Incorrect residential telephone match cases** (108 cases) in which the address provided by a respondent during the telephone interview was completely different from the sampled address;⁷⁴
- Addresses matched to **nonworking or nonresidential** telephone numbers (1,394 cases); and
- **Potential address-telephone mismatches** (23 were sent for in-person follow-up) were cases attempted in the TRC but the respondent-provided address was slightly different than the sampled address or the respondent refused to provide the household's physical address so the address could not be confirmed. If the address-telephone match was verified, the case was finalized as complete. If the case was a mismatch, the survey information in the CATI was cleaned out because it was collected with the wrong household. The field interviewer returned to the household when the CATI was ready to accept information on the case that was sampled for the study to gain cooperation. Six of these cases were identified as address-telephone number mismatches and of those six, two were completed.

Nonresponse cases include:

- **Language problem cases** (48 cases), those cases sent to the field that were coded in the TRC as as households in which a language other than English or Spanish appeared to be spoken, or cases that were coded as hearing or speech problems;
- **Maximum call cases** (477 cases), those cases that reached the maximum call limit in the TRC. The cases in the maximum call group may have had one language problem or up to two non-hostile refusals in its history but finalized as a maximum call case (i.e., up to 20 calls had been made without completing a Screener);
- **Noncontact cases** (310 cases), those that resulted in no human contact and no answering machine or only answering machine contact but no human contact; and
- **Non-hostile refusal cases** (693), those that refused three times during telephone efforts, or cases in refusal status when the TRC data collection period closed were sent to the field as non-hostile refusals; refusal cases may have received additional mailings and up to an additional \$2 in incentive cash.
- **RDD duplicate cases** (2), two telephone numbers sampled for the main RDD study and resulting in completed Screeners were duplicates of telephone numbers matched to sampled

⁷⁴For these cases, the data collected in the TRC was cleaned out of CATI prior to sending the case to the field.

addresses for the Bias Study. These cases were sent to the field to confirm that the telephone number was matched to the correct address.

All Bias Study cases were sent a letter on U.S. Department of Education stationery explaining the purpose of the study and its sponsor prior to in-person data collection efforts. Cases that were first called by a TRC interviewer before being sent to the field were sent the letter and a \$2 incentive (previously described in section 8.1) when telephone data collection began. Cases that were not matched to a telephone number were sent a similar letter on March 13, just prior to the beginning of in-person field efforts. Letters sent to non-matched cases did not contain a cash incentive because field interviewers would be arriving at those addresses with a \$20 incentive to complete the Screener.

8.3.2 Recruitment and Training of Bias Study Field Interviewers

Recruitment for the NHES:2007 Bias Study began in November 2006. Five supervisors, previously employed by Westat as field supervisors in different regions of the U.S., were recruited to hire and supervise field interviewers in their respectively assigned PSUs. Regions were roughly assigned to supervisors by each supervisor's home location. In January 2007, supervisors began recruiting field interviewers for their assigned regions. Supervisors were instructed to hire two interviewers per PSU who were experienced in field interviewing methods. All field interviewers were recruited from lists of previously employed field interviewers or through connections to the supervisor.

In-person training was held in Rockville, Maryland on March 15, 2007 for supervisors and on March 16 and half day on March 17, 2007 for field interviewers. Five interviewers were trained at various times over the course of the Bias Study data collection period because they were unable to attend training on the training dates or were hired after the field training. In total, 66 interviewers were trained; 10 of whom were bilingual in English and Spanish and 12 were travelers who were willing to conduct interviews in other regions. As with TRC interviewers, supervisors and field interviewers were required to sign a notarized Affidavit of Nondisclosure and a Westat confidentiality pledge to adhere to the confidentiality procedures outlined in the Field Worker Guide.

Supervisor Training. Prior to training, several conference calls with all of the supervisors were scheduled in which field interviewer recruitment progress and in-person study procedures were discussed with the project director and field manager. In addition, before training, supervisors were mailed a supervisors' manual, a field interviewers' manual, and supplemental printed materials to help

them understand NHES, the purpose of the Bias Study, and their role as supervisors. Supervisors' training consisted of a half day of informal lecture and a half day of training on the Basic Field Operating System (BFOS) for managing cases.

Field Interviewer Training. Field interviewers were mailed a field interviewer manual, along with other printed home-study materials and exercises to be completed prior to training. Classroom training for field interviewers consisted of lectures, cell-phone training, and hands-on role-plays and practices. At the conclusion of training all field interviewers had to successfully complete a certification exercise before they could begin field work.

8.3.3 Bias Study In-Person Data Collection Procedures

In-person data collection began on March 19, 2007 and ended on June 24, 2007. Cases were distributed to field interviewers in three releases. The first release of cases (3,601 cases in total, 2,067 of which were nonmatch cases) was shipped to field interviewers such that the cases would arrive at their home address on March 19. A large portion of these cases were nonmatch cases because many of the cases that were matched to a telephone number had yet to go through the full telephone-interviewing protocol. The second release of cases was shipped to field interviewers around April 10, 2007 and contained 567 cases. All cases in the second and third releases were cases that had been attempted in the TRC. The third release of cases was shipped around May 9, 2007 and contained 954 cases.

In addition to some basic office supplies, interviewers received four main tools for conducting the in-person follow up. These tools included the Household Folder (HHF), the Household Information Sheet (HIS), a cellular telephone, and a NHES photo ID badge (the HHF and HIS form are described briefly below). Before approaching a sampled residence, field interviewers' first task was to note observations about the neighborhood and the sampled address using an Interviewer Observation Form (IOF). The IOF was intended to capture observations on a number of factors including urbanicity, neighboring area land use, (e.g., residential, commercial, or industrial), neighborhood and household affluence, indicators of neighborhood safety or household security, indicators of children in the area, and language diversity.

Once the IOF was completed, the interviewer's job was to verify that the address was a dwelling unit (defined in exhibit 8-6), verify the address label on the HHF (and phone number if there

was one) with a resident of the household, and attempt to gain cooperation. In order to facilitate this effort, the field interviewers offered a cash incentive of \$20 for participating in the study, specifically for completing the Screener interview. Upon gaining cooperation, field interviewers would connect the respondent with the TRC on either a Westat-provided cellular telephone or on a household telephone via a toll-free number to complete the survey. The TRC interviewer would proceed with an expanded Screener. The expanded Screener contained additional questions about the household and its members and was only administered to cases sent for in-person follow-up.⁷⁵ If the respondent who was selected for an extended interview had a household telephone and it was used to call into the TRC, the extended interview could be continued on the household telephone and the field interviewer could leave once the Screener was completed. If the respondent was selected for an extended interview and did not have a household telephone or did not want to use the household telephone, the extended interview continued on the Westat cellular telephone. However, not all extended interviews in the household could be completed immediately after the Screener. In these instances, the interviewer either made arrangements with the TRC to call the respondent back at a specified time, or the field interviewer returned to the household at an agreed upon date and time to complete the interview.

In addition to the study phone, HHF, HIS, and badge, field interviewers were provided with supplemental materials to handle a variety of nonresponse and other situations. These materials included:

- “Sorry I missed you” cards indicating a contact attempt when household members were not at home;
- Appointment cards to write an appointment time, the field interviewer’s name, and the study cellular phone number for the respondent;
- Study brochures;
- Copies of the advance letter and copies of a community letters to be shown to community officials, such as local police departments and home owner’s associations to establish legitimacy;
- A Spanish translation card for English speaking field interviewers to gain cooperation with a Spanish speaking respondent; and
- Spanish versions of many of the materials for non-English, Spanish-speaking respondents.

⁷⁵The additional questions in the expanded Screener were repeated in the extended interview for sampled Screener respondents. Data from the additional questions in the expanded Screener was collected for possible analytic use in cases in which the extended interview was not completed. The question wording was similar to the corresponding question in the extended interview.

If, upon locating a dwelling unit, the interviewer learned that there were no residents home or the only person home was under 18 years of age, the interviewer was instructed to either leave a “Sorry I Missed You” card in a discreet location or with a youth, or to ask the youth for a time when an adult was available and leave an appointment card with an approximate time when she would return.

In-person contacts by field interviewers followed the same time slice procedure as those telephone calls placed when cases were being attempted in the TRC. That is, contact attempts varied by day and by time to maximize the possibility of finding a respondent at home, including weekday evenings, weekday daytimes, and weekends. Field interviewers made up to ten follow-up attempts at each address in their assignment with the caveat that they would not revisit a household that refused in person without first consulting their supervisor. In order to efficiently work cases, interviewers were instructed to plan such that they could make calls on several cases in the same or close-by segments, prioritizing appointments first, followed by new cases, and then all other cases.

At a designated time each week, the field interviewer would hold a reporting call with a field supervisor. Each case the field interviewer attempted that week was reviewed with the field supervisor and the field supervisor would determine if the case was to be reattempted, reassigned, or given a final disposition code. The field supervisors then entered all contact attempts and results into BFOS. The NHES field manager in the Rockville location would monitor the BFOS and hold a weekly individual meeting with each supervisor to discuss any problems or field interviewer needs. A weekly conference call that included all field supervisors, the project director, and the field manager was held at the end of each week during data collection to discuss overall progress, any changes in protocol, new cases being sent to the field, and any outstanding problems.

8.3.3.1 Key Data Collection Tools

Field interviewers were supplied with a number of tools to help them gain cooperation during in-person efforts and to collect important observational information about each case. The key tools included the Interviewer Observation Form (IOF) (discussed at the beginning of section 8.3.3), the Household Folder (HHF), the Household Information Sheet (HIS), and the Field Non-Interview Report (NIR). The HHF, HIS, and NIR will be briefly discussed below.

Household Folder. Each HHF indicated the sampled address, the telephone number (if one had been matched to the sampled address), and script that the field interviewer was to follow. Interviewers were instructed to locate the address, indicate the time and date of the visit, type of dwelling unit (e.g., stand alone home, townhouse or rowhouse, apartment, or other etc.), and briefly discuss the outcome of the visit, any problems encountered, or important observations on the back of the HHF.

Household Information Sheet. A Household Information Sheet (HIS)/TRC Non-Interview Report Form (NIRF) was enclosed with each HHF if the sampled address had been matched to a telephone number. This form was one or two pages in length and indicated the sampled address, telephone number, and a summary of contact attempts made by the TRC indicating the date, time, day of the week, time slice (morning, daytime, or evening), and result of the call. This form also contained the comments from the TRC NIRFs. TRC NIRFs indicates the household telephone number, date and time of NIRF, the reason for the refusal, the gender of the refuser, and whether the refusal was mild, firm, or hostile.

A **Field Non-Interview Report (NIR)** was filled out for each household where an interview was not completed. Information collected on the NIR included obtained and observable demographics of the would-be respondent/refuser (name, sex, age, race), type of nonresponse (e.g., language, maximum calls, refusal, other), and reason for a refusal/breakoff.

8.3.3.2 Final Household Dispositions

Cases could be finalized with one of several different final field disposition codes. These dispositions were used in BFOS to record the status of the field effort (exhibit 8-3). There were some discrepancies between the BFOS status and the CATI status (i.e., the final status captured by the CATI system) of some cases. For example, if a field interviewer left the household before the extended interview was completed, there may have been a breakoff or language problem of which the interviewer was unaware. The BFOS and CATI were reconciled at the end of data collection. Results are reported in table 8-2 using the final disposition codes recorded during the field effort. However, composite dispositions that take into account the final TRC disposition (i.e., the CATI status at the end of the TRC-initiated attempts) were derived for use in weighting and computing unit response rates. Also in table 8-2, among cases that were sent to the field for address-phone match verification, only the field effort results of those cases that were found to be mismatched are reported (6 cases out of 23 potential mismatch cases

were found to be mismatched; 1 case out of 2 RDD duplicates was found to be a mismatch), since for the remaining cases, the TRC-initiated results were retained.

Exhibit 8-3. Final Household Disposition Codes: 2007

Final disposition	Code	Explanation
Complete – no extended interviews needed	C1	This code was used when the TRC completed the screener and no extended interviews were required.
Completed – screener and one or more extended interviews	C2	This code was used if the respondent completed the screener and any or all extended interviews were also completed.
Completed screener – one or more extended interviews outstanding	C3	This code was used if the respondent completed the screener, and one or more extended interviews remained to be completed in the household.
Refusal/breakoff	RB	A household member refused to participate, or broke off the interview before connecting to the TRC.
Maximum calls	MC	A field interviewer was unable to make a successful contact with the household after making ten attempts, on different days and at different times.
Language	LP	This code was used when no one in the household spoke English or Spanish or there was a speech or hearing problem.
No Entry	NE	This code was used for a locked building or gated community.
Not Found	NF	This code was used when an interviewer could not locate a valid address
Vacant/Demolished/Condemned	NV	A case was coded as vacant if no one lived in the residence or the residence was demolished or condemned.
Not a Dwelling Unit	ND	This code was used when an address did not fit the definition of a dwelling unit.
Other	NO	Any other result not described above, such as a respondent who was too ill to participate.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Surveys Program (NHES), 2007.

Completed Cases (C1, C2, C3). Several different completion codes were developed to describe completed cases. This coding system was developed to aid in identifying cases that needed further follow-up during in-person data collection because of incomplete extended interviews (C3). This distinction was necessary because the extended interview may not have been completed while the field interviewer was at a residence. For example, a respondent sampled for an extended interview may not have been available when the Screener was completed so the interview was scheduled for a later time. An appointment to complete an extended interview was often set with the TRC and not the field

interviewer because most respondents had a household telephone on which the interview could be conducted and it was logistically more efficient for the TRC to set an appointment to call the household. Occasionally, however, the field interviewer had to return to the residence to complete the extended interview. When an extended interview was not completed at the same time as the Screener the field interviewer would code the case a “C3”, or “Screener completed with an outstanding extended interview.” In order to ensure that the extended interview was eventually finalized, the field supervisor would regularly monitor a report of the TRC interim and final result codes for Bias Study cases to determine if any extended interview appointments had not been met and whether or not the field interviewer needed to return to an address to attempt to secure cooperation for an outstanding extended interview.

In-person field efforts resulted in 998 completed Screeners where no one in the household was sampled for an extended interview (C1); 1,106 sampled households had both completed Screeners and extended interviews (C2); and 447 households had a completed Screener but one or more extended interviews were never completed (C3).

Refusal Cases (RB). If, during an in-person visit, a household member refused to participate, and the refusal was not hostile and no one in the household had refused before (in-person or by telephone), then a letter on U.S. Department of Education stationery was sent by FedEx to the sampled address further explaining the importance of the study. Field interviewers were instructed to attempt to gain cooperation again about two weeks after the letter had been mailed. In-person refusal letters were sent to about 426 households during the NHES:2007 in-person data collection. Any refusal that was deemed hostile either in the TRC or in person was coded as a final refusal and a field interviewer did not attempt refusal conversion. In-person refusal cases that had also refused at least once by telephone or had one prior in-person refusal (i.e., a member of the household refused twice to a field interviewer) were closed as final refusals. There were 1,100 final Screener refusals as the result of in-person efforts.

Maximum Call Cases (MC). In order to close out a case as a maximum call, field interviewers must have made at least 10 in-person attempts with a minimum of three attempts on weekends, three attempts in the evening (after 6 PM) on different days of the week, two attempts in the afternoon on different days of the week, and two attempts in the morning. In the final two weeks of the Bias Study data collection, this maximum call criteria was reduced to five contact attempts, to ensure that efforts were spread across all remaining cases. When a case was classified as a final maximum call case, with a supervisor’s approval, field interviewers left a postcard that contained four questions about the

household (exhibit 8-4) and a \$5.00 cash incentive. Out of 635 maximum call Screener cases, postcards were returned for 222 cases, or 35 percent of them.

Table 8-2. Final results of in-person efforts: Bias Study NHES:2007

Cases sent for in-person data collection	Total number	Results of in-person efforts of Bias Study										
		C1	C2	C3	RB	MC	LP	NE	NF	NV	ND	NO
Total ¹	5,104	998	1,106	447	1,100	635	95	56	14	397	93	163
Nonmatch cases (address not matched to telephone)	2,067	435	471	178	379	245	31	33	9	186	37	63
Mismatched cases												
Incorrect residential telephone number match	108	22	23	6	20	14	1	0	0	11	4	7
Nonworking or nonresidential telephone number	1,394	299	328	126	243	139	17	6	3	153	38	42
Potential address-telephone number mismatch ²	6	1	0	1	2	1	0	0	0	0	0	1
Nonresponse cases												
Language problem	48	7	4	0	5	2	27	0	0	2	0	1
Maximum call	477	64	100	55	110	94	7	6	1	14	6	20
Noncontact	310	48	70	22	57	64	3	5	0	22	1	18
Nonhostile refusal	693	121	110	59	285	75	9	6	1	9	7	11
RDD duplicate cases ³	1	0	0	0	0	1	0	0	0	0	0	0

¹Excluded 18 cases sent to the field for which addresses were verified as being the ones sampled for the bias study. These cases were considered to be the TRC completes.

²Twenty-three potential address-telephone number mismatch cases were sent to the field for address-telephone number match verification. Six of the cases were found to be address-telephone number mismatches and were attempted by field interviewers and two of those were completed in the field. Only the field result of the 6 mismatch cases are reported in the table.

³Two sampled addresses for these cases were matched to telephone numbers that were identical to telephone numbers sampled for the main RDD NHES:2007 study. They were sent to the field to verify that the address-telephone match was correct. One was found to be an incorrect address-telephone match and is reported in the table. NOTE: The results of the in-person efforts are coded as follows (see exhibit 4-4 for more detailed descriptions of these codes): C1, C2, C3: Screener completed. RB: Refusal/breakoff. MC: Maximum call. LP: Language, speech, or hearing problem. NE: No entry. NF: Not found. NV: Vacant/ demolished/condemned. ND: Not a dwelling unit. NO: Other

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Surveys Program (NHES), 2007.

Language Problem Cases (LP). The NHES interviews could be conducted in English or Spanish and bilingual TRC interviewers were available to conduct the interview in either language. Field interviewers were instructed that, if they were not bilingual and they encountered a non-English, Spanish

Exhibit 8-4. Maximum Call Postcard



SORRY WE MISSED YOU!

We had hoped to interview you for the National Household Education Surveys Program, an important research study sponsored by the National Center for Education Statistics of the U.S. Department of Education. The study is completed and we will not attempt to reach you again. However, for statistical purposes, will you please take a minute to complete this postcard? We know that your time is valuable, and as a token of our appreciation we are enclosing \$5.

After responding to the questions, please use the attached sticker to seal it with the mailing address on the outside, and then mail it back to us. If you have any questions about the survey, please feel free to contact Westat, the social science research firm conducting the survey, at 1-888-696-5672.

Please answer the following questions by placing a check mark (✓) in the appropriate box. Your answers are confidential and the information will be used for statistical purposes only.

How many people currently live in this household?

- One
- Two or three
- Four or more

How many children (under 18 years old) currently live in this household?

- None
- One
- Two or three
- Four or more

Is your home:

- Owned (with a mortgage, or paid in full)?
- Rented?
- Other arrangement?

What is the highest level of education completed by anyone in your household?

- Bachelor's degree or higher
- High school diploma
- Less than a high school diploma

Thank you very much for your time.

<Print Field ID at bottom>

Exhibit 8-5. Translation card text**English text:**

I work for Westat, a social science research company in Maryland. I am working on the National Household Education Surveys Program, which is a research study sponsored by the U.S. Department of Education. Are you a member of this household and at least 18 years old? I only speak English, but we are conducting interviews by telephone and have Spanish-speaking interviewers who can explain the study to you. Using my cell phone, will you allow me to call our telephone research center so that you can speak with someone who speaks Spanish? We're offering \$20 to households that complete the initial screening interview. Thank you.

Spanish text:

Trabajo para Westat, una firma localizada en el estado de Maryland que hace investigación en el área de las ciencias sociales. Trabajo para el Programa Nacional de Encuestas en Hogares sobre Educación, el cual es un estudio patrocinado por el Departamento de Educación de los Estados Unidos. ¿Es usted miembro de este hogar y tiene por lo menos 18 años de edad? Yo hablo solamente inglés, pero estamos realizando entrevistas por teléfono y tenemos entrevistadores que hablan español; ellos le pueden explicar de qué se trata el estudio. ¿Me permite usar mi celular para llamar a nuestro centro de investigación para que usted pueda hablar con alguien que habla español? Estamos ofreciendo \$20 a los hogares que completan la entrevista inicial. Muchas gracias.

speaking household, they could attempt to gain cooperation using a translation card (exhibit 8-5) to introduce the purpose of their visit and connect to a bilingual TRC interviewer. If they were unable to gain cooperation using the translation card, interviewers then attempted to verify the address and telephone information and then notify their supervisor so that the case could be reassigned to a bilingual field interviewer. If the language was something other than English or Spanish, the case was closed out as a “Language Problem.” Ninety-five Screener cases were finalized as language problems due to speech or hearing difficulties or because the language spoken in the household was something other than English or Spanish.

No Entry (NE). Some interviewers encountered apartment buildings that were security-locked or communities that were gated. Most security-locked buildings contained entryways with intercom systems. Field interviewers were instructed to use the intercom system to explain the reason for the visit if they could not gain entry. For both gated communities and locked buildings, if the interviewer could not gain access after several tries, or if there was no intercom system, they were instructed to present the Community Authorization letter to the manager of the building or of the security company used to monitor the community to help explain the importance of NHES. In 56 cases, field interviewers were never able to gain entry to the building or the community to complete a Screener.

Not Found (NF). In 14 cases field interviewers could not locate an address. The code of not found was only used after attempting to find the address using three different resources. Additional resources included internet search engines, local post offices, the local fire or police departments, real estate agencies, and citizens in the area.

Vacant, Demolished, or Condemned (NV). A dwelling unit was coded as vacant, demolished, or condemned if upon the field interviewer's first visit the residence was vacant, demolished, or condemned. If, during their initial contact with a household, the field interviewer made contact with a household member and verified the address, and later returned to conduct the Screener and found that the household was vacant, demolished, or condemned, the case was given a final code of "NO" or other nonresponse, and notes about the case were made on the HHF. A total of 397 sent to the field were finalized as vacant, demolished, or condemned.

Not a Dwelling Unit (ND). Field interviewers were expected to identify whether or not an address was a dwelling unit (DU) and the type of DU. In most cases, field interviewers did not have difficulty determining whether an address was a DU. Generally, Bias Study addresses were associated with a detached house, an apartment, or one house in a row of houses, such as a townhome or half of a duplex. Structures that did not qualify as DUs were institutional group quarters, such as a halfway house or other institution with 10 or more unrelated residents, military barracks and BOQs (Bachelor Officer's Quarters), dormitories, penal institutions (jails, prisons), hospitals, homes for the aged, and nursing homes.

The exhibit 8-6 is the definition of a DU used for purposes of this study. A total of 93 addresses did not fit the study definition of a DU.

Field interviewers also indicated the type of DU structure located at the address (exhibit 8-7). There were 3,043 field cases that were coded as stand alone homes; 512 were coded as town homes or duplexes; 1,230 were coded as apartments; and 176 were coded as something other than stand alone home, town home or duplex, or apartment. The remaining cases were missing a code for DU type.

Exhibit 8-6. Dwelling Unit Defined

A **dwelling unit** is a house, an apartment, a mobile home or trailer, a group of rooms or a single room occupied as separate living quarters or, if vacant, intended for occupancy as separate living quarters.

Separate living quarters are those in which the occupants live and eat separately from any other individuals in the building and have direct access from the outside the building or through a common hall.

Exhibit 8-7. Dwelling Unit Structure Type**DU STRUCTURE TYPE**

SA.....Stand alone home
 TH.....Town home or Duplex
 AP.....Apartment, Flat
 OS.....Other, Specify

Other Nonresponse (NO). The code “NO” or other nonresponse was used when all other final result codes did not apply. For example, when all household respondents were unavailable during the entire field period because of vacation or because the residence is used as a seasonal home, this code would be used. Other examples of when this code was used are when the only adult respondent was too ill to participate or when the address was initially confirmed by a resident but upon an interviewer’s second visit the residence was vacant. One hundred sixty-three cases were coded “other” nonresponse.

Validation of Field Interviews

In the NHES:2007 Bias Study, approximately 10 percent of all cases sent to the field for in-person follow up were randomly selected to be validated for quality control (598 cases). That is, to ensure that field interviewers were following procedures, were polite and professional, and provided accurate study information and the study materials, cases were selected at random by Westat for further follow-up. Field supervisors could also select a subsample of cases from a particular field interviewer’s assignment if the supervisor had reason to suspect falsification of cases. Supervisors were given phone scripts to read when calling to validate cases and letters to mail to cases for validation. For cases that had been completed, respondents were asked to verify their address, if they had received \$20.00 for participation, if the study had been explained well, and if the interviewer was polite. The script and

letters were tailored by case result and telephone number availability. For example, residents of sampled addresses that were finalized as maximum calls were validated by asking if they received the yellow postcard and the \$5.00 incentive; residents of sampled addresses finalized as no entry were validated by asking if they lived in a locked building or gated community.

Cases for validation were either called, mailed a letter, or visited in-person by a field interviewer other than the interviewer to whom the case was originally assigned. The form of validation was based on the case outcomes as follows:

- Field supervisors called all cases sampled for validation with telephone numbers that were completed in the field except cases that had been found to have a nonworking telephone number, an address-telephone mismatch, or a potential address-telephone mismatch.
- Field supervisors sent validation letters to be completed and returned by respondents to cases sampled for validation without a telephone number that were completed in the field. These validation cases included those with a nonworking telephone number, an address-telephone mismatch, or a potential address-telephone mismatch. If there was no response after 2 weeks, another interviewer was sent to the household to conduct the validation.
- For cases that were finalized as vacant and sampled for validation, another interviewer from the same PSU was sent to confirm that the sampled address was still vacant or vacant during the time period that the initial interviewer visited the residence.
- For cases that were sampled for validation, refused in the field, were not hostile and did not refuse during TRC efforts, the same contact procedure as was used for completed cases was used. For hostile refusals, or refusals that had refused both in the field and in the TRC, validation was not attempted.
- Other non-completes sampled for validation with telephone numbers, such as maximum call cases, language problem cases, cases finalized as not found, and cases classified as not a DU were validated via telephone by the supervisor. In these cases, the supervisor asked questions like whether the residence had seen any of the NHES literature, verified that the main language in the household was something other than English or Spanish, verified the address and ascertained whether it was a residential or business address.
- Another field interviewer from the same PSU was sent to verify other non-complete cases without telephone numbers that were sampled for validation and completed an IOF for that location. However, general characteristics of the cases that failed to respond to the field effort were available from the IOF and decennial Census. A higher proportion of field respondents than field nonrespondents were found to live in zip codes with lower median home values and lower median income deciles. Also, interviewers classified a higher proportion of field respondents as living in working class or poor households, having evidence of children, and being on blocks where no households had signs for private security, compared to field nonrespondents. For the majority of characteristics

examined, however, the field respondents were found to be similar to field nonrespondents.

8.3.4 Item and Unit Response Rates

For most of the data items collected in NHES:2007 Bias Study, the item response rate was very high. For items on the SR, PFI, and AEW⁷⁶ surveys respectively, the median item response rates were 99.32 percent, 99.37 percent, and 99.81 percent respectively. For items that are rarely asked (e.g., the items pertaining to the second mother in the SR or PFI interview), a small number of missing values could result in a low item response rate.

As in the main NHES: 2007 study, most items on the SR, PFI, and AEW surveys had item response rates over 90 percent. For the SR survey, there was one item for which the response rate was substantially lower in the Bias Study than for the RDD sample (SEDOWELL, the number of times since the beginning of the school year that the child's teacher/school has contacted the household about anything the child is doing particularly well or better in preschool) and two items in the PFI survey (SEBEHAV, the number of times since the beginning of the school year that the child's teacher/school has contacted the household about any behavior problems the child is having in school, and SPUBCHOI, whether the public school district lets the parents choose which public school they want the child to attend). There is no reason to believe that SEDOWELL, SEBEHAV, and SPUBCHOI are sensitive items that would be subject to lower response rates with the in-person effort than with strictly telephone collection. Thus, there is no indication of systematic differences between the two samples in the willingness or ability of respondents to respond to items. In summary, the response rates for the NHES:2007 surveys, from both the RDD sample and the Bias Study sample, are high and consistent across samples.

⁷⁶For the AEW survey, the median item response rates given correspond to the set of items that were imputed. For this survey, because no public-use data file was produced, only a subset of items needed for the analysis were imputed.

8.3.5 Summary of Bias Study Findings

The NHES:2007 Bias Study was developed to provide a more direct assessment of nonresponse bias for cases that did not complete the survey by telephone. This approach was the first undertaken to follow up with the nonrespondents in the field. The in-field follow-up was successful in yielding additional completes. Of cases that refused the Screener on the telephone, 42 percent completed the Screener in the field.⁷⁷ Similarly, 46 percent of telephone maximum call cases and 45 percent of telephone noncontact cases completed the Screener during the in-field follow-up. This nonresponse study is still limited because survey estimates for the households that did not respond to either the telephone or in-field effort are not available. However, general characteristics of the cases that failed to respond to the field effort were available from the IOF and decennial Census. A higher proportion of field respondents than field nonrespondents were found to live in zip codes with lower median home values and lower median income deciles. Also, interviewers classified a higher proportion of field respondents as living in working class or poor households, having evidence of children, and being on blocks where no households had signs for private security, compared to field nonrespondents. For the majority of characteristics examined, however, the field respondents were found to be similar to field nonrespondents.

Nonresponse bias occurs when sampled units fail to respond to the survey request and those units differ in some systematic fashion from those that do respond. Results from this study suggest that there is no systematic pattern of bias in key statistics from the NHES:2007. A comparison of the fully weighted RDD estimates to Bias Study estimates showed potential for bias in five estimates. The estimated percentages of preschoolers who count to 20 or higher, whose speech is often understandable to a stranger, and who watch 2 or more hours of TV in a typical weekday were lower for the RDD survey than the Bias Study. The estimate of the percentage of preschoolers whose mother is not in the labor force, as well the percentage of adults who are currently married, was higher for the RDD survey than the Bias Study. However, the majority of estimates evaluated showed no evidence of substantial bias.

In addition to the evaluation of overall bias in the NHES:2007 estimates, the Bias Study also allowed for the estimation of the nonresponse and noncoverage bias components. The NHES:2007 estimates were produced using weights that were adjusted for nonresponse and calibrated to population totals—adjustments that are expected to reduce nonresponse and noncoverage bias. The results from the NHES:2007 Bias Study, in concert with the previous bias analyses, suggest that despite the falling response rates, there is no bias of substantive importance in the NHES:2007 estimates due to nonresponse. A comparison of estimates before and after the raking adjustments indicated potential

⁷⁷The percentage includes nonhostile refusals only. Hostile refusals were not sent to the field.

noncoverage biases in some unadjusted SR survey estimates that were reduced through the weighting process.⁷⁸ For the PFI Survey and AEW Survey, although there were some differences in estimates of demographic characteristics, the estimates of key survey outcome variables at each stage of the weighting were comparable. While the weighting adjustments appear to have reduced noncoverage bias, the Bias Study analysis did provide evidence of the potential for noncoverage bias in the final estimate of the percentage of preschoolers whose parents' highest educational attainment is beyond a high school diploma. Although estimates of noncoverage bias in other final estimates examined in this study do not appear to be sufficiently large to be of substantive importance, noncoverage bias may become more of an issue in the future as more households drop their landline telephone service.

8.3.6 Problems Encountered and Suggestions for Improvements

In designing the Bias Study, Westat used past field studies as a guide for anticipating possible problems that could occur, and developing procedures and approaches to address these potential problems. This approach proved successful in heading off operational problems in most instances. For example, Westat developed, from experience in previous field tests, a method for sampling apartment numbers in instances when a sampled address should, but did not, have an apartment number provided by the vendor. Most of the problems encountered during the 2007 Bias Study were related to the fact that the Bias Study was a much larger, national sample compared to samples used in previous tests of in-person follow-up, and the previous field tests required fewer field interviewers and only one supervisor. Because the Bias Study was conducted on a larger scale, it presented a challenge in staffing the TRC to meet the needs of the field at any given time. Prior to in-person data collection, procedures were developed to coordinate field interviewer and telephone interviewer schedules, such as field interviewers supplying a weekly projection of days and times they would work and real-time text messaging to inform the TRC of actively working field interviewers. Despite these efforts, coordinating schedules was difficult on a large scale because issues such as weather could affect field operations.

Other issues that were not apparent in previous field tests were the potential difficulties of tracking extended interview progress in the field. As a result of the experience in the NHES:2007 Field

⁷⁸ Estimates after the weighting adjustments were lower than the unadjusted estimates for the proportion of preschoolers who participate in center-based care, recognize all colors, count to 20 or higher, and write their first name; who have parents who believe it is essential to prepare their child for kindergarten by teaching them the alphabet, numbers, and sharing; who have a family member that reads to them everyday in the past week; whose parents took three or more outings with them in the past month; who have household incomes above \$50,000; and who have both a mother and father in the household. The final estimates were higher than the unadjusted estimates for the proportion of preschoolers who are 3 years-old, live in homes that are not owned, have parents with a high school diploma or below, are below the poverty threshold, have household incomes below \$30,000, and have a mother only in the household.

Test, additional field codes were developed before data collection for the Bias Study to keep field supervisors informed of outstanding extended interviews. However, the BFOS for the 2007 Bias Study was not developed to maintain details about the specific extended interview(s) outstanding or the respondent(s) sampled for the interview(s). This kind of information is important if a field interviewer is expected to return to a household to secure cooperation from a specific respondent. While procedures were implemented during data collection to meet interviewer needs in order to secure cooperation in the Bias Study, the process of tracking this type of information would be more efficiently and seamlessly gathered if collected using BFOS.

Communication to and with field interviewers was also more difficult in a large study. In previous field tests, when there were fewer field interviewers and only one field supervisor, communication of procedural changes or respondent refusals to the TRC was more direct. Relaying information in real-time was much easier because there were fewer supervisors and interviewers to inform. The use of laptops by field interviewers and regular checking of project email would increase the efficiency of communication in future studies.

There were other issues that arose during the Bias Study data collection that were not related to the relative scale of the study in relation to past field studies. One was the relative ease for falsifying maximum call postcards. One way to reduce the potential for falsification of maximum call postcards is to develop a minimum percentage of maximum call postcards selected for validation for each field interviewer. Although a small number of falsified maximum call postcards were detected, these were removed from processing and new maximum call postcards were sent to the affected addresses. Thus, information from these falsified maximum call postcards has no effect on the analysis given in this report.

9. COMPARISON OF NHES:2007 ESTIMATES WITH OTHER DATA SOURCES

9.1 Introduction

This chapter presents a comparison of selected estimates from the 2007 National Household Education Surveys Program (NHES:2007) with estimates from previous NHES collections, the Current Population Survey (CPS), and other relevant extant data sources. The comparisons provide an indication of the reasonableness of selected NHES:2007 estimates. Where differences were found between NHES:2007 estimates and those from other sources, possible reasons are presented. All differences noted are significant at the 0.05 level.

NHES:2007 was designed to cover educational topics in three surveys, the School Readiness Survey (SR-NHES:2007), Parent and Family Involvement in Education (PFI-NHES:2007), and Adult Education for Work-Related Reasons Survey (AEWR-NHES:2007). The Screener collected information about household composition and determined which members of the household were eligible for extended interview(s), if any. The various data sources used for this comparative analysis were selected because they included topical information and samples comparable to those used in one or more of the NHES:2007 surveys.

9.2 Methodological Considerations in Data Comparisons

Sample and nonsampling errors, sample sizes, methods of survey administration, the timing of surveys, and response rates all affect the data collected and any comparisons made (Bradburn 1983; Groves 1989). In addition, question wording variation, question order, question context, and respondent recall can have a major impact on survey responses (Bradburn 1983; Groves 1989). As a result, it is important to note some general methodological issues.

Every survey, including NHES:2007, is subject to both sampling error and nonsampling error. Sampling errors occur because the data are collected from a sample rather than a census of the population. Because the sample of telephone households selected for NHES:2007 is just one of the many possible samples that could have been selected, estimates produced from the NHES:2007 sample may differ from estimates that would have been produced from other samples. In the same way, the data from

the other surveys used for comparison are also subject to sampling error. Nonsampling errors, however, are errors made in the collection and processing of data and may be caused by population coverage limitations and data collection, processing, and reporting procedures. The sources of nonsampling error are typically problems like unit and item nonresponse, the differences in respondents' interpretations of the meaning of the questions, response differences related to the particular time the survey was conducted, and mistakes in data preparation. Although the NHES surveys are designed to account for sampling error and minimize nonsampling error, the estimates presented in this chapter are subject both types of error (See section 7.4 for a discussion of sampling error.)

Population coverage is an issue that arises in the examination of results of any telephone survey because households without telephones are excluded from the sample. The March 2006 CPS shows that 93.6 percent of all persons ages 16 and older live in households with landline telephones, 93.1 percent of all children ages 3 to 6 live in households with landline telephones, and 93.7 percent of all children and youth ages 3 through 20 live in households with landline telephones (based on independent tabulations of the March 2006 CPS—U.S. Census Bureau). Low-income persons, minority group members, and persons who do not own their own homes are more likely than others to live in households without landline phones (Groves and Kahn 1979; Thornberry and Massey 1988; Anderson, Nelson, and Wilson 1998; Blumberg 2004).

The NHES:2007 data were statistically adjusted to reduce the effects of population undercoverage due to lack of landline telephone ownership (See Chapter 7). As a result, the estimates from NHES:2007 sum to the total number of eligible persons in all households, not just those in households with telephones.⁷⁸ Although these statistical adjustments may be useful in reducing biases in aggregates for the whole population, more serious biases may exist for estimates of segments of the population with relatively low telephone coverage rates (Brick, Burke, and West 1992).

Several studies have examined telephone coverage bias for subsamples of the population in NHES. Brick, Burke, and West (1992) looked at undercoverage bias for 3- to 5-year-olds and 14- to 21-year-olds. Brick (1996) examined undercoverage bias for 0- to 2-year-olds and adults. Undercoverage bias for 3- to 7-year-olds was examined by Brick et al. (1997). Undercoverage bias for estimates of characteristics of households and for adults was investigated by Montaquila, Brick, and Brock (1997b). These studies found that, with very few exceptions, the adjusted weights yielded estimates with absolute

⁷⁸Comparable statistical adjustments were made for NHES:2005, NHES:2003, NHES:2001, NHES:1999, NHES:1996, NHES:1995, and NHES:1993 data, which are also included in comparisons in this chapter.

landline telephone coverage bias of 2 percent or less. The only important exceptions are estimates of educational attainment for certain subgroups of adults (in particular, non-Hispanic Blacks, Hispanics, and renters).

Apart from population coverage, responses to survey items can vary depending upon the method of survey administration. Data collection modes differed for several of the survey sources used in this chapter. For example, NHES surveys were conducted by telephone in centralized facilities. The CPS surveys were primarily conducted by telephone, but about one-fourth to one-third of CPS interviews were conducted in person. These differences in mode and survey context may underlie some of the differences among survey estimates that are presented in this chapter.

Timing of survey administration in terms of the years in which surveys were conducted or the time of year they were administered also may affect responses (Groves 1989). Estimates from surveys that were administered close in time to NHES:2007 have been provided. However, for some items, comparison data were only available in earlier NHES administrations (e.g., 1996). In such cases, the historical context of the surveys and real change over time may contribute to variation in the estimates.

Another important consideration is the time of the year when the data are collected, which can affect responses to questions related to specific topics such as school attendance. For example, the relationship between age and grade in school can be affected by the time of year data are collected. A child at a given age in October (the time of the CPS Education Supplement) is most likely enrolled in the grade appropriate for his or her age during the fall. About one-sixth of those children, however, will have turned a year older by the new year, and would appear in NHES:2007 as being a year older.

In this analysis, the NHES:2007 estimates have been adjusted to account for differences in the timing of the surveys, if appropriate. For example, to facilitate meaningful comparisons between the CPS Education Supplement conducted in October and NHES:2007 conducted in January to April, ages of children whose birthdays fell in October, November, or December in NHES:2007 were recoded (for this comparative analysis in table 9-2A only) to more closely match the CPS definition of the child's age as of September 30. Despite these adjustments, it is important to keep in mind that the data collection period can be an important factor to consider when comparing estimates.

Variation in response rates across surveys can also result in differences in the estimates. To the extent that nonrespondents are different from respondents, low response rates may introduce biases into the survey estimates. In SR-NHES:2007, the overall unit response rate was 40.7 percent and for PFI-NHES:2007 it was 39.1 percent. For AEW-NHES:2007, the overall unit response rate was 33.0 percent. The issue of unit response rates for NHES:2007 is addressed more thoroughly in chapter 5. Unit response rates for the comparable data sources discussed in this chapter were CPS March 2006, 83.3 percent; CPS October 2005, 89.5 percent; CPS March 2002, 83.8 percent; and CPS October 2001, 89.9 percent. The response rates of the previous NHES surveys that are used as comparisons in this chapter included NHES:2005, with the Early Childhood Program Participation Survey (ECP) overall unit response rate of 58.0 percent. In NHES:2003, the PFI overall unit response rate was 53.8 percent, and the AEW overall unit response rate was 49.2 percent. In NHES:2001, the Adult Education and Lifelong Learning Survey (AELL) overall unit response rate was 53.4 percent, and the ECP overall unit response rate was 59.9 percent. In NHES:1999, the Parent Survey overall unit response rate was 66.7 percent, and the Adult Education Survey (AE) overall unit response rate was 62.3 percent. In NHES:1996, the Parent and Family Involvement in Education/Civic Involvement Survey (PFI/CI) had an overall unit response rate of 62.5 percent. In ECP-NHES:1995, the overall unit response rate was 66.3 percent, and the Adult Education Survey overall unit response rate was 58.6 percent. In SR-NHES:1993, the overall unit response rate was 73.6 percent.

Variations in question wording and operational definitions between surveys are other potential sources of differences between estimates. These issues are discussed in conjunction with the comparisons presented later in this chapter.

Because NHES data are adjusted with a raking procedure to match CPS population totals, NHES estimates exactly match CPS estimates for the characteristics used in the raking, provided the categorization is the same as that used in raking. Any NHES estimate of a characteristic not specifically controlled for in the raking adjustment would not be expected to exactly match CPS totals for one of more of the reasons discussed earlier.

9.2.1 General Comments on the NHES:2007 Estimates

The estimates to be presented here are just some of the multitude of comparisons that could be made between NHES:2007 estimates and those of other sources using different variables and

categorizations of those variables. When many comparisons are made, some will undoubtedly show statistically significant differences. The main purpose of the comparisons is to explore the overall quality of the data and to determine whether there are some substantial differences in estimates that need to be investigated further.

9.2.2 Methodology for Significance Testing

Wherever possible, comparisons in this chapter were examined to ensure that the differences discussed were statistically significant at the 95 percent level of confidence. For comparisons in which NHES:2007 data and data from previous NHES studies are involved, the standard errors of estimates could be obtained and are provided in the tables.

The CPS public use data files do not contain the information required to compute standard errors directly. However, the CPS provides documentation on computing approximate standard errors using generalized variance functions (GVFs). GVFs are functions that model the variance (or standard error) of survey estimates based on the value of the estimates. Further information on the CPS GVFs can be found on the CPS web site, at <http://www.census.gov/cps>. The GVFs were used to obtain approximate standard errors for each of the CPS estimates presented in this chapter.

Due to large sample sizes, some relatively small difference (3 to 5 percentage points) may be statistically significant when all cases are included in analysis. For example, AEWI interviews yielded responses from 7,710 adult respondents, SR interviews yielded parent responses from 2,633 sampled children ages 3 to 6 years old not enrolled in school, and PFI interviews yielded parent responses from 10,681 sampled children ages 3 through 20, enrolled in kindergarten through grade 12, including 10,370 students enrolled in public or private schools and 311 homeschooled children.

The discussion that follows is limited to those differences that are potentially of substantive importance, defined as differences of 5 percentage points or more. In addition to examining differences in percentage points, relative differences that are three times greater or more in one survey than in another are also noted (e.g., an estimate of 3 percent in one survey and 1 percent in another). Although the differences in percentage points may not be 5 or more, the relative difference may be important. All differences discussed are statistically significant.

9.2.3 Other Data Considerations

As is true for most surveys, responses were not obtained for all the NHES:2007 data items for all interviews. Despite the high item response rate, all NHES:2007 missing data items were imputed.⁷⁹ The CPS estimates provided as comparison data also contain imputed data.

Another data consideration is respondent age. The CPS includes respondents age 15 and older, whereas AEW-NHES:2007 adults were at least 16 years old. For the purpose of the comparisons pertaining to adults in this chapter, this difference in the age subgroup was accounted for by restricting tabulations of the CPS data to persons ages 16 and older.

9.3 SR, PFI, and AEW Comparisons with CPS Estimates

9.3.1 The Current Population Survey

The CPS is a monthly household survey conducted by the Bureau of the Census to provide information about employment, unemployment, and other characteristics of the civilian noninstitutionalized population. The CPS respondent is a household member age 15 or older and the survey is conducted each month in a sample of up to 77,000 households, with data on up to 213,000 individuals. The U.S. Department of Education is a joint sponsor of the annual October supplement to the CPS, which provides specific information on educational topics.

CPS data from October 2005 and March 2006⁸⁰ were used for comparison with estimates from SR, PFI, and AEW surveys. The October 2005 supplement contains the most recent available CPS data regarding child care arrangements and data relating enrollment status and grade to age and the March 2006 supplement contains the most recent CPS data on age, race/ethnicity by educational attainment, industry, and occupation. The data comparisons below for SR, PFI, and AEW cover key estimates including ages of subject, student grade, enrollment status, school type, sex, and highest level of educational attainment. The SR, PFI, and AEW estimates presented in this section were calculated using adjusted weights, but the estimates based on unadjusted base weights are also tabulated with CPS estimates in Appendix J.

⁷⁹The median item response rates for items in the SR, PFI, and AEW surveys were 99.28, 99.04, and 99.72 percent, respectively.

⁸⁰The October 2005 and March 2006 CPS data were the most recent available at the time this report was drafted. Generally, the CPS shows little variation over two-year time spans.

9.3.2 Comparability of NHES:2007 with 2005 and 2006 CPS Distributions for Age of Persons

Table 9-1 shows NHES:2007 and 2005 CPS estimates of the age distribution of the population as indicated by the age of persons who were subjects of NHES interviews (i.e., children/youth from age 3 to 20 and enrolled in grade 12 or below and noninstitutionalized adults age 16 or older and not enrolled in grade 12 or below). There were no differences of 5 percentage points or more. All differences were 2 percentage points or less.

Table 9-1. Percentage distribution for age of subjects of interviews: SR-NHES:2007, PFI-NHES:2007, AEWR-NHES:2007, and CPS:2005

Age category	SR-NHES:2007, PFI-NHES:2007 and AEWR-NHES:2007 ¹		CPS:2005	
	Percent	s.e.	Percent	s.e.
3–5 years	4	#	4	0.1
6–9 years	6	0.1	6	0.1
10–15 years	9	#	9	0.1
16–19 years	6	0.3	6	0.1
20–29 years	14	0.3	14	0.1
30–39 years	13	0.7	14	0.1
40–49 years	17	0.7	16	0.1
50–59 years	12	0.4	14	0.1
60 or more years	19	0.4	17	0.1

Rounds to zero.

¹ Estimates of children age 3 through 6 and not yet enrolled in kindergarten were obtained from the School Readiness (SR) Survey. Estimates of children/youth age 3 through 20 and enrolled in kindergarten through grade 12 were obtained from the Parent and Family Involvement in Education (PFI) Survey. Estimates of adults age 16 and older, not enrolled in grade 12 or below, and not on activity duty in the U.S. Armed Forces were obtained from the Adult Education for Work-Related Reasons (AEWR) Survey.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, School Readiness Survey of the National Household Education Surveys Program (NHES), 2007; Parent and Family Involvement in Education Survey of the NHES, 2007; and Adult Education for Work-related Reasons Survey of the NHES, 2007. U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 2005.

School enrollment and grade level by age. Tables 9-2A through 9-2D provide the NHES:2007 and 2005 CPS estimates and standard errors for estimates of enrollment and current grade level among 3- to 20-year-olds. Since the CPS estimates were gathered in October, the ages of children in NHES:2007 were recalculated to reflect their ages as of September 30, 2006, rather than the NHES standard of December 31, 2006.

NHES:2007 tends to show higher percentages of children enrolled in modal grade for each age compared to 2005 CPS, but the differences are not statistically significant. The patterns are similar to those observed in NHES:2005.

Table 9-2A. Percentage distribution of children ages 3 through 20 not enrolled in school or enrolled in kindergarten through grade 12: SR-NHES:2007 and PFI-NHES:2007

Child's age	Number of children (thousands)	Child's current grade														
		U	N	K	1	2	3	4	5	6	7	8	9	10	11	12
NHES:2007																
3	3,993	59	39	3												
4	3,854	27	65	7												
5	3,674	4	9	81	6											
6	3,829			14	80	5										
7	4,103				20	73	6	1								
8	3,871				1	18	78	3								
9	3,791					1	15	77	7							
10	4,043						1	19	75	5						
11	3,947							1	17	74	6	1				
12	4,013								1	19	73	7				
13	4,201									4	18	71	6			
14	4,245										4	21	68	7		
15	4,323											1	22	70	6	
16	4,530												3	21	71	6
17	3,811													3	23	73
18	802														5	94
19	93														4	96
20	26															100

NOTE: For the National Household Education Surveys Program (NHES) kindergarten (K) includes grades classified as kindergarten, transitional kindergarten, and prefirst grade. Age in NHES:2007 was recalculated to match the Current Population Survey definition of the child's age as of September 30. Homeschoolers are excluded from the NHES estimates. Because of rounding, percentages may not add to 100. Blank cells in the table represent estimates that round to zero.

SOURCE: U.S. Department of Education, National Center for Education Statistics, School Readiness (SR) Survey of the National Household Education Surveys Program (NHES), 2007; Parent and Family Involvement in Education Survey of the NHES, 2007.

Table 9-2B. Standard errors of the percentage distribution of children ages 3 through 20 not enrolled in school or enrolled in kindergarten through grade 12: SR-NHES:2007 and PFI-NHES:2007

Child's age	Number of children (thousands)	Child's current grade															
		U	N	K	1	2	3	4	5	6	7	8	9	10	11	12	
NHES:2007																	
3	138	1.6	1.6	1.5													
4	132	1.8	1.8	1.1													
5	117	0.9	1.1	1.6	1.4												
6	174			1.9	2.1	1.0											
7	179				3.0	2.7	1.1	0.6									
8	125				0.4	1.7	1.6	0.7									
9	130					0.3	2.2	2.2	1.3								
10	109						0.6	1.6	1.6	0.7							
11	116							0.5	1.5	1.6	1.0	0.4					
12	124								0.4	1.8	1.9	1.4					
13	137									1.9	1.7	2.5	1.0				
14	118										0.9	1.4	1.8	1.0			
15	131											0.5	1.7	1.8	1.0		
16	138												0.7	1.7	1.9	1.1	
17	140													1.5	2.0	2.0	
18	110														1.9	2.0	
19	27															4.1	4.1
20	13																

NOTE: Standard errors increase for children who are 18, 19, and 20 years old. This is because there are small numbers of those children in the grade categories shown above. Blank cells in the table represent estimates that round to zero.

SOURCE: U.S. Department of Education, National Center for Education Statistics, School Readiness (SR) Survey of the National Household Education Surveys Program (NHES), 2007; Parent and Family Involvement in Education Survey of the NHES, 2007.

Table 9-2C. Percentage distribution of children ages 3 through 20 not enrolled in school or enrolled in kindergarten through grade 12: CPS:2005

Child's age	Number of children (thousands)	Child's current grade														
		U	N	K	1	2	3	4	5	6	7	8	9	10	11	12
CPS:2005																
3	4,151	59	40	2												
4	4,028	34	59	7												
5	3,955	7	13	74	6	1										
6	3,889	3	2	16	73	6	1									
7	3,875			1	21	72	5	1								
8	3,904				3	19	71	6	1							
9	3,849				4	2	20	67	5	1						
10	4,005					1	3	20	70	5	1					
11	3,979						1	3	22	67	6	1				
12	3,993							1	2	24	65	6	2			
13	4,331								1	4	24	65	6			
14	4,175									1	3	24	67	5		
15	4,184										1	3	22	66	7	1
16	4,443												5	27	62	6
17	3,864												1	5	29	65
18	1,137												1	2	14	82
19	246										2		3	8	18	70
20	77												9		32	59

NOTE: Homeschoolers are included in the Current Population Survey estimates. Because of rounding, percentages may not add to 100. Blank cells in the table represent estimates that round to zero.

SOURCE: U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 2005.

Table 9-2D. Standard errors of the percentage distribution of children ages 3 through 20 not enrolled in school or enrolled in kindergarten through grade 12: CPS:2005

Child's age	Number of children (thousands)	Child's current grade																			
		U	N	K	1	2	3	4	5	6	7	8	9	10	11	12					
CPS:2005																					
3	4,151	1.3	1.3	0.3																	
4	4,028	1.3	1.3	0.7																	
5	3,955	0.7	0.9	1.2	0.7	0.3															
6	3,889	0.4	0.4	1.0	1.2	0.7	0.3														
7	3,875			0.3	1.1	1.2	0.6	0.3													
8	3,904				0.5	1.1	1.3	0.6	0.3												
9	3,849				0.5	0.4	1.1	1.3	0.6	0.3											
10	4,005					0.2	0.5	1.1	1.3	0.6	0.3										
11	3,979						0.2	0.5	1.1	1.3	0.7	0.3									
12	3,993							0.3	0.4	1.2	1.3	0.6	0.3								
13	4,331								0.3	0.5	1.1	1.2	0.6								
14	4,175									0.3	0.5	1.1	1.3	0.6							
15	4,184										0.2	0.5	1.1	1.3	0.7	0.2					
16	4,443												0.5	1.1	1.3	0.6					
17	3,864													0.3	0.6	1.3	1.3				
18	1,137														0.5	0.8	1.8	2.0			
19	246															1.5	1.8	3.0	4.2	5.1	
20	77																		5.7	9.2	9.7

NOTE: Blank cells in the table represent estimates that round to zero.

SOURCE: U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 2005.

School type and student grade level. Estimates of the number of children in kindergarten through grade 12, by school type and by student grade level, are presented in table 9-3 for the PFI surveys and for CPS:2005. Estimates of the number of children at each grade level from kindergarten through grade 12 are comparable. Number estimates are rounded to the nearest thousand for ease of interpretation. NHES:2007 estimates show that there were 53,186,000 children in kindergarten through grade 12, and CPS:2005 estimates show that there were 53,328,000 children (a difference of 142,000 children). NHES:2007 estimates that there were 45,521,000 children enrolled in public schools and 6,080,000 enrolled in private schools. CPS:2005 estimates that there were 48,018,000 children enrolled in public schools (2,497,000 more children than in public schools in NHES:2007) and 5,309,000 enrolled in private schools (771,000 fewer children than in private schools in NHES:2007). NHES:2007 estimates that there were 1,585,000 children who were homeschooled, whereas the CPS:2005 did not identify homeschoolers. The percentage distributions for grade are nearly identical between NHES:2007 and CPS:2005 because NHES data are adjusted with a raking procedure to match CPS population totals. The standard errors of the estimates by grade are zero. Because the standard error of an estimate is a measure of sampling error variance, a standard error of zero indicates the absence of sampling error variance. When the NHES estimates of totals are adjusted to exactly match CPS totals, all sampling error in those estimated totals is eliminated, under the assumption that the CPS total is the true population value.

Table 9-3. Number of children in kindergarten through grade 12, by school type and by student grade level: PFI-NHES:2007 and CPS:2005

School type and grade	PFI-NHES:2007		CPS:2005	
	Number (thousands)	s.e. (thousands)	Number (thousands)	s.e. (thousands)
Total number of children in kindergarten through 12th grade	53,186	0	53,328	330
School type¹				
Public	45,521	269	48,018	320
Private	6,080	232	5,309	124
Homeschooled	1,585	118	—	—
Student grade level				
K	3,902	0	3,912	107
1	4,135	0	4,146	110
2	3,918	0	3,928	107
3	3,915	0	3,925	107
4	3,850	0	3,860	106
5	4,047	0	4,058	109
6	4,053	0	4,064	109
7	4,143	0	4,154	110
8	4,240	0	4,251	111
9	4,272	0	4,283	112
10	4,365	0	4,376	113
11	4,415	0	4,427	113
12	3,932	0	3,942	107

— Not available.

¹ The Current Population Survey did not identify homeschoolers.

NOTE: s.e. is standard error. Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program, 2007; and U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 2005.

Table 9-4 shows estimates of the number of children enrolled in kindergarten through grade 12 at each grade level in public versus private schools. There are no differences of 5 percentage points or more between PFI-NHES:2007 and CPS:2005 with respect to enrollment in public and private schools across grade levels.

Table 9-4. Number and percentage of children in kindergarten through grade 12 enrolled in public and private schools: PFI-NHES:2007 and CPS:2005

Child's current grade	School type					
	Public			Private		
	Number (thousands)	Percent	Percent s.e.	Number (thousands)	Percent	Percent s.e.
PFI-NHES:2007						
K	3,079	82	2.2	698	18	2.2
1	3,392	86	1.7	565	14	1.7
2	3,329	88	1.7	453	12	1.7
3	3,361	88	1.6	458	12	1.6
4	3,386	90	1.3	359	10	1.3
5	3,503	89	1.7	454	11	1.7
6	3,445	89	2.3	447	11	2.3
7	3,588	89	1.3	435	11	1.3
8	3,657	88	1.5	486	12	1.5
9	3,708	90	1.2	416	10	1.2
10	3,813	89	1.2	450	11	1.2
11	3,806	89	1.8	488	11	1.8
12	3,454	90	1.1	371	10	1.1
CPS:2005						
K	3,349	86	1.0	563	14	1.0
1	3,663	88	0.9	483	12	0.9
2	3,490	89	0.9	438	11	0.9
3	3,555	91	0.8	370	9	0.8
4	3,475	90	0.8	385	10	0.8
5	3,619	89	0.8	439	11	0.8
6	3,651	90	0.8	413	10	0.8
7	3,738	90	0.8	416	10	0.8
8	3,836	90	0.8	415	10	0.8
9	3,906	91	0.7	377	9	0.7
10	4,061	93	0.7	315	7	0.7
11	4,016	91	0.8	411	9	0.8
12	3,659	93	0.7	284	7	0.7

NOTE: s.e. is standard error. For the National Household Education Surveys Program: 2007, kindergarten (K) includes grades reported as kindergarten, transitional kindergarten, and prefirst grade. NHES:2007 estimates excluded children who are homeschooled. The Current Population Survey did not identify homeschooled children. If homeschooled children could have been compared, the estimates would likely have been more similar.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program, 2003; and U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 2005.

Enrollment by household income: SR. Table 9-5 presents SR and CPS estimates of the percentage of children age 3 through 6, not yet enrolled in kindergarten who resided in households with particular income ranges. Across income categories, estimates from both surveys are quite comparable; no differences are greater than 4 percentage points.

Table 9-5. Percentage of children in ages 3 through 6 and not enrolled in school, by household income: SR-NHES:2007 and CPS:2005

Household income	SR-NHES:2007		CPS:2005	
	Percent	s.e.	Percent	s.e.
\$5,000 or less	4	0.7	4	0.4
\$5,001 to \$10,000	4	0.6	6	0.5
\$10,001 to \$15,000	7	0.8	5	0.4
\$15,001 to \$20,000	4	0.6	7	0.5
\$20,001 to \$25,000	8	0.9	6	0.5
\$25,001 to \$30,000	5	0.7	6	0.5
\$30,001 to \$35,000	4	0.6	5	0.5
\$35,001 to \$40,000	6	0.7	9	0.6
\$40,001 to \$50,000	7	0.6	5	0.5
\$50,001 to \$60,000	10	0.8	9	0.6
\$60,001 to \$75,000	12	0.7	11	0.6
Over \$75,000	30	0.8	26	0.9

NOTE: s.e. is standard error. Current Population Survey estimates exclude cases with missing income data. Because of rounding, percentages may not add to 100.

SOURCE: U.S. Department of Education, National Center for Education Statistics, School Readiness Survey of the National Household Education Surveys Program, 2007; and U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 2005.

Enrollment by household income and race/ethnicity: SR. Few differences are observed in table 9-6, which compares SR-NHES:2007 and CPS:2005 estimates of household income by race/ethnicity for children age 3 through 6. For non-Hispanic Whites with a household income from \$30,001 to \$50,000 and \$50,000 or more, the estimates of children not yet in school differed for the two surveys, 21 percent and 60 percent (CPS:2005) versus 16 percent and 66 percent (SR-NHES:2007), respectively.

Table 9-6. Number and percentage of children ages 3 through 6 and not enrolled in school, by household income and race/ethnicity: SR-NHES:2007 and CPS:2005

Race/ethnicity	Number of children (thousands)	Household income							
		Less than \$15,000		\$15,001 to \$30,000		\$30,001 to \$50,000		More than \$50,000	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
SR-NHES:2007									
White, non-Hispanic	4,674	6	0.9	11	1.3	16	1.3	66	1.6
Black, non-Hispanic	1,319	30	4.1	23	4.4	17	2.7	30	3.0
Hispanic	1,919	24	1.8	29	2.7	19	1.8	28	2.1
Other	823	13	3.1	18	4.7	17	3.3	53	3.8
CPS:2005									
White, non-Hispanic	4,882	8	0.7	11	0.8	21	1.1	60	1.3
Black, non-Hispanic	1,323	34	2.5	22	2.2	20	2.1	23	2.2
Hispanic	1,924	20	1.7	32	2.0	22	1.8	26	1.9
Other	629	12	2.5	17	2.8	18	2.9	53	3.8

NOTE: s.e. is standard error. Current Population Survey percentage estimates exclude cases with missing income data. Because of rounding, percentages may not add to 100.

SOURCE: U.S. Department of Education, National Center for Education Statistics, School Readiness Survey of the National Household Education Surveys Program, 2007; and U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 2005.

Enrollment by household income: PFI. Table 9-7 presents PFI-NHES:2007 and CPS:2005 estimates of the percentage of children in kindergarten through grade 12, who resided in households with particular income ranges. Across income categories, estimates from both surveys are quite comparable except for few differences. Compared to CPS:2005 (30 percent), a higher percentage of children came from households earning more than \$75,000 annually in PFI-NHES:2007 (36 percent). The differences might be partially due to the fact that CPS estimates exclude cases with missing income data and income nonresponse tends to be skewed toward the high end of the distribution (Lillard et al. 1986). The patterns of difference are consistent with the results from similar comparisons for previous NHES surveys.

Table 9-7. Percentage of children in kindergarten through grade 12, by household income: PFI-NHES:2007 and CPS:2005

Household income	PFI-NHES:2007		CPS:2005	
	Percent	s.e.	Percent	s.e.
\$5,000 or less	3	0.3	3	0.1
\$5,001 to \$10,000	4	0.3	5	0.2
\$10,001 to \$15,000	5	0.3	4	0.2
\$15,001 to \$20,000	5	0.3	6	0.2
\$20,001 to \$25,000	6	0.3	6	0.2
\$25,001 to \$30,000	4	0.3	6	0.2
\$30,001 to \$35,000	4	0.3	5	0.2
\$35,001 to \$40,000	5	0.2	9	0.2
\$40,001 to \$50,000	8	0.3	4	0.2
\$50,001 to \$60,000	8	0.3	9	0.2
\$60,001 to \$75,000	12	0.4	11	0.3
Over \$75,000	36	0.4	30	0.4

NOTE: s.e. is standard error. Current Population Survey estimates exclude cases with missing income data. Because of rounding, percentages may not add to 100.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program, 2007; and U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 2005.

Enrollment by household income and race/ethnicity: PFI. Table 9-8 presents PFI-NHES:2007 and CPS:2005 estimates of household income by race/ethnicity for children in kindergarten through grade 12. While most estimates were consistent across surveys, there were some differences. For instance, whereas 14 percent of children from non-Hispanic White groups came from households with annual incomes of \$30,001 to \$50,000 in PFI-NHES:2007, this was the case for 19 percent of children from non-Hispanic White groups in CPS:2005. Also, a higher percentage of children from other race/ethnicity groups came from households earning more than \$50,000 in PFI-NHES:2007 than in CPS:2005 (59 percent versus 53 percent), a higher percentage of children from non-Hispanic White groups came from households earning more than \$50,000 in PFI-NHES:2007 than in CPS:2005 (70 percent versus 64 percent), and a lower percentage of children from other race/ethnicity groups came from households earning from \$30,001 to \$50,000 in PFI-NHES:2007 than in CPS:2005 (15 percent versus 20 percent). These results might be due in part to the fact that CPS estimates exclude cases with missing income data.

Table 9-8. Number and percentage of children in kindergarten through grade 12, by household income and race/ethnicity: PFI-NHES:2007 and CPS:2005

Race/ethnicity	Number of children (thousands)	Household income							
		Less than \$15,000		\$15,001 to \$30,000		\$30,001 to \$50,000		More than \$50,000	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
PFI-NHES:2007									
White, non-Hispanic	31,045	6	0.3	9	0.4	14	0.5	70	0.6
Black, non-Hispanic	7,898	29	1.3	23	1.4	18	1.0	30	1.3
Hispanic	9,929	18	1.0	27	1.3	22	1.2	32	1.4
Other	4,315	12	2.2	14	1.5	15	1.8	59	2.5
CPS:2005									
White, non-Hispanic	31,689	6	0.3	10	0.3	19	0.4	64	0.5
Black, non-Hispanic	7,919	31	1.0	23	0.9	20	0.9	26	0.9
Hispanic	9,955	20	0.7	27	0.8	24	0.8	29	0.8
Other	3,765	11	1.0	15	1.1	20	1.3	53	1.6

NOTE: s.e. is standard error. Current Population Survey percentage estimates exclude cases with missing income data. Because of rounding, percentages may not add to 100.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program, 2003; and U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 2005.

Public and private school enrollment by race/ethnicity. Estimates from PFI-NHES:2007 and CPS:2005 of the number and percent of children in kindergarten through grade 12 enrolled in public and private schools by race/ethnicity are presented in table 9-9. Estimates were comparable. No differences are greater than 2 percentage points.

Table 9-9. Number and percentage of children enrolled in kindergarten through grade 12 in public and private schools, by race/ethnicity: PFI-NHES:2007 and CPS:2005

Race/ethnicity	PFI-NHES:2007					CPS:2005				
	Number of children (thousands)	Public		Private		Number of children (thousands)	Public		Private	
		Percent	s.e.	Percent	s.e.		Percent	s.e.	Percent	s.e.
White, non-Hispanic	31,045	85	0.6	15	0.6	31,689	87	0.3	13	0.3
Black, non-Hispanic	7,898	92	1.3	8	1.3	7,919	94	0.5	6	0.5
Hispanic	9,929	93	0.6	7	0.6	9,955	95	0.4	5	0.4
Other	4,315	90	1.1	10	1.1	3,765	91	0.8	9	0.8

NOTE: s.e. is standard error. Percentages include only those students for whom public/private enrollment was reported, that is, children whose parents indicated they were enrolled in school.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program, 2007; and U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 2005.

Adult population, by sex and age. Table 9-10 shows estimates of the adult population by sex and age. As discussed in chapter 7, the adult education weights were raked to control totals of age by sex from the CPS. Therefore, estimates from the two surveys are expected to be comparable. The age estimates for both males and females from AEWR-NHES:2007 and CPS:2006 are consistent.

Table 9-10. Percentage distribution of the adult population, by sex and age: AEW-NHES:2007 and CPS:2006

Age	AEWR-NHES:2007				CPS:2006			
	Male		Female		Male		Female	
	Estimate	s.e.	Estimate	s.e.	Estimate	s.e.	Estimate	s.e.
Total number of adults ¹ (thousands)	103,833	327	112,994	327	104,359	345	112,468	335
16 to 24 years	6	0.6	6	0.5	6	0.1	6	0.1
25 to 34 years	8	0.7	8	0.6	9	0.1	9	0.1
35 to 44 years	9	0.6	10	0.6	10	0.1	10	0.1
45 to 54 years	10	0.6	10	0.6	10	0.1	10	0.1
55 years and older	14	0.3	17	0.2	14	0.1	17	0.1

[†] Not applicable.

¹Includes civilian, noninstitutionalized adults, age 16 or older, not enrolled in elementary or secondary school, and not on active duty in the U.S. Armed Forces at the time of the interview.

NOTE: The percentages provided in this table are cell percentages. That is, for each data set, these percentages sum to 100 across all age-sex cells. Due to rounding, the percentages shown here may not sum to 100.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the National Household Education Surveys Program, 2007. U.S. Department of Commerce, Bureau of the Census, Current Population Survey, March 2006.

Adult population by highest educational attainment and race/ethnicity. Race/ethnicity was also used in raking the adult education weights. Since CPS:2006 is the source of the control totals for raking NHES:2007, estimates of number of adults in each race/ethnicity group are expected to be comparable. The estimates of totals for the non-Hispanic White and other race/ethnicity groups shown in table 9-11 are not identical, however, because the NHES:2007 data were raked to a three-category race/ethnicity variable (Black, non-Hispanic; Hispanic; and White, non-Hispanic or others), whereas a four-category race/ethnicity variable is used in the comparison.

As depicted in table 9-11, AEW-NHES:2007 and CPS:2006 estimates of educational attainment by race/ethnicity are quite comparable in most cases. Although some differences of 5 percentage points or more were observed, none of them are statistically significant.

Table 9-11. Percentage distribution of the adult population, by highest educational attainment and race/ethnicity: AEW-NHES:2007 and CPS:2006

Race/ethnicity	Number of adults (thousands)	Highest educational attainment							
		Less than high school		High school diploma		Associate's or some college		Bachelor's or higher	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
AEWR-NHES:2007									
Total adults ¹	216,827	14	0.1	31	0.8	27	0.8	28	0.4
White, non-Hispanic	149,540	10	0.6	31	0.9	27	1.0	32	0.6
Black, non-Hispanic	24,322	22	3.5	32	3.0	30	2.8	16	2.0
Hispanic	27,980	34	3.3	35	4.2	20	2.9	10	1.4
All other races	14,985	13	3.5	20	3.3	30	3.1	37	3.3
CPS:2006									
Total adults (thousands)	216,827	15	0.1	32	0.2	28	0.2	26	0.2
White, non-Hispanic	151,076	10	0.1	32	0.2	29	0.2	29	0.2
Black, non-Hispanic	24,322	19	0.4	36	0.5	28	0.5	17	0.4
Hispanic	27,980	40	0.5	29	0.5	20	0.4	11	0.3
All other races	13,449	13	0.5	24	0.6	25	0.6	38	0.7

† Not applicable.

¹ Includes civilian, noninstitutionalized adults, age 16 or older, not enrolled in elementary or secondary school, and not on active duty in the U.S. Armed Forces at the time of the interview.

NOTE: Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the National Household Education Surveys Program, 2007. U.S. Department of Commerce, Bureau of the Census, Current Population Survey, March 2006.

9.4 SR Survey Comparisons

Data comparisons in this section cover some of the major topical areas addressed in SR-NHES:2007. The 2007 estimates were compared to previous NHES cycles, which contained the same or comparable items, as described below.

9.4.1 The 1993, 1995, 1996, 1999, 2001, and 2005 National Household Education Surveys

Information on early childhood characteristics was collected in NHES:1993, NHES:1995, NHES:1996, NHES:1999, NHES:2001, and NHES:2005. Data from these previous NHES administrations were used in comparisons of SR-NHES:2007 survey estimates concerning participation in child care arrangements and programs, participation in literacy-related activities with family members,

disabling conditions, and parent and household characteristics. The School Readiness Survey of NHES, 1993 (SR-NHES:1993) included 10,888 children age 3 to 7 years in grade 2 or below. ECPP-NHES:1995 contained 14,064 children age 10 and younger who were enrolled in grade 3 or below. PFI/CI-NHES:1996 contained 20,792 children ages 3 through 20 years enrolled in grade 12 or below. Parent-NHES:1999 included 24,600 children birth through 20 years of age who were either being homeschooled or in grade 12 or below. ECPP-NHES:2001 contained 6,749 children age 0 to 6 years enrolled in preschool or not enrolled in school. ECPP-NHES:2005 included 7,209 children age 0 to 6 years not yet enrolled in kindergarten.

Participation in center-based care arrangements by race/ethnicity. Table 9-12 presents SR-NHES:2007, ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, and ECPP-NHES:1995 estimates of participation in center-based care arrangements by the race/ethnicity for children ages 3 through 5 who are not yet in kindergarten. Across race/ethnicity categories, estimates from all survey are quite comparable in most cases. One difference was observed when comparing NHES:2007 to NHES:1995. For non-Hispanic Whites, the estimate of participation in center-based arrangements increased from 58 percent (in 1995) to 65 percent (in 2007).

Table 9-12. Percentage of children ages 3 through 5 not yet in kindergarten participating in center-based arrangements, by race/ethnicity: SR-NHES:2007, ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, and ECPP-NHES:1995

Child's race/ethnicity	Number of children (thousands)	Percent	s.e.
SR-NHES:2007			
White, non-Hispanic	4,657	65	1.4
Black, non-Hispanic	1,311	67	5.5
Hispanic	1,899	41	2.4
Other	819	62	4.9
ECPP-NHES:2005			
White, non-Hispanic	5,177	63	1.1
Black, non-Hispanic	1,233	69	3.1
Hispanic	1,822	47	2.1
Other	834	64	3.4
ECPP-NHES:2001			
White, non-Hispanic	5,313	62	0.9
Black, non-Hispanic	1,251	67	2.8
Hispanic	1,506	42	1.9
Other	482	64	4.2
Parent-NHES:1999			
White, non-Hispanic	5,389	61	0.9
Black, non-Hispanic	1,214	71	2.4
Hispanic	1,376	44	2.2
Other	547	65	4.1
ECPP-NHES:1995			
White, non-Hispanic	6,334	58	1.5
Black, non-Hispanic	1,396	61	3.5
Hispanic	1,042	39	2.3
Other	457	54	5.4

NOTE: s.e. is standard error. Center-based programs include nursery schools, preschools, center-based Head Start programs, and prekindergartens

SOURCE: U.S. Department of Education, National Center for Education Statistics, School Readiness (SR) Survey of the National Household Education Surveys Program (NHES), 2007; ECPP-NHES:2005; ECPP-NHES:2001; Parent-NHES:1999; and ECPP-NHES:1995.

Participation in center-based programs by income. Table 9-13 presents SR-NHES:2007, ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, PFI/CI-NHES:1996, ECPP-NHES:1995, and SR-NHES:1993 estimates of center-based program participation rates by high and low household income for children ages 3 through 5 who are not yet in kindergarten. For children in high-income households, the center-based participation estimates gradually declined from 75 percent in 1993 to 67 percent in 2005. The participation estimates increased from 67 percent in 2005 to 70 percent in 2007, but the increase is not statistically significant. For children in low-income households, the center-based participation estimates have fluctuated from 43 percent in 1996, to 56 percent in 1999, to 46 percent in 2001, to 53 percent in 2005, to 43 percent in 2007. In 2004, there was an increase in the monies earmarked for Head Start in Federal fiscal year 2004 that may account for a larger percentage of children of low-income families reporting participation in center-based care (for further information, see <http://www2.acf.dhhs.gov/programs/hsb>). However, there was a decline from 2005 to 2007 in the NHES estimate. Readers should note that the estimates from most years are in the range of 43 to 49 percent, and only NHES:1999 and NHES:2005 had estimates in the fifties.

Table 9-13. Percentage of children ages 3 through 5 not yet in kindergarten participating in center-based programs, by high and low income: SR-NHES:2007, ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, PFI/CI-NHES:1996, ECPP-NHES:1995, and SR-NHES:1993

Income level	SR-NHES:2007		ECPP-NHES:2005		ECPP-NHES:2001		Parent-NHES:1999		PFI/CI-NHES:1996		ECPP-NHES:1995		SR-NHES:1993	
	Per-cent	s.e.	Per-cent	s.e.	Per-cent	s.e.	Per-cent	s.e.	Per-cent	s.e.	Per-cent	s.e.	Per-cent	s.e.
High income	70	1.6	67	1.2	69	1.3	71	1.4	72	1.6	76	1.8	75	1.4
Low income	43	6.3	53	4.5	46	3.8	56	3.2	43	2.9	49	3.2	47	2.0

NOTE: s.e. is standard error. Center-based programs include nursery schools, preschools, center-based Head Start programs, and prekindergartens. High income was defined as household income of over \$50,000. Low income was defined as household income of \$10,000 or less.

SOURCE: U.S. Department of Education, National Center for Education Statistics, School Readiness (SR) Survey of the National Household Education Surveys Program (NHES), 2007; ECPP-NHES:2005; ECPP-NHES:2001; Parent Survey of NHES, 1999; Parent and Family Involvement in Education/Civic Involvement Survey (PFI/CI) of NHES, 1996; ECPP-NHES:1995; and School Readiness Survey (SR) of NHES, 1993.

Family structure, parents' highest level of education, and household urbanicity.

Estimates of the percentage of children age 3 through 5, not yet in kindergarten, by family structure, parents' highest education, and by household urbanicity for SR-NHES:2007, ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, and ECPP-NHES:1995 are presented in table 9-14. Estimates for SR-

NHES:2007 and ECPP-NHES:2005 were comparable in most cases. The estimate of percentage of children who had parents with a high school graduate education decreased from 27 percent in 2005 to 21 percent in 2007. The result shows that the parents' highest education slightly shifted upward between 2005 and 2007. A higher estimated percentage of children who live in households with both parents is observed in SR-NHES: 2007 (79 percent), compared to ECPP-NHES:1999 (75 percent), Parent-NHES:1999 (71 percent), and ECPP-NHES: 1995 (73 percent). The estimate of percentage of children who live in households with mother only declined from 24 percent in 1995 and 1999 to 17 percent in 2007. A larger proportion of preschoolers live in urban areas (80 percent) in 2007, compared to earlier survey years (77 percent in 2005, 74 percent in 2001, 75 percent in 1999, and 74 percent in 1995).

Table 9-14. Percentage of children ages 3 through 5 not yet in kindergarten, by family structure, parents' highest level of education, and urbanicity of ZIP Code area: SR-NHES:2007; ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, and ECPP-NHES:1995

Family and community characteristics	SR-NHES:2007		ECPP-NHES:2005		ECPP-NHES:2001		Parent-NHES:1999		ECPP-NHES:1995	
	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Family structure										
Mother and father	79	1.0	77	0.8	75	0.9	71	0.9	73	0.7
Mother	17	0.9	19	0.8	21	0.8	24	0.9	24	0.7
Father	1	0.3	2	0.3	2	0.3	3	0.3	2	0.2
Nonparent guardian(s)	3	0.5	2	0.3	2	0.3	2	0.3	2	0.3
Parents' highest education										
Less than high school	7	0.8	7	0.6	9	0.6	8	0.5	8	0.5
High school graduate	21	1.2	27	1.1	28	1.0	27	0.9	31	0.8
Some college	29	1.2	27	1.0	29	0.9	30	0.9	29	0.8
College graduate	22	1.0	21	0.9	19	0.8	19	0.7	17	0.7
Graduate school	21	1.0	18	0.8	15	0.7	15	0.7	14	0.7
Household urbanicity										
Urban	80	0.4	77	0.6	74	0.8	75	0.8	74	0.7
Rural	20	0.4	23	0.6	26	0.8	25	0.8	26	0.7

NOTE: s.e. is standard error. Mother and father refer to birth, adoptive, step, or foster parents. Detail may not sum to totals because of rounding. Parents' highest level of education for SR-NHES:2007 was derived by taking into account the education level of second mothers/female guardians and second fathers/male guardians whereas parents' highest level of education for prior years was derived by taking into account only the education level of primary mothers/female guardians and primary fathers/male guardians.

SOURCE: U.S. Department of Education, National Center for Education Statistics, School Readiness (SR) Survey of the National Household Education Surveys Program (NHES), 2007; ECPP-NHES:2005; ECPP-NHES:2001; Parent Survey of NHES, 1999; and ECPP-NHES:1995.

Parents' highest level of education by race/ethnicity of child. Table 9-15 presents estimates of the percentage of children ages 3 to 5, not yet in kindergarten by parents' highest level of education and race/ethnicity for SR-NHES:2007, ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, and ECPP-NHES:1995. For non-Hispanic Whites, the percentage in the "high school" category declined from 21 percent in 2005 to 15 percent in 2007. For non-Hispanic Blacks, the percentage in the "high school" category decreased from 42 percent in 2005 to 29 percent in 2007, and the percentage in the "Graduate school" category increased from 5 percent in 2005 to 14 percent in 2007. Since 2001, the percentage in the "college graduate" category increased from 23 percent to 30 percent for non-Hispanic White, and the percentage in the "graduate school" category increased from 18 percent to 26 percent. For non-Hispanic Black, the increase in the percentage in the "graduate school" category (7 percent in 2001 vs. 14 percent in 2007) is statistically significant. There is evidence of steady increases in the college enrollment of non-Hispanic Black and White Americans and less gains in college enrollment of Hispanics over the past 30 years; however, between 1998 and 2003, NCES reported a plateau in these enrollment figures. See <http://nces.ed.gov/programs/coe/2007/section3/indicator25.asp>. For additional evidence of higher college enrollment rates for high school graduates, see <http://www.bls.gov/news.release/hsgec.nr0.htm>.

Table 9-15. Number and percentage of children ages 3 through 5 not yet in kindergarten, by parents' highest level of education and race/ethnicity: SR-NHES:2007, ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, and ECPP-NHES:1995

Race/ethnicity	Number of children (thousands)	Parents' highest level of education									
		Less than high school		High school		Some college		College graduate		Graduate school	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
SR-NHES:2007											
White, non-Hispanic	4,657	2	0.5	15	1.4	28	1.6	30	1.5	26	1.3
Black, non-Hispanic	1,311	9	3.4	29	4.9	38	4.4	11	1.7	14	2.9
Hispanic	1,899	18	2.1	33	2.0	29	2.5	11	1.5	9	1.5
Other	819	6	2.8	16	3.5	19	3.3	22	4.3	37	4.7
ECPP-NHES:2005											
White, non-Hispanic	5,177	2	0.5	21	1.3	27	1.3	27	1.3	23	1.2
Black, non-Hispanic	1,233	7	1.6	42	3.6	33	3.9	12	2.4	5	1.1
Hispanic	1,822	21	1.9	35	2.4	25	1.9	11	1.4	8	1.0
Other	834	4	2.8	19	3.0	28	3.4	20	2.6	28	3.6
ECPP-NHES:2001											
White, non-Hispanic	5,313	4	0.6	26	1.3	30	1.2	23	1.2	18	1.0
Black, non-Hispanic	1,251	17	2.1	32	3.0	32	2.2	12	1.7	7	1.1
Hispanic	1,506	24	1.8	36	2.2	23	1.7	10	1.1	6	0.9
Other	482	6	2.1	24	4.0	19	2.8	18	3.2	32	4.3
Parent-NHES:1999											
White, non-Hispanic	5,389	2	0.5	24	1.1	31	1.3	24	1.0	19	0.9
Black, non-Hispanic	1,214	12	1.6	37	2.6	32	2.2	11	1.5	8	1.4
Hispanic	1,376	27	1.9	31	1.8	28	1.7	9	1.1	5	0.8
Other	547	6	2.0	24	3.5	30	3.2	20	3.0	20	3.0

See notes at end of table.

Table 9-15. Number and percentage of children ages 3 through 5 not yet in kindergarten, by parents' highest level of education and race/ethnicity: SR-NHES:2007, ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, and ECPP-NHES:1995—Continued

Race/ethnicity	Number of children (thousands)	Parents' highest level of education									
		Less than high school		High school		Some college		College graduate		Graduate school	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
ECPP-NHES:1995											
White, non-Hispanic	6,334	4	0.5	29	1.1	29	1.0	21	0.9	18	1.0
Black, non-Hispanic	1,396	16	2.0	39	2.6	32	2.5	8	1.5	5	1.3
Hispanic	1,042	27	2.0	37	1.6	24	1.7	6	0.9	6	1.1
Other	457	4!	1.9!	26	4.2	32	4.4	19	3.5	19	3.1

NOTE: s.e. is standard error. Detail may not sum to totals because of rounding. Parents' highest level of education for SR-NHES:2007 was derived by taking into account the education level of second mothers/female guardians and second fathers/male guardians whereas parents' highest level of education for prior years was derived by taking into account only the education level of primary mothers/female guardians and primary fathers/male guardians.

SOURCE: U.S. Department of Education, National Center for Education Statistics, School Readiness (SR) Survey of the National Household Education Surveys Program (NHES), 2007; ECPP-NHES:2005; ECPP-NHES:2001; Parent Survey of NHES, 1999; and ECPP-NHES:1995.

Literacy-related activities with family members. Table 9-16 presents results from SR-NHES:2007, ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, PFI/CI-NHES:1996, ECPP-NHES:1995, and SR-NHES:1993 with respect to parent reports of reading to their 3- to 5-year-old children. The estimate of the percentage of children ages 3 through 5 whose parents reported reading to them three time a week or more was higher in 2007 (83 percent) than in 1993 (78 percent).

Table 9-16. Percentage of children ages 3 through 5 not yet in kindergarten whose parents reported reading to them three times a week or more: SR-NHES:2007, ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, PFI/CI-NHES:1996, ECPP-NHES:1995, and SR-NHES:1993

Survey	Percent	s.e.
SR-NHES:2007	83	1.1
ECPP-NHES:2005	86	0.7
ECPP-NHES:2001	84	0.8
Parent-NHES:1999	82	0.7
PFI/CI-NHES:1996	83	0.9
ECPP-NHES:1995	84	0.6
SR-NHES:1993	78	0.6

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, School Readiness (SR) Survey of the National Household Education Surveys Program (NHES), 2007; ECPP-NHES:2005; ECPP-NHES:2001; Parent Survey of NHES, 1999; Parent and Family Involvement in Education/Civic Involvement (PFI/CI) Survey of NHES, 1996; ECPP-NHES:1995; and School Readiness (SR) Survey of NHES, 1993.

Specific disabilities. Table 9-17 presents comparative estimates for SR-NHES:2007, ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, and PFI/CI-NHES:1996 related to the percentage of children with specific disabilities. The percentage of children ages 3 through 5 with speech impairments and with any disability increased significantly since 2001 (6 percent and 13 percent in 2001 vs. 12 percent and 18 percent in 2007). The percentages of children with learning disability increased from 1 percent in 2001 to 4 percent in 2007. Because of the small number of children with specific disabilities, those with differences of 2 percentage points or more are also noted. The number and prevalence of children with disabilities has increased in recent years (U.S. Department of Education 2005). This increase has been associated with a number of societal factors, including higher survivorship of very low birth weight infants, a higher incidence of multiple births, higher maternal age, and earlier identification of children with disabilities through increased service provision (Mathews, Menacker, and MacDorman 2003; Hogan and Park 2000).

As noted in the discussion of table 9-13, in 2004, there was an increase in the monies earmarked for Head Start (including health care services) for children in low-income families. Although we have not found any extant reports to support this, it is plausible that this additional funding has resulted in an increase in the detection of speech impairments.

Table 9-17. Percentage of children ages 3 through 5 not yet in kindergarten with specific disabilities: SR-NHES:2007, ECPP-NHES:2005, ECPP-NHES:2001, Parent-NHES:1999, and PFI/CI-NHES:1996

Disability	SR-NHES:2007		ECPP-NHES:2005		ECPP-NHES:2001		Parent-NHES:1999		PFI/CI-NHES:1996	
	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Learning disability	4	0.6	2	0.3	1	0.2	2	0.3	2	0.4
Mental retardation	#	†	#	†	#	†	#	†	#	†
Speech impairment	12	0.8	10	0.6	6	0.5	7	0.5	7	0.6
Serious emotional disturbance	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
Deafness or another hearing impairment	2	0.3	1	0.2	1	0.3	1	0.2	1	0.2
Blindness or another visual impairment	1	0.4	1	0.3	2	0.3	2	0.3	1	0.2
An orthopedic impairment	2	0.4	1	0.3	1	0.2	1	0.2	2	0.3
Another health impairment lasting 6 months or more	6	0.6	3	0.4	5	0.5	5	0.4	6	0.5
Percent with any disability	18	1.0	15	0.8	13	0.8	14	0.8	15	0.6

Rounds to zero.

† Standard errors are not provided for estimates of less than 1 percent.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, School Readiness (SR) Survey of National Household Education Surveys Program (NHES), 2007; ECPP-NHES:2005; ECPP-NHES:2001; Parent Survey of NHES, 1999; and Parent and Family Involvement/Civic Involvement (PFI/CI) Survey of NHES, 1996.

9.5 PFI Survey Comparisons

The data comparisons for the PFI interview include topics such as participation in literacy-related activities with family members, school size, contacts from the school, parent involvement with the school, disabling conditions, and parent and household characteristics .

The data sources used for comparisons to the PFI-NHES:2007 estimates include PFI-NHES:2003, Parent-NHES:1999, PFI/CI-NHES:1996, ECPP-NHES:1995 and SR-NHES:1993. Estimates from the 1993, 1995, 1996, 1999, and 2003 National Household Education Surveys can provide especially meaningful comparisons with PFI-NHES:2007 data. SR-NHES:1993 included 10,888 children age 3 to 7 years or in grade 2 or below. ECPP-NHES:1995 included 14,064 children age 10 and younger

who were enrolled in grade 3 or below. PFI/CI-NHES:1996 included 20,792 children age 3 through 20 years enrolled in grade 12 or below. Parent-NHES:1999 included 24,600 children birth through 20 years of age who were either being homeschooled or in grade 12 or below. PFI-NHES:2003 contained 12,426 children age 3 to 20 who were either being homeschooled or enrolled in kindergarten through grade 12.

Reading activities with family members. Table 9-18 presents results from PFI-NHES:2007, PFI-NHES:2003, Parent-NHES:1999, PFI/CI-NHES:1996, ECPP-NHES:1995, and SR-NHES:1993 with respect to parent reports of reading to their children in kindergarten through grade 2. The estimate of NHES:2007 (69 percent) was significantly different with the estimates of 1999 and 1995 (78 percent and 78 percent, respectively). However, the estimates both decreased and increased across years. For example, comparing 2007 to the most recent comparison year of 2003, there was a 4 percentage point decrease in the percentage of children whose parents reported reading to them three or more times a week in 2007 (69 percent) compared with 2003 (73 percent). A 5 percentage point decrease is evident in comparing 2003 (73 percent) to 1999 (78 percent). However, comparing 2007 to the earliest comparison year of 1993, there was a 3 percentage point increase in the percentage of children whose parents reported reading to them three or more times a week in 2007 (69 percent) compared with 1993 (66 percent). Although the percentages vary from year to year in amounts sometimes greater than 5 percentage points, the NHES:2007 estimate falls within the range of estimates (66 to 78 percent) achieved in previous years. The decrease in the percentages since 1999 may be a reflection that parents are focusing their reading on children when they are younger, and there is decreased need for parents to read to older children because they are likely to be able to read.

Table 9-18. Percentage of children in kindergarten through grade 2 whose parents reported reading to them three or more times per week: PFI-NHES:2007, PFI-NHES:2003, Parent-NHES:1999, PFI/CI-NHES:1996, ECPP-NHES:1995, and SR-NHES:1993

Survey	Percent	s.e.
PFI-NHES:2007	69	1.6
PFI-NHES:2003	73	1.0
Parent-NHES:1999	78	0.9
PFI/CI-NHES:1996	70	0.9
ECPP-NHES:1995	78	0.7
SR-NHES:1993	66	0.7

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2007; Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2003; Parent Survey of NHES, 1999; Parent and Family Involvement in Education/Civic Involvement Survey of NHES, 1996; Early Childhood Program Participation Survey of NHES, 1995; and School Readiness Survey of NHES, 1993.

School size. Comparisons of PFI-NHES:2007, PFI-NHES:2003, Parent-NHES:1999, and PFI/CI-NHES:1996 estimates concerning school size are presented in table 9-19. The estimate of percentage of children in schools with 300-599 students declined from 37 percent in 2003 to 31 percent in 2007, whereas the estimate of percentage of children in schools with 600-999 students increased by 5 percentage points (22 percent in 2003 versus 27 percent in 2007).

Table 9-19. Percentage of children in kindergarten through grade 12, by school size: PFI-NHES:2007, PFI-NHES:2003, Parent-NHES:1999, and PFI/CI-NHES:1996

School size	PFI-NHES:2007		PFI-NHES:2003		Parent-NHES:1999		PFI/CI-NHES:1996	
	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Under 300	15	0.6	18	0.5	17	0.4	18	0.3
300-599	31	0.7	37	0.6	38	0.5	39	0.5
600-999	27	0.6	22	0.5	22	0.4	22	0.4
1,000 or more	27	0.5	23	0.5	23	0.4	22	0.4

NOTE: s.e. is standard error. Students who are homeschooled are not represented. Because of rounding, percentages may not add to 100. The estimates of PFI-NHES:2007 were based on the school size information on the CCD/PSS data files and excluded cases with missing school size. The estimates of previous NHES surveys were based on the school size reported by parents.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2007; Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2003; Parent Survey of the NHES, 1999; and Parent and Family Involvement/Civic Involvement Survey of the NHES, 1996.

Family structure, parents' highest level of education, and household urbanicity. Table 9-20 presents estimates of the percentage of children in kindergarten through grade 12 by family structure, by parents' highest level of education, and by household urbanicity for PFI-NHES:2007, PFI-NHES:2003, Parent-NHES:1999, PFI/CI-NHES:1996, and CPS:2005-2006. The NHES estimates are comparable between 2007 and 2003, with most differences being between 1 and 4 percentage points. The PFI-NHES:2007 estimates were comparable to CPS:2005-2006, with only two differences of 5 percentage points or more. The estimate for the percentage of children who had both mother and father in the households was 5 percentage points higher in PFI-NHES:2007 (73 percent) compared to CPS:2006 (68 percent). The estimate for the percentage of children who had parent with a graduate school education was 8 percentage points higher in PFI-NHES:2007 (21 percent) compared to CPS:2005 (13 percent). The reason for this difference is unclear but consistent with the differences that were observed between the CPS data and the previous NHES surveys.

Table 9-20. Percentage of children in kindergarten through grade 12, by family structure, parents' highest level of education, and urbanicity: PFI-NHES:2007, PFI-NHES:2003, Parent-NHES:1999, PFI/CI-NHES:1996, and CPS: 2005-2006

Family and community characteristics	PFI-NHES:2007		PFI-NHES:2003		Parent-NHES:1999		PFI/CI-NHES:1996		CPS:2005-2006	
	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Family structure										
Mother and father	73	0.5	71	0.6	66	0.4	69	0.4	68	0.4
Mother	20	0.5	22	0.6	27	0.4	24	0.4	24	0.3
Father	3	0.2	4	0.3	4	0.2	3	0.2	5	0.2
Nonparent guardian(s)	4	0.4	3	0.2	3	0.2	3	0.2	4	0.1
Parents' highest education										
Less than high school	7	0.4	7	0.4	9	0.3	10	0.3	9	0.2
High school graduate	21	0.6	25	0.6	28	0.4	31	0.4	24	0.3
Some college	29	0.6	31	0.6	30	0.4	30	0.5	33	0.4
College graduate	22	0.5	19	0.5	16	0.3	15	0.4	21	0.3
Graduate school	21	0.5	17	0.5	17	0.4	14	0.4	13	0.2
Household urbanicity										
Urban	79	0.0	79	0.0	74	0.2	—	—	—	—
Rural	21	0.0	21	0.0	26	0.2	—	—	—	—

—Not available.

NOTE: s.e. is standard error. Mother and father refer to birth, adoptive, step, or foster parents. Because of rounding, percentages may not add to 100. Parents' highest level of education for PFI-NHES:2007 was derived by taking into account the education level of second mothers/female guardians and second fathers/male guardians whereas parents' highest level of education for prior years was derived by taking into account only the education level of primary mothers/female guardians and primary fathers/male guardians. Current Population Survey percentage estimates by family structure are for children ages 5 through 17, excluding emancipated minors, from CPS March 2006. Current Population Survey percentage estimates by parents' highest education are approximated by highest education attainment within households, from CPS October 2005.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2007; Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2003; Parent Survey of the NHES, 1999; and Parent and Family Involvement/Civic Involvement Survey of the NHES, 1996. U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program, 2003; and U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 2005 and March 2006.

Parents' highest level of education by race/ethnicity of child. Table 9-21 presents estimates of the percentage of children in kindergarten through grade 12 by parents' highest level of education and race/ethnicity. The pattern of differences detected for level of education by race/ethnicity reflects the pattern of differences detected in the total population for all race/ethnicity groups. One difference of 5 percentage points or more was detected between PFI-NHES:2007 and PFI-NHES:2003. For non-Hispanic White children, the estimate of parents whose highest level of education was graduate school showed a 5 percentage point increase for PFI-NHES:2007 (26 percent) compared to PFI-NHES:2003 (21 percent).

For non-Hispanic Black children, estimates for parents whose highest level of education was high school showed a 10 percentage point decrease for PFI-NHES:2007 (30 percent) compared to Parent-NHES:1999 (40 percent) and an 11 percentage point decrease compared to PFI/CI-NHES:1996 (41 percent). Also, for non-Hispanic Black children, estimates for parents whose highest level of education was college graduate showed a 5 percentage point increase for PFI-NHES:2007 (15 percent) compared to Parent-NHES:1999 (10 percent) and a 6 percentage point increase compared to PFI/CI-NHES:1996 (9 percent). The percentage of non-Hispanic Black children whose parents have a highest education level of graduate school also increased by 6 percentage points in PFI-NHES:2007 (11 percent) compared to PFI/CI-NHES:1996 (5 percent).

For Hispanics, estimates for parents whose highest level of education was less than high school showed a 12 percentage point decrease for PFI-NHES:2007 (19 percent) compared to Parent-NHES:1999 (31 percent) and a 13 percentage point decrease compared to PFI/CI-NHES:1996 (32 percent). For Hispanics, estimates for parents whose highest level of education was some college showed a 7 percentage point increase for PFI-NHES:2007 (29 percent) compared to PFI/CI-NHES:1996 (22 percent). The percentage of Hispanic children whose parents have a highest education level of college graduate increased by 6 percentage points in PFI-NHES:2007 (13 percent) compared to PFI/CI-NHES:1996 (7 percent).

For children in the other race/ethnicity groups, estimates for parents whose highest level of education was high school showed a 9 percentage point decrease for PFI-NHES:2007 (15 percent) compared to Parent-NHES:1999 (24 percent) and a 10 percentage point decrease compared to PFI/CI-NHES:1996 (25 percent). Estimates for parents whose highest level of education was graduate school increased by 6 percentage points in PFI-NHES:2007 (29 percent) compared to PFI/CI-NHES:1999 (23 percent) and by 10 percentage points compared to PFI/CI-NHES:1996 (19 percent). There were no

obvious sampling or nonsampling errors that would explain the differences; thus, the differences may be due to changes over time in education level by race/ethnicity.

Table 9-21. Number and percentage of students in kindergarten through grade 12, by parents' highest level of education and race/ethnicity: PFI-NHES:2007, PFI-NHES:2003, Parent-NHES:1999, and PFI/CI-NHES:1996

Race/ethnicity	Number of children (thousands)	Parents' highest level of education									
		Less than high school		High school		Some college		College graduate		Graduate school	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
PFI-NHES:2007											
White, non-Hispanic	31,045	2	0.3	17	0.7	28	0.8	27	0.7	26	0.6
Black, non-Hispanic	7,898	11	1.6	30	2.0	33	2.2	15	1.5	11	1.0
Hispanic	9,929	19	1.4	29	1.6	29	1.5	13	1.2	10	0.7
Other	4,315	4	1.1	15	2.2	30	2.2	23	1.7	29	1.9
PFI-NHES:2003											
White, non-Hispanic	32,844	3	0.4	21	0.8	32	0.8	23	0.7	21	0.7
Black, non-Hispanic	8,274	11	1.4	33	1.6	35	1.6	12	1.0	10	1.1
Hispanic	8,322	22	1.1	32	1.3	28	1.3	10	0.9	8	0.8
Other	3,143	2	0.8	21	2.7	28	2.7	22	2.0	27	2.6
Parent-NHES:1999											
White, non-Hispanic	33,512	3	0.2	25	0.6	32	0.6	19	0.5	20	0.5
Black, non-Hispanic	8,343	13	1.1	40	1.3	29	1.2	10	0.7	9	0.6
Hispanic	7,322	31	1.3	28	1.0	25	0.9	9	0.6	7	0.5
Other	2,719	7	1.2	24	1.8	26	2.2	20	1.7	23	2.1
PFI/CI-NHES:1996											
White, non-Hispanic	33,730	5	0.3	28	0.6	32	0.5	18	0.5	17	0.4
Black, non-Hispanic	7,865	15	0.9	41	1.5	30	1.2	9	0.6	5	0.5
Hispanic	6,424	32	1.2	32	1.2	22	1.2	7	0.8	7	0.7
Other	2,108	6	1.0	25	1.8	31	2.1	20	1.8	19	1.6

NOTE: s.e. is standard error. Because of rounding, percentages may not add to 100. Parents' highest level of education for PFI-NHES:2007 was derived by taking into account the education level of second mothers/female guardians and second fathers/male guardians whereas parents' highest level of education for prior years was derived by taking into account only the education level of primary mothers/female guardians and primary fathers/male guardians.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2007; Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2003; Parent Survey of NHES, 1999; and Parent and Family Involvement/Civic Involvement Survey of NHES, 1996.

Selected school contacts with family. Table 9-22 shows the percentage of students enrolled in kindergarten through grade 12 whose parents reported that they were contacted by their children’s schools about their children’s academic performance or behavior for PFI-NHES:2007, PFI-NHES:2003, Parent-NHES:1999, and PFI/CI-NHES:1996. Observed differences are not statistically significant.

Table 9-22. Percentage of students enrolled in kindergarten through grade 12 whose parents reported selected school contacts with family: PFI-NHES:2007, PFI-NHES:2003, Parent-NHES:1999, and PFI/CI-NHES:1996

School effort to contact family	PFI-NHES:2007		PFI-NHES:2003		Parent-NHES:1999		PFI/CI-NHES:1996	
	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
School contacted parents about student’s academic performance	23	0.6	26	0.5	19	0.3	27	0.4
School contacted parents about student’s behavior	23	0.6	19	0.4	23	0.4	22	0.4

NOTE: s.e. is standard error. Students who are homeschooled are not represented.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2007; Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2003; Parent Survey of NHES, 1999; and Parent and Family Involvement/Civic Involvement Survey of NHES, 1996.

Parent involvement with the school. Table 9-23 shows the percentage of students enrolled in kindergarten through grade 12 whose parents reported involvement in various school activities for PFI-NHES:2007, PFI-NHES:2003, Parent-NHES:1999, and PFI/CI-NHES:1996. The estimates are comparable between PFI-NHES:2007 and PFI-NHES:2003. No difference larger than 4 percentage points was observed between 2007 and 2003.

Table 9-23. Percentage of students enrolled in kindergarten through grade 12 whose parents reported attendance at selected school meetings, events, and volunteering: PFI-NHES:2007, PFI-NHES:2003, Parent-NHES:1999, and PFI/CI-NHES:1996

School effort to contact family	PFI-NHES:2007		PFI-NHES:2003		Parent-NHES:1999		PFI/CI-NHES:1996	
	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Attended a general school meeting (open house), back-to-school night, meeting of parent-teacher organization	89	0.5	88	0.4	78	0.5	77	0.4
Went to a regularly scheduled parent-teacher conference with child's teacher	78	0.5	77	0.4	73	0.5	72	0.4
Attended a school or class event (e.g., play, sports event, science fair) because of child	74	0.6	70	0.4	65	0.4	67	0.4
Acted as a volunteer at the school or served on a committee	44	0.6	42	0.6	37	0.4	39	0.4

NOTE: s.e. is standard error. Students who are homeschooled are not represented.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2007; Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2003; Parent Survey of NHES, 1999; and Parent and Family Involvement/Civic Involvement Survey of NHES, 1996.

Specific disabilities. Table 9-24 presents comparative estimates for PFI-NHES:2007, PFI-NHES:2003, and Parent-NHES:1999 related to the percentage of children with specific disabilities for children in kindergarten through grade 12. Most of the estimates for each disability are comparable across survey years. The percentage of children with a speech impairment increased from 4 percent in 1999 to 6 percent in 2003 and to 9 percent in 2007. The data do not suggest any explanations for these small differences. The percentage of children with blindness or another visual impairment decreased significantly from 8 percent in 2003 to 2 percent in 2007. This is mainly because the change in wording of the questions. In PFI-NHES:2003, the question was phrased as “Has a health professional told you that your child has blindness or other visual impairment?”, whereas in PFI-NHES:2007, the question was phrased as “Has a health professional told you that your child has blindness or another visual impairment *not corrected with glasses?*” Additionally, as noted in table 9-17, the number and prevalence of children with disabilities has increased in recent years (U.S. Department of Education 2005) and the increase was due to many societal factors (Mathews, Menacker, and MacDorman 2003; Hogan and Park 2000).

Table 9-24. Percentage of children in kindergarten through grade 12 with specific disabilities: PFI-NHES:2007, PFI-NHES:2003 and Parent-NHES:1999

Disability	PFI-NHES:2007		PFI-NHES:2003		Parent-NHES:1999	
	Percent	s.e.	Percent	s.e.	Percent	s.e.
Learning disability	10	0.5	9	0.3	9	0.4
Mental retardation	1	0.1	1	0.1	1	0.1
Speech impairment	9	0.4	6	0.3	4	0.2
Serious emotional disturbance	3	0.3	3	0.2	3	0.2
Deafness or another hearing impairment	2	0.2	2	0.1	2	0.1
Blindness or another visual impairment	2	0.1	8	0.3	5	0.2
An orthopedic impairment	2	0.2	3	0.2	2	0.1
Another health impairment lasting 6 months or more	8	0.4	8	0.3	6	0.2
Percent with any disability	24	0.7	26	0.5	21	0.4

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2007; Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2003; Parent Survey of NHES, 1999; and Parent and Family Involvement/Civic Involvement Survey of NHES, 1996.

9.6 AEW Survey Comparisons

The data comparisons for AEW cover most of the major topics included in the questionnaire. The estimates compared below include employment status, adult education participation rates, and demographic characteristics of adults.

Work for pay or income in the past 12 months. In table 9-25, the estimates of employment status from the AEW-NHES:2007 and CPS:2006 are presented for adults aged 16 or older. About 69 percent of adults reported that they worked for pay or income in the past 12 months in AEW and about 69 percent reported working in CPS:2006.

Table 9-25. Percentage of adults who worked for pay or income in the past 12 months: AEW-NHES:2007, AEW-NHES:2003, AELL-NHES:2001, AE-NHES:1999, and CPS:2006

Types of adult education participation	AEWR-NHES:2007		AEWR-NHES:2003		AELL-NHES:2001		AE-NHES:1999		CPS:2006	
	Estimate	s.e.	Estimate	s.e.	Estimate	s.e.	Estimate	s.e.	Estimate	s.e.
Total number of adults ¹ (thousands)	216,827	†	206,533	†	198,803	†	194,625	†	216,827	†
Worked in the past 12 months	69	1.0	71	0.4	73	0.4	76	0.6	69	0.2
Did not work in the past 12 months	31	1.0	29	0.4	27	0.4	24	0.6	31	0.2

† Not applicable.

¹ Includes civilian, noninstitutionalized adults, age 16 or older, not enrolled in elementary or secondary school, and not on active duty in the U.S. Armed Forces at the time of the interview.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the National Household Education Surveys Program (NHES), 2007; Adult Education for Work-Related Reasons Survey of the National Household Education Surveys Program (NHES), 2003; Adult Education and Lifelong Learning Survey of NHES, 2001; Adult Education Survey of NHES, 1999. U.S. Department of Commerce, Bureau of the Census, Current Population Survey, March 2006.

Participation in adult education activities for work-related reasons in the past 12 months. Table 9-26 shows estimates of participation rates for AEW-NHES:2007, AEW-NHES:2003, AELL-NHES:2001, AE-NHES:1999, and AE-NHES:1995. Since there are few data sources for comparing participation rates in adult education activities, the previous NHES estimates were used for comparisons. The AEW-NHES:2007 estimate was comparable to AEW-NHES:2003 and AELL-NHES:2001.

Table 9-26. Percentage of adults who participated in adult education activities for work-related reasons in the past 12 months: AEW-NHES:2007, AEW-NHES:2003, AELL-NHES:2001, AE-NHES:1999, and AE-NHES:1995

Survey	Percent	s.e.
AEW-NHES:2007	38	1.0
AEW-NHES:2003	40	0.5
AELL-NHES:2001	36	0.5
AE-NHES:1999	34	0.7
AE-NHES:1995	31	0.4

[†] Includes civilian, noninstitutionalized adults, age 16 or older, not enrolled in elementary or secondary school, and not on active duty in the U.S. Armed Forces at the time of the interview.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the National Household Education Surveys Program (NHES), 2007; Adult Education for Work-Related Reasons Survey of the National Household Education Surveys Program (NHES), 2003; Adult Education and Lifelong Learning Survey of NHES, 2001; Adult Education Survey of NHES, 1999; Adult Education Survey of the NHES, 1995.

Participation in adult education activities for work-related reasons, by characteristics of adults. Table 9-27 shows overall participation rates in adult education for work-related reasons for AEW-NHES:2007, AEW-NHES:2003, AELL-NHES:2001, and AE-NHES:1999 by a number of demographic characteristics. The differences of participation rates in adult education for work-related reasons between 2003 and 2007 are significant for household income more than \$75,000 (54 percent in 2003 vs. 48 percent in 2007); and for adults with educational attainment of Bachelor's degree or higher (60 percent in 2003 vs. 53 percent in 2007). These differences may be attributable to a pattern of retrenchment in business, in which businesses are cutting costs by reducing educational assistance programs.

Although there are large differences in the point estimates of adult education participation rates for a few other groups (such as other race/ethnicity category; household income \$10,000 or less; household income \$30,001 to \$50,000), none of these differences are statistically significant.

Table 9-27. Number and percentage of adults who participated in adult education activities for work-related reasons in the past 12 months, by characteristics of adults: AEW-NHES:2007, AEW-NHES:2003, AELL-NHES:2001, and AE-NHES:1999

Characteristic	Number (thousands)	Participated in adult education for work-related reasons in the past 12 months			
		Number (thousands)	s.e. (thousands)	Percent	s.e.
AEW-NHES:2007					
Total adults ¹	216,827	81,620	2,060	38	1.0
Age					
16–24 years	26,266	14,781	1,236	56	3.9
25–34 years	35,476	18,109	1,040	51	3.5
35–44 years	42,029	18,428	1,480	44	3.1
45–54 years	44,610	18,622	882	42	2.2
55 years and over	68,446	11,681	476	17	0.7
Sex					
Male	103,833	38,836	1,632	37	1.6
Female	112,994	42,784	1,313	38	1.1
Race/ethnicity					
White, non-Hispanic	149,540	56,853	1,648	38	1.1
Black, non-Hispanic	24,322	9,475	832	39	3.4
Hispanic	27,980	9,349	1,231	33	4.4
Other race, non-Hispanic	14,985	5,943	626	40	3.4
Household income					
\$10,000 or less	12,350	2,066	339	17	2.7
\$10,001 to 30,000	44,125	9,849	889	22	1.8
\$30,001 to 50,000	45,368	15,794	1,617	35	3.3
\$50,001 to 75,000	42,152	19,068	1,346	45	2.5
More than \$75,000	72,832	34,843	1,189	48	1.7
Marital status					
Never married	48,314	23,440	1,324	49	2.4
Currently married	133,369	49,260	1,720	37	1.3
Other	35,144	8,920	549	25	1.6
Educational attainment					
Less than high school	31,421	4,015	828	13	2.6
High school	66,200	17,747	1,537	27	2.2
Associate's degree or some college	58,527	27,448	1,329	47	1.9
Bachelor's degree or higher	60,680	32,410	1,031	53	1.7
Worked in the past 12 months					
Yes	149,162	75,232	1,873	50	1.3
No	67,665	6,387	1,187	9	1.7

See notes at end of table.

Table 9-27. Number and percentage of adults who participated in adult education activities for work-related reasons in the past 12 months, by characteristics of adults: AEW-NHES:2007, AEW-NHES:2003, AELL-NHES:2001, and AE-NHES:1999—Continued

Characteristic	Number (thousands)	Participated in adult education for work-related reasons in the past 12 months			
		Number (thousands)	s.e. (thousands)	Percent	s.e.
AEW-NHES:2003					
Total adults ¹	206,533	81,828	967	40	0.5
Age					
16–24 years	24,053	14,158	593	59	2.1
25–34 years	37,024	19,093	684	52	1.5
35–44 years	45,199	20,492	685	45	1.5
45–54 years	39,635	17,670	651	45	1.4
55 years and over	60,622	10,415	301	17	0.5
Sex					
Male	98,793	39,102	820	40	0.8
Female	107,740	42,726	701	40	0.7
Race/ethnicity					
White, non-Hispanic	149,135	60,612	891	41	0.6
Black, non-Hispanic	23,151	9,118	420	39	1.8
Hispanic	24,248	7,419	482	31	2.0
Other race, non-Hispanic	9,998	4,680	277	47	2.5
Household income					
\$10,000 or less	15,073	3,248	278	22	1.8
\$10,001 to 30,000	50,672	11,289	495	22	1.0
\$30,001 to 50,000	43,486	17,365	625	40	1.2
\$50,001 to 75,000	43,155	20,538	647	48	1.3
More than \$75,000	54,146	29,388	885	54	1.1
Marital status					
Never married	44,636	23,240	705	52	1.5
Currently married	125,213	48,461	774	39	0.6
Other	36,684	10,127	504	28	1.2
Educational attainment					
Less than high school	32,357	3,336	365	10	1.1
High school	61,194	17,355	626	28	0.9
Associate's degree or some college	58,055	28,299	822	49	1.1
Bachelor's degree or higher	54,927	32,838	582	60	1.0
Worked in the past 12 months					
Yes	146,030	75,403	1,007	52	0.6
No	60,503	6,425	359	11	0.6

See notes at end of table.

Table 9-27. Number and percentage of adults who participated in adult education activities for work-related reasons in the past 12 months, by characteristics of adults: AEW-NHES:2007, AEW-NHES:2003, AELL-NHES:2001, and AE-NHES:1999—Continued

Characteristic	Number (thousands)	Participated in adult education for work-related reasons in the past 12 months			
		Number (thousands)	s.e. (thousands)	Percent	s.e.
AELL-NHES:2001					
Total adults ¹	198,803	71,224	986	36	0.5
Age					
16–24 years	23,523	11,143	611	47	2.1
25–34 years	38,325	16,689	525	44	1.3
35–44 years	43,355	19,501	666	45	1.2
45–54 years	38,109	16,710	636	44	1.3
55 years and over	55,490	7,181	384	13	0.7
Sex					
Male	94,955	34,114	767	36	0.8
Female	103,848	37,111	673	36	0.6
Race/ethnicity					
White, non-Hispanic	144,147	53,859	878	37	0.6
Black, non-Hispanic	22,186	6,384	332	29	1.5
Hispanic	21,537	6,334	366	29	1.7
Other race, non-Hispanic	10,932	4,648	421	43	3.0
Household income					
\$10,000 or less	15,433	2,769	262	18	1.7
\$10,001 to \$30,000	52,027	11,259	507	22	1.0
\$30,001 to \$50,000	44,696	15,858	583	35	1.1
\$50,001 to \$75,000	40,725	18,700	674	46	1.3
More than \$75,000	45,922	22,638	607	49	1.2
Marital status					
Never married	41,829	17,994	627	43	1.4
Currently married	121,455	43,692	822	36	0.6
Other	35,519	9,539	424	27	1.1
Educational attainment					
Less than high school	31,343	3,032	318	10	1.0
High school	64,606	15,727	561	24	0.8
Associate's degree or some college	52,559	24,418	760	46	1.1
Bachelor's degree or higher	50,295	28,048	584	56	1.0
Worked in past 12 months					
Yes	145,249	67,124	913	46	0.7
No	53,553	4,101	302	8	0.6

See notes at end of table.

Table 9-27. Number and percentage of adults who participated in adult education activities for work-related reasons in the past 12 months, by characteristics of adults: AEW-NHES:2007, AEW-NHES:2003, AELL-NHES:2001, and AE-NHES:1999—Continued

Characteristic	Number (thousands)	Participated in adult education for work-related reasons in the past 12 months			
		Number (thousands)	s.e. (thousands)	Percent	s.e.
AE-NHES:1999					
Total adults ¹	194,625	66,201	1,359	34	0.7
Age					
16–24 years	23,438	10,523	565	45	2.1
25–34 years	37,851	17,392	803	46	1.8
35–44 years	45,299	17,854	730	39	1.5
45–54 years	35,193	13,225	690	38	1.9
55 years and over	52,845	7,207	494	14	0.9
Sex					
Male	93,137	32,287	903	35	1.0
Female	101,488	33,915	865	33	0.9
Race/ethnicity					
White, non-Hispanic	143,201	48,827	1,104	34	0.8
Black, non-Hispanic	22,129	7,811	414	35	1.9
Hispanic	19,491	5,545	405	28	2.1
Other race, non-Hispanic	9,804	4,018	406	41	3.5
Household income					
\$10,000 or less	14,335	2,020	229	14	1.6
\$10,001 to \$30,000	54,902	12,425	604	23	1.1
\$30,001 to \$50,000	49,496	18,268	850	37	1.6
\$50,001 to \$75,000	35,984	15,578	607	43	1.7
More than \$75,000	39,909	17,911	650	45	1.5
Marital status					
Never married	40,190	17,307	693	43	1.5
Currently married	120,250	40,434	105	34	0.9
Other	34,185	8,460	448	25	1.2
Educational attainment					
Less than high school	32,678	3,581	432	11	1.3
High school	55,553	13,970	739	25	1.2
Associate's degree or some college	52,062	22,235	752	43	1.3
Bachelor's degree or higher	54,332	26,415	995	49	1.3
Worked in the past 12 months					
Yes	148,629	63,523	1,347	43	0.9
No	45,996	2,678	274	6	0.6

¹ Includes civilian, noninstitutionalized adults, age 16 or older, not enrolled in elementary or secondary school, and not on active duty in the U.S. Armed Forces at the time of the interview.

NOTE: s.e. is standard error. Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the National Household Education Surveys Program (NHES), 2007; Adult Education for Work-Related Reasons Survey of the National Household Education Surveys Program (NHES), 2003; Adult Education and Lifelong Learning Survey of the NHES, 2001; and Adult Education Survey of the NHES, 1999.

9.7 Summary

Overall, the comparisons of selected estimates from NHES:2007 with comparable data sources have provided an indication of the reasonableness of the NHES:2007 estimates. Although the estimates presented here are just some of the multitude of comparisons that could be made between NHES:2007 estimates and those of other sources using different variables and categorizations, this approach has proven useful in determining whether significant differences in estimates exist, and if so, providing possible reasons for these differences.

10. PFI-NHES:2007 REINTERVIEW

This chapter describes a reinterview study that was conducted for the Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (PFI-NHES:2007). As with the reinterview studies conducted for the School Readiness Survey (SR-NHES:1993), School Safety and Discipline Survey (SS&D-NHES:1993), the Adult Education Survey (AE-NHES:1995 and 2005), the Parent and Family Involvement in Education/Civic Involvement Survey (PFI/CI-NHES:1996), the Youth Civic Involvement Survey (YCI-NHES:1996), the Before- and After-School Programs and Activities Survey (ASPA-NHES:2001), and the Adult Education and Work-Related Reasons Survey (AEWR-NHES:2003), this study was done in order to assess data item reliability and to inform future NHES surveys. The PFI reinterview questionnaire is in appendix K.

10.1 Introduction

This chapter examines measurement errors arising in interviewing respondents in PFI-NHES:2007. The estimates from this survey and every survey are subject to both sampling error and nonsampling error. Sampling errors, the differences between the population values and the sample estimates that arise because data are obtained from only a sample of the population, are generally well understood and can be estimated from the survey data themselves. Nonsampling errors, on the other hand, arise from a variety of sources and are more difficult to measure. Important components of nonsampling error for the NHES include coverage, nonresponse, and measurement errors. Population coverage and nonresponse are addressed in previous chapters of this report; this chapter examines measurement error, specifically response variability.

For PFI-NHES:2007, measurement errors were estimated by reinterviewing a sample of respondents and asking them a subset of the same questions included in the original interview. The reinterview procedure does not account for all the measurement errors in the interviewing process. For example, systematic errors that might be made in both the original interview and the reinterview are not discovered with this approach. Rather, the statistics produced by comparing the original interview and reinterview responses estimate the consistency of reporting, assuming both interviews were conducted under the same general conditions. A general review of the design and analysis of reinterviews is given by Forsman and Schreiner (1991). Brick et al. (1994) discuss the use of reinterviews in the context of other

nonsampling errors. Brick, Collins, and Chandler (1997); Brick, Wernimont, and Montes (1996); Montaquila, Brick, and Brock (1997a); Nolin et al. (2004); and Hagedorn et al. (2005) used these methods in the analysis of SR-NHES:1993 and SSD-NHES:1993, AE-NHES:1995, PFI/CI-NHES:1996 and YCI-NHES:1996, ASPA-NHES:2001, AEW-NHES:2003, and AE-NHES:2005 reinterview data.

When the same respondents are asked the same questions on different occasions, different responses may be obtained. Not all the differences are necessarily the result of measurement error. Discrepancies in responses can be grouped into four categories:

- Circumstances related to the topic under study may have changed between the first report and the second; both answers, although different, may be correct;
- The original response may have been recorded (interviewer error) or reported (respondent error) incorrectly;
- The reinterview response may have been recorded or reported incorrectly; and
- Both the original and reinterview responses may have been recorded or reported incorrectly.

The primary objectives of the NHES:2007 reinterview program were as follows:

- Identify survey questions that were not reliable (i.e., the two interviews did not elicit the same response);
- Quantify the magnitude of the response variance for groups of questions collected from the same respondent at two different times; and
- Provide feedback to improve the design of questions for future surveys.

An objective in some reinterview programs is to provide a check on interviewers who might be recording entire interviews without speaking to the respondents. The CATI system required a interviewer to receive a case from the CATI Scheduler module and use a computer autodialer that dialed the sampled telephone in order to access a case, making falsification difficult. Additionally, interviews were routinely monitored throughout data collection. Therefore there was no need to design reinterviews to verify that the interviews were genuine.⁸¹

⁸¹ Monitoring of interviews involved simultaneously listening to the interview and observing the entry of responses into the CATI system.

A subset of the original PFI-NHES:2007 questions was included in the reinterview. This was done to reduce the burden on respondents who had already completed one or more full interviews, and to focus on items that had not been tested in previous reinterviews. The items administered in the PFI-NHES:2007 reinterview (see appendix K) were questions that had not been tested in other NHES surveys. For the PFI-NHES:2007 reinterview, questions were selected from the following specific subject areas:

- School choice;
- School identification;
- Tutoring services;
- Television viewing; and
- Factors affecting parent participation.

In addition to the questions above, the reinterview includes additional items designed to identify possible sources of inconsistency. These include questions about whether the child has changed schools since the time of the first interview and when tutoring services began or ended.

10.2 Reinterview Design

The PFI-NHES:2007 reinterviews were conducted with the original interview respondents and were designed to provide information about the reliability of the data collected. Fourteen random samples of completed interviews were selected on a weekly basis, beginning during the fifth week of data collection and ending on the close of data collection.

Table 10-1 gives the number and percentage of PFI interview respondents eligible for reinterview sampling as well as the reasons for ineligibility. The exclusions given in the table were determined by reviewing completed PFI interviews for eligibility.

Table 10-1. Number of PFI-NHES:2007 interviews eligible for reinterview sampling

Category	Number of interviews	Percent of completed PFI-NHES:2007 interviews
Total number of completed PFI-NHES:2007 interviews	10,681	100.0
Total number sampled for the reinterview	1,096	10.3
Total number eligible but not sampled for the reinterview	7,713	72.2
Total number excluded from reinterview sampling	1,872	17.5
Child switched from SR to PFI	63	0.6
PFI interview not conducted in English	796	7.5
Not all interviews in household finalized, or PFI interview not sufficiently aged ¹ by the time of reinterview sampling	707	6.6
Homeschooler	306	2.9

¹ Completed at least 14 days (7 days, for the last week of data collection) prior to the reinterview sampling date.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Reinterview Survey of the National Household Education Surveys Program (NHES), 2007.

One criterion for determining whether a PFI interview was eligible for the reinterview was that all of the interviews for which household members had been selected had to have been completed (all completes or a combination of completes and ineligible). Thus, if some of the interviews in the household were not completed and others were completed, then a completed PFI interview in the household was not eligible for reinterview sampling. This restriction in the sample was implemented to prevent the reinterview activity from disrupting the completion of the original interviews. Additionally, to be eligible for the reinterview, the original PFI interview must have been completed at least 2 weeks (14 days) prior to the reinterview sampling date. This restriction was implemented so that respondents were unlikely to simply remember and repeat their earlier responses. The time restriction was relaxed to at least 1 week during the last week of data collection so that more interviews had an opportunity to be sampled. A total of 707 PFI interviews were ineligible for the reinterview because either not all interviews within their household were completed and/or the PFI interview itself was not “old” enough at the time of the final reinterview sampling.

Interviews were reviewed for other eligibility criteria before they were included in the reinterview sample. One such restriction was that only those PFI interviews that were conducted in English were eligible. A total of 796 interviews were ineligible for reinterview sampling because they were not conducted in English.

Table 10-2 shows the target and actual numbers of cases sampled for and completing the reinterview, by school choice and tutoring service. To assess the response variability of items concerning school choice, the reinterview sample was designed so that approximately one-half of the sample was

composed of students who attended their assigned public schools, about one-fourth was composed of those attending public schools chosen by their families, and about one-fourth was composed of private school students. In order to support the analysis of the tutoring items, it was designed so that one-third of the sample has received some tutoring services in the current school year. As a result, PFI interviews were selected with different probabilities based on their school choice and tutoring services. The reinterview data are weighted to reflect these different selection probabilities. Due to the random variation resulting from applying sampling rates to relatively small counts of eligible cases on the weekly sampling frames, the distribution of the actual sample is different from the target. The actual sample has a distribution of about 40 percent students attending assigned public schools, about 30 percent students attending public schools chosen by their families, and about 30 percent students attending private schools. Additionally, the selected students who have received tutoring services are about 45 percent of the entire realized sample.

A sample of 1,096 PFI-NHES:2007 interviews was selected for reinterview. A total of 825 PFI-NHES:2007 reinterviews were completed for a unit response rate of 75.3 percent. The CHAID analysis of the PFI reinterview sample (see section 5.2.3 for further discussion of CHAID analyses) showed that unit response rates varied among subgroups defined by child's gender, race/ethnicity, age, Census region, and household income. Thus, reinterview nonresponse adjustments were applied within cells formed by the five characteristics mentioned above.

Table 10-2. Target and actual numbers of PFI-NHES:2007 interviews sampled for and completing the reinterview, by school choice and tutoring service.

PFI participation status	Target		Actual		Estimated completion rate (%)
	Number sampled for reinterview	Number of completed reinterviews	Number sampled for reinterview	Number of completed reinterviews	
Total	1,250	1,000	1,096	825	75.3
1 (Assigned public school/tutored)	79	63	98	74	75.5
2 (Assigned public school /not tutored)	545	436	354	270	76.3
3 (Chosen public school /tutored)	169	135	243	186	76.5
4 (Chosen public school /not tutored)	144	115	95	68	71.6
5 (Private school /tutored)	169	135	153	115	75.2
6 (Private school /not tutored)	144	115	153	112	73.2

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Reinterview Survey of the National Household Education Surveys Program (NHES), 2007.

The main reasons for not completing a reinterview were the refusal of the respondent to participate and the inability of interviewers to contact the respondent during the reinterview time period. Approximately 42 percent of the sampled reinterviews that were not completed were final respondent refusals.⁸² Additionally, 42 percent of the nonresponse cases are finalized as maximum call cases, i.e., those received 9 or more reinterview call attempts without being completed. Other reasons for not completing a reinterview included language problems and the PFI interview respondent being unavailable during the remainder of the field period.

The reinterview was conducted using the same CATI system that was used in the original interview, modified to display the selected reinterview items instead of all the original items. For most of the questions, the interviewers read identical words to the same respondent who completed the original interview. Exceptions were a revised introduction, in which the respondent was informed that a subset of questions was being asked again for quality control purpose, and questions to identify possible sources of inconsistency. For example, if in the reinterview a child was reported to attend a school which is different from the school in the original interview, a question about whether the child has changed schools was asked.

10.3 Analysis Methods

Several statistics have been developed to assess the reliability of responses using reinterview data. The two statistics used in this report are the gross difference rate and the net difference rate. These two statistics were used in previous NHES reinterview reports (Brick and West 1992, Brick, Wernimont, and Montes 1996, Brick, Collins, and Chandler 1997, Montaquila, Brick, and Brock 1997a, Nolin et al. 2004, and Hagedorn et al. 2005) and are well documented in the reinterview literature (Hansen, Hurwitz, and Pritzker 1964; U.S Census Bureau 1985; Forsman and Schreiner 1991).

For dichotomous response variables, the gross difference rate measures the proportion of cases with different responses in the two administrations of the interview. Thus, it is an estimate of the reliability or consistency of reporting. The net difference rate, which is the average difference between the original interview and reinterview responses, takes account of offsetting misclassifications. If the second interview contains the true value for the respondent, the net difference rate estimates the bias.

⁸²Refusal conversion was not conducted for the reinterviews.

Exhibit 10-1 shows the general format of the possible reporting outcomes from the original interviews and reinterviews when the question has only two possible values. From tables formatted in this fashion, it is possible to estimate several features of the consistency of the reporting between the original survey and the reinterview. For example, the off-diagonal cells estimate the responses that were reported differently in the original interview and the reinterview. The definitions of the statistics used in this report are given here, where the cell counts are the weighted totals. Cases with missing values for the characteristic are dropped from the analysis. Because most items in the PFI survey had very high item response rates, it is unlikely that treating item nonresponse any differently than we did in this analysis would have any effect on the conclusions of the reinterview study.

Exhibit 10-1. General format of PFI-NHES:2007 interview-reinterview results

Reinterview	Original interview		Total
	Number of cases with characteristic	Number of cases without characteristic	
Total	a + c	b + d	n = a + b + c + d
Number of cases with characteristic	a	b	a + b
Number of cases without characteristic	c	d	c + d

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey (PFI) of the National Household Education Surveys Program (NHES), 2007, Parent and Family Involvement in Education Reinterview Survey of NHES, 2007.

10.3.1 Gross Difference Rate

The gross difference rate is the weighted ratio of the gross difference divided by the estimated total number of cases. The gross difference rate is as follows:

$$gdr = \frac{1}{\sum_1^n w_i} \sum_1^n w_i \{x_{1i} - x_{2i}\}^2, \tag{10.1}$$

where x_{1i} is the response to the original interview question for case i ;

x_{2i} is the response to the reinterview question for case i ; and

w_i is the full sample weight for case i .

For characteristics that have exactly two possible outcomes, the gross difference rate, expressed as a percentage, can be written using the terms from exhibit 10-1 as

$$gdr = 100 \frac{b + c}{n} \quad (10.2)$$

This can easily be seen to be a special case of (10.1) where the x_i terms only take on the values of 0 or 1. The gross difference rates for all questions were computed using (10.2) and only data from the original and reinterview responses, unless otherwise noted. For binary data, it is clear from (10.2) that the gross difference rate is an estimate of the percentage of cases not reported the same in both interviews (i.e., those falling in the off-diagonal cells). The gross difference rate divided by 2 is a measure of the response variance. Forsman and Schreiner (1991) show that this is an unbiased estimate of response variance if the observations are independent and identically distributed. The response variance is defined as the variation associated with the responses to the same question when the survey is repeated under the same general conditions.

For nominal variables, neither (10.1) nor (10.2) can be used to compute the gross difference rate because the values assigned to the levels of the characteristic are not scaled. For such questions, a set of binary variables was computed based on the response to the original variable, and then the gross difference rate was computed for each new variable using (10.2). The number of binary variables created from each original variable was equal to the number of response categories for the original variable. For example, one of the questions in the PFI-NHES:2007 reinterview (FHTUTSA2) asked how satisfied the respondent was with the tutoring services that child received. This item had four response categories: very satisfied, somewhat satisfied, somewhat dissatisfied, and very dissatisfied. Four binary variables were created from this variable. The first binary variable has the value 1 if the response was “Very satisfied” and has the value 0 otherwise; the second binary variable has the value 1 if the response was “Somewhat satisfied” and has the value 0 otherwise; the third binary variable has the value 1 if the response was “Somewhat dissatisfied” and has the value 0 otherwise; and the fourth binary variable has the value 1 if the response was “Very dissatisfied” and has the value 0 otherwise. The same procedure of creating binary variables was used for net difference rates as discussed below.

10.3.2 Net Difference Rate

The net difference rate can be defined for characteristics that are binary or continuous. The net difference rate for a continuous variable is given by

$$ndr = \frac{1}{\sum_1^n w_i} \sum_1^n w_i \{x_{1i} - x_{2i}\}, \quad (10.3)$$

where the variables are defined as in (10.1). The net difference rate is thus the average difference between the original and reinterview responses.

For the binary case, the net difference is the difference between the weighted number of cases with a characteristic as reported in the original interview and the weighted number of cases in the reinterview. That is, $(a + c) - (a + b) = c - b$, using the terms in exhibit 10-1. Thus, a positive net difference rate indicates that more adults reported having the characteristic in the original interview than in the reinterview. While the gross difference indicates differences in both directions, the net difference is the nonoffsetting part of the gross difference. Written as a percentage, the net difference rate is:

$$ndr = 100 \frac{c - b}{n} \quad (10.4)$$

If the reinterview response is the *true* value, or at least a better approximation to the true value, then the net difference rate is a measure of the bias (or reduction in bias) of the estimate. Generally speaking, this was not the case in PFI-NHES:2007 since the reinterview responses were collected under the same conditions as the original interview (i.e., using the same mode of data collection, virtually the same questions [although in the context of a shorter questionnaire], and the same respondent as in the original interview). Brick, et al. (1994) discussed this issue in more detail. In some surveys, it is assumed that when the original and reinterview differences are reconciled with the respondent, more accurate responses result. In these cases the net difference rate computed using the original and the reconciled responses is a valid estimate of the response bias. Brick and West (1992) and Brick, et al. (1994) found that there was little empirical support for this assumption, even for reconciled data.

The net difference rate computed from the original and reinterview data can be used to evaluate one of the assumptions associated with the gross difference rate. If the reinterview is an independent replication of the original interview, then the gross difference rate is a valid measure of

response variance. Generally, it is assumed that this condition holds, but the net difference rate provides a means of partially evaluating this assumption. If the interviews are replications, then the estimated net difference rate should be equal to zero in expectation (the original interview and reinterview should have the same average value). Biemer and Forsman (1992) discuss this issue more fully. Thus, the net difference rates for the questions in the PFI-NHES:2007 reinterview study presented below are used to evaluate whether the gross difference rate is a valid measure of response variance.

10.4 Findings

The gross and net difference rates for the reinterview questions are presented below (see table 10-3 and table 10-4) along with a discussion of the implications of the results for the analysis of estimates from PFI-NHES:2007 and the planning of future NHES studies that address similar topics. The estimates given in table 10-3 are the weighted percentage of respondents responding in the affirmative to the original interview question, based only on the data from the respondents to the reinterview. The estimates given in table 10-4 are the weighted average of responses that have continuous values. Since these are restricted to the reinterview subsample, the estimates may differ from those from the full PFI-NHES:2007 sample. The sample sizes vary from item to item because of skip patterns in the interviews and because of item nonresponse.

The primary focus of the PFI-NHES:2007 reinterview study was to measure the random component of measurement error using the gross difference rate based on the reinterview data. If it is determined that measurement error is nonnegligible, the next step might be to characterize the nature of the measurement error. For example, it would be useful to know whether the measurement error tends to be due to response error as opposed to a true change in conditions. Another hypothesis is that the time between the original interview and the reinterview might influence the response errors. A specific concern is that if the time between the interviews is short then the respondents might simply be recalling their previous responses. If this is true then the general expectation is that response error should increase as this lag time increases. To examine this hypothesis, gross difference rates for the reinterview variables and for the original variables are tabulated by LAGCAT, a variable that classifies the amount of time between the two interviews.

For a few items, the error measures that contribute to the gross difference rate may be due, at least partially, to differences in the way interviewers coded responses. For example, for the variables

about reasons for choosing a school and the TV channels watched, interviewers had to code the responses reported by the respondents. The differences between the original interview data and reinterview data may be due in part to differences in the way interviewers coded these responses.

Table 10-3 shows the estimates, the gross and net difference rates, and the standard errors for the questions from the PFI reinterview. The variable names given in the table can be referenced to the specific questions by looking at the reinterview questionnaire in appendix K. For example, SCONSID2 is the question that asks whether the respondent considered other schools for child. In this table, gross and net difference rates were computed for all variables in the PFI reinterview with the exception of the questions for school identification,⁸³ the questions with continuous values (See table 10-4), and the new questions inserted into the reinterview questionnaire (SCCHGMO, SCHLCHG, WHENTUT2, STOPTU2, RNSTPTU2). The new questions were inserted into the reinterview questionnaire either for analysis of differences in responses between the original interview and the reinterview or to obtain information on the reason for stopping tutoring services. For two questions (FHGETTU2, FHOTHTU2) difference rates were calculated for both the unreconciled values and reconciled values. The reconciled values took into account the changes that took place between the original interview and reinterview that may have caused discrepancies in the responses. For example, if the response to the question of receiving tutoring service is “No” in the original interview and “Yes” in the reinterview, and the child started receiving tutoring service after the original interview (WHENTUT2 = 2), then the reinterview response would be reconciled to “No” for the receiving tutoring service question. So this case would not be considered as having different responses when calculating the difference rates using reconciled values.

The gross difference rates are no more than 30 percent for all the PFI reinterview questions in table 10-3. Of the 59 items in the table, 52 have gross difference rates less than 20 percent, and only 7 have gross difference rates between 20 and 30 percent.⁸⁴ It is interesting to note that 4 out of the 7 items, with the highest gross difference rates, (between 20 and 30 percent) are subjective or perceptual items.

The net difference rates in table 10-3 are based on the comparison of the original interview and reinterview values. The net difference rates for only 7 of the 59 items presented here would be statistically different from zero with a significance level of 0.05. Thus, for the most part, the estimates are consistent with the assumption that the reinterview was an independent replication of the original

⁸³Due to the numerous response categories of school identification questions, it is not meaningful to calculate difference rates for them.

⁸⁴Items are individual measures as described earlier in this chapter and not interview questions.

interview, at least for the questions included in the reinterview. The assumption that the gross difference rate is a valid measure of response variability is supported by these results.

For the two questions (FHGETTU2, FHOTHTU2) with both reconciled and unreconciled values, the estimates and difference rates were very similar between reconciled values and unreconciled values. This indicates that response discrepancies between the original interview and the reinterview can be attributed primarily to response error, not changes in condition.

Table 10-4 presents statistics on continuous variables in PFI reinterview questionnaire. It shows the weighted average value, the gross and net difference rates, and the standard errors. One special case is that for the tutoring cost question (FHTUCOS2), the difference was calculated only when the units of cost are the same between original interview and the reinterview. Two (TVWDYNU2, TVWKDNU2) of the three continuous variables in the table have gross difference rates statistically different from zero with a significance level of 0.05. This indicates that the responses to the two questions are not reliable. None of the net difference rates are statistically different from zero. So the estimates are consistent with the assumption that the reinterview was an independent replication of the original interview, at least for the questions included in the reinterview. The assumption that the gross difference rate is a valid measure of response variability is supported by these results.

Table 10-5 presents the gross difference rates, where cases are classified according to the amount of time between the original interview and the reinterview. Of the 825 completed PFI reinterviews, 167 occurred within 13 days of the original interview, 311 occurred between 14 and 23 days after the original interview, and 347 occurred more than 23 days after the original interview. The 3-13 days category was included because cases in this category did not meet the eligibility requirement for the PFI reinterview but were included at the end of data collection when that restriction had to be relaxed due to time constraints. These categories do not represent large differences in lag time between interviews, but the tight interviewing schedule for the NHES limits the possible variability in the lag times between the original interviews and the reinterviews, and it is not possible to further differentiate the lag times in an analytically meaningful way. The gross difference rates in table 10-5 correspond to the reinterview variable. This table shows that, in general, time between interviews does not play a significant role in the magnitude of the measurement error. There are four variables (SPUBCHO2, S1STCHO2, FPTALK2(1),

Table 10-3. Estimated percent, gross and net difference rates based on reinterview responses, by PFI questions: 2007

Question	Sample size	Prevalence estimate		Gross difference rate		Net difference rate	
		Percent	s.e.	Percent	s.e.	Percent	s.e.
School Choice							
SPUBCHO2	706	50	3.3	20	2.9	-6	3.6
SCONSID2	824	33	2.5	19	2.5	-4	2.5
SPERFOR2	283	75	4.9	16	3.7	-6	4.2
STLKPAR2	284	85	4.4	23	6.8	-3	8.4
SREASN2(1) ⁺	538	27	3.2	21	3	-6	2.8
SREASN2(2) ⁺	538	6	1.3	10	2	5	2
SREASN2(3)	538	1	0.3	1	0.8	1	0.8
SREASN2(4)	538	2	1.1	4	1.3	#	1.4
SREASN2(5)	538	18	3.4	15	2.5	-1	2.6
SREASN2(6)	538	1	0.5	#	0.2	#	0.2
SREASN2(7)	538	2	0.7	3	1.1	2	1
SREASN2(8)	538	#	0.1	1	0.6	1	0.6
SREASN2(9) ⁺	538	#	0.4	5	1.8	5	1.8
SREASN2(10)	538	10	2.3	6	1.7	1	1.8
SREASN2(11)	538	2	0.8	3	1.8	1	1.9
SREASN2(91) ⁺	538	31	4.8	28	3.3	-9	3.9
S1STCHO2	816	82	3.0	11	2.3	1	2.3
SNEIGHB2	595	26	3.3	11	2.1	1	2
Family Involvement in School							
FPMTGWK2(1)	811	44	2.6	30	2.7	-3	3.6
FPMTGWK2(2)	811	51	2.6	29	2.6	-2	3.1
FPMTGWK2(3) ⁺	811	4	1.0	9	2	5	2.2
FPTALK2(1)	817	88	1.6	13	1.8	#	1.8
FPTALK2(2)	817	4	1.3	6	1.2	1	1.2
FPTALK2(3)	817	8	1.2	11	1.6	-1	1.5
Tutoring Services							
FHSCHTU2	804	46	2.4	23	2.7	-5	3.1
FHGETTU2 ⁺⁺	346	32	4.4	11	2.3	1	2.3
FHGETTU2 ⁺⁺	346	31	4.5	10	2.1	2	2.2
FHTUTSA2(1)	131	86	4.8	16	6.9	-12	6.7
FHTUTSA2(2)	131	10	3.7	16	6.9	12	6.7
FHTUTSA2(3)	131	2	1.7	3	2.1	2	2.1
FHTUTSA2(4)	131	2	2.0	2	2	-2	2
FHOTHTU2 ⁺⁺	823	12	1.5	9	1.4	1	1.4
FHOTHTU2 ⁺⁺	823	11	1.5	7	1.3	1	1.3
FHPDTSA2(1)	129	63	9.8	15	7	-6	7.3
FHPDTSA2(2)	129	35	9.8	15	4.9	-1	5
FHPDTSA2(3)	129	2	1.8	7	3.6	7	3.6
FHPDTSA2(4)	129	0	0	#	0.2	#	0.2

See notes at end of table

Table 10-3. Estimated percent, gross and net difference rates based on reinterview responses, by PFI questions: 2007—Continued

Question	Sample size	Prevalence estimate		Gross difference rate		Net difference rate	
		Percent	s.e.	Percent	s.e.	Percent	s.e.
Television Viewing							
TVHRWKD2(1)	160	97	1.4	10	3.1	-5	3.2
TVHRWKD2(2)	160	3	1.4	7	2.6	2	2.6
TVHRWKD2(3)	160	0	0	3	1.8	3	1.8
TVHRWKN2	153	98	1.5	5	3.1	-2	3.1
TVCHNL2(10)	153	5	2.5	8	3	3	2.8
TVCHNL2(11)	153	12	3.7	6	2.6	3	2.6
TVCHNL2(12)	153	9	3.1	10	3.9	7	3.8
TVCHNL2(13)	153	#	0.1	#	0.1	#	0.1
TVCHNL2(14)	153	25	5.2	18	4.7	-6	4.8
TVCHNL2(15)	153	33	6.2	17	4.6	5	4.7
TVCHNL2(16)	153	2	1.6	3	1.8	-1	1.9
TVCHNL2(17)	153	1	0.6	2	0.8	#	0.8
TVCHNL2(18)	153	0	0	0	0	0	0
TVCHNL2(19)	153	47	7.1	18	4.8	-1	5.2
TVCHNL2(20)	153	1	0.9	3	2.1	1	2.2
TVCHNL2(21) ⁺	153	7	2.6	4	1.6	4	1.6
TVCHNL2(22)	153	34	7.6	12	3.6	4	3.4
TVCHNL2(23)	153	0	0	0	0	0	0
TVCHNL2(24)	153	0	0	2	1.3	2	1.3
TVCHNL2(25)	153	0	0	#	0.4	#	0.4
TVCHNL2(91) ⁺	153	4	2.1	15	3.4	8	3.6
TVCHNL2(26)	153	4	3.3	2	1.4	-1	1.0

Rounds to zero.

⁺ These variables have net difference rates statistically different from 0 at a significance level of 0.05.⁺⁺ The first rows of FHGETTU2 and FHOTHU2 contain the information from the unreconciled variables. The second rows of FHGETTU2 and FHOTHU2 contain the information after reconciliation of the original and reinterview variables using WHENUT2 and STOPTU2.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey (PFI) of the National Household Education Surveys Program (NHES), 2007; Parent and Family Involvement in Education Reinterview Survey of NHES, 2007.

Table 10-4. Estimated gross and net difference rates for PFI reinterview continuous variables: 2007

Question	Sample size	Reinterview variable		Gross difference rate		Net difference rate	
		Mean	s.e.	Estimate	s.e	Estimate	s.e.
FHTUCOS2	43	(1)	(1)	27,077.59	23,433.801	64.28	48.403
TVWDYNU2 ⁺	153	1.57	0.125	1.30	0.582	0.01	0.146
TVWKDNU2 ⁺	155	2.91	0.158	2.38	0.8170	-0.12	0.165

[†] The mean and standard error were not computed for FHTUCOS2 because the values of FHTUCOS2 were based on different and unconvertible units. So it was not appropriate to compute a mean and s.e. for this variable. The difference rates were calculated only when the units of cost are the same between original interview and the reinterview.

⁺ The gross difference rates of these variables are statistically different from zero at a significance level of 0.05.

Table 10-5. Gross difference rates (GDR) by the number of days between the original PFI interview and the PFI reinterview: 2007

Question	Length of time between interviews			Length of time between interviews			Length of time between interviews		
	3 to 13 days			14 to 23 days			24 days or more		
	Sample size	GDR estimate	GDR s.e.	Sample size	GDR estimate	GDR s.e.	Sample size	GDR estimate	GDR s.e.
School Choice									
SPUBCHO2 ⁺	148	24	7.6	261	12	3.4	297	26	5.8
SCONSID2	167	16	4.4	310	20	3.9	347	20	3.9
SPERFOR2	56	24	9.5	110	11	4.9	117	18	7.7
STLKPAR2	56	12	4.9	111	16	6.1	117	34	13.9
SREASN2(1)	106	30	9.7	196	21	4.5	236	17	3.8
SREASN2(2)	106	8	3.7	196	11	3.8	236	9	2.8
SREASN2(3)	106	#	0.2	196	3	2.0	236	#	0.3
SREASN2(4)	106	5	4.3	196	4	2.2	236	4	1.7
SREASN2(5)	106	23	8.9	196	16	4.0	236	12	3.0
SREASN2(6)	106	1	1.2	196	#	0.2	236	#	0.2
SREASN2(7)	106	1	1.0	196	3	1.3	236	4	2.4
SREASN2(8)	106	0	0	196	#	0.2	236	2	1.4
SREASN2(9)	106	8	4.5	196	8	3.4	236	2	1.2
SREASN2(10)	106	6	2.7	196	6	2.9	236	7	2.6
SREASN2(11)	106	8	4.9	196	#	0.4	236	4	3.9
SREASN2(91)	106	33	9.7	196	29	5.6	236	25	4.9
S1STCHO2 ⁺	166	4	1.6	306	16	4.1	339	11	3.8
SNEIGHB2	122	10	4.5	225	14	4.0	248	9	1.8
Family Involvement in School									
FPMTGWK2(1)	164	27	6.9	307	32	4.9	340	30	4.5
FPMTGWK2(2)	164	23	6.6	307	34	4.3	340	28	3.8
FPMTGWK2(3)	164	5	2.8	307	10	2.3	340	9	4.1
FPTALK2(1) ⁺	164	9	2.8	309	12	2.6	344	16	3.2

See notes at end of table

Table 10-5. Gross difference rates (GDR) by the number of days between the original PFI interview and the PFI reinterview: 2007 -- Continued

Question	Length of time between interviews			Length of time between interviews			Length of time between interviews		
	3 to 13 days			14 to 23 days			24 days or more		
	Sample size	GDR estimate	GDR s.e.	Sample size	GDR estimate	GDR s.e.	Sample size	GDR estimate	GDR s.e.
FPTALK2(2)	164	6	2.3	309	4	1.6	344	7	2.5
FPTALK2(3) ⁺	164	6	2.2	309	13	2.7	344	12	2.5
Tutoring Service									
FHSCHTU2	163	22	5.3	301	20	3.7	340	26	5.0
FHGETTU2 ⁺⁺	71	17	6.3	129	11	3.9	146	7	2.4
FHGETTU2 ⁺⁺	71	17	6.3	129	10	3.8	146	5	1.9
FHTUTSA2(1)	23	[a]	[a]	52	19	10.9	56	14	5.4
FHTUTSA2(2)	23	[a]	[a]	52	19	10.9	56	14	5.7
FHTUTSA2(3)	23	[a]	[a]	52	0	0	56	13	9.1
FHTUTSA2(4)	23	[a]	[a]	52	0	0	56	9	9.3
FHOTHTU2 ⁺⁺	167	10	3.3	311	9	2.3	345	8	1.9
FHOTHTU2 ⁺⁺	167	10	3.3	311	6	1.9	345	7	1.8
FHPD TSA2(1)	33	5	3.3	49	29	16.3	47	7	3.8
FHPD TSA2(2)	33	6	4.0	49	24	10.3	47	11	6.0
FHPD TSA2(3)	33	1	1.6	49	12	8.5	47	6	4.3
FHPD TSA2(4)	33	0	0	49	1	0.6	47	0	0
Television Viewing									
TVHRW KD2(1)	27	[a]	[a]	57	11	5.3	76	12	5.0
TVHRW KD2(2)	27	[a]	[a]	57	11	5.3	76	5	2.2
TVHRW KD2(3)	27	[a]	[a]	57	0	0	76	7	4.6
TVHRW KN2	25	[a]	[a]	57	10	6.7	71	1	0.6
TVCHNL2(10)	25	[a]	[a]	57	4	2.9	71	11	6.0
TVCHNL2(11)	25	[a]	[a]	57	4	2.8	71	12	5.7

See notes at end of table

Table 10-5. Gross difference rates (GDR) by the number of days between the original PFI interview and the PFI reinterview: 2007 -- Continued

Question	Length of time between interviews			Length of time between interviews			Length of time between interviews		
	3 to 13 days			14 to 23 days			24 days or more		
	Sample size	GDR estimate	GDR s.e.	Sample size	GDR estimate	GDR s.e.	Sample size	GDR estimate	GDR s.e.
TVCHNL2(12)	25	[a]	[a]	57	10	6.4	71	14	5.7
TVCHNL2(13)	25	[a]	[a]	57	0	0	71	0	0
TVCHNL2(14)	25	[a]	[a]	57	19	6.8	71	24	7.8
TVCHNL2(15)	25	[a]	[a]	57	19	7.1	71	19	7.2
TVCHNL2(16)	25	[a]	[a]	57	3	3.4	71	2	1.7
TVCHNL2(17)	25	[a]	[a]	57	2	1.4	71	#	0.3
TVCHNL2(18)	25	[a]	[a]	57	0	0	71	0	0
TVCHNL2(19)	25	[a]	[a]	57	27	8.9	71	14	5.5
TVCHNL2(20)	25	[a]	[a]	57	6	4.5	71	1	0.6
TVCHNL2(21)	25	[a]	[a]	57	6	3.0	71	1	0.6
TVCHNL2(22)	25	[a]	[a]	57	11	5.0	71	16	6.3
TVCHNL2(23)	25	[a]	[a]	57	0	0	71	0	0
TVCHNL2(24)	25	[a]	[a]	57	4	2.9	71	#	0.4
TVCHNL2(25)	25	[a]	[a]	57	1	1.0	71	0	0
TVCHNL2(91)	25	[a]	[a]	57	9	4.8	71	20	7.1
TVCHNL2(26)	25	[a]	[a]	57	0	0	71	1	0.9

Rounds to zero.

[a] indicates that for the corresponding category of LAGCAT, the variable had sample size less than thirty so no data are reported.

⁺ These variables showed significance between gross difference rates.

⁺⁺ The first rows of FHGETTU2 and FHOTHTU2 contain the information from the unreconciled variables. The second rows of FHGETTU2 and FHOTHTU2 contain the information after reconciliation of the original and reinterview variables using WHENTUT2 and STOPTU2.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey (PFI) of the National Household Education Surveys Program (NHES), 2007; Parent and Family Involvement in Education Reinterview Survey of NHES, 2007.

FPTALK2(3)) out of 59 variables that show a significant difference in gross difference rates among the three categories of LAGCAT.⁸⁵ In some of these cases, the length of time could have had an effect due to the respondent's recall of his or her original response. However, the variables that show significance are a very small percentage of those assessed. Thus, in this limited study there appears to be little support for the hypothesis that the time between interviews is important.

10.5 Conclusions

The PFI reinterview for NHES:2007 was used to examine how consistently respondents responded when asked the same questions on two occasions. The important findings of the reinterview analyses and their implications are summarized here.

Overall, the reinterview analysis shows that nearly all of the items examined have gross difference rates less than 20 percent. In addition, because the proportion of variables with a net difference rate statistically different from zero is very small, the net difference rates generally support the use of the gross difference rates as measures of response variance.

The reinterview served its major purpose of investigating to find questions with high error rates and providing feedback to help improve the design of the questions for future surveys. In this survey, two questions (TVWDYNU2, TVWKDNU2), which asked about the number of hours child watched TV on typical weekdays and weekends respectively, had gross difference rates significantly different from zero. So these two questions were found to be unreliable. However, given the subjective nature of the answers and possibly changing circumstances, it is not very surprising to see the differences. The net difference rates for the two questions are not significantly different from zero, which supports the use of gross difference rates as measures of response variance. Additionally, this indicates that although response error variance is a concern with these two items, there is no indication of response error bias in these variables.

Because of adequate sample sizes for most questions, the gross difference rates from the NHES:2007 reinterview generally attained adequate levels of precision. This is similar to the NHES:1996, NHES:2001, NHES: 2003, and NHES:2005 reinterviews, but in contrast to NHES:1995

⁸⁵ Since an increasing gross difference rate as the lag time increases would be indicative of the possibility that the respondents were recalling their original responses, one-sided tests were used to examine this.

(Brick, Wernimont, and Montes 1996) where some subgroups had small sample sizes and the reinterview could not provide precise measures of response variance. Finally, the time lag between interviews did not appear to be a significant factor in this reinterview.

Taken as a whole, the reinterview results do not suggest the need for substantial changes to the PFI survey. Given that an important goal of NHES surveys is the ability to study change over time, the absence of evidence of substantial measurement problems in the reinterview supports retaining the items for future administration.

REFERENCES

- Biemer, P., and Forsman, G. (1992). On the Quality of Reinterview Data with Application to the Current Population Survey. *Journal of the American Statistical Association*, 87(420): 915-923.
- Blumberg, S.J., Luke, J.V., and Cynamon, M.L. (2006). Telephone Coverage and Health Survey Estimates: Evaluating the Need for Concern about Wireless Substitution. *American Journal of Public Health*, 96(5), 926-931.
- Bradburn, N.M. (1983). Response Effects. In P.H. Rossi, J.D. Wright, and A.B. Anderson (Eds.), *Handbook of Survey Research*. Orlando, FL: Academic Press.
- Brick, J.M. (1996). *Undercoverage Bias in Estimates of Adults and 0- to 2-Year-Olds in the 1995 National Household Education Survey (NHES:95)* (NCES 92-101). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Brick, J.M., Burke, J., and West, J. (1992). *Telephone Undercoverage Bias of 14- to 21-Year-Olds and 3- to 5-Year-Old* (NCES 92-101). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Brick, J.M., Cahalan, M., Gray, L., Severynse, J., and Stowe, P. (1994). *A Study of Selected Sampling Errors in the 1991 Survey of Recent College Graduates, Technical Report* (NCES 95-640). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Brick, J.M., Celebuski, C.A., Collins, M.A., and West, J. (1992). *Overview of the NHES Field Test. Technical Report No. 1* (NCES 92-099). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Brick, J.M., Collins, M.A., and Chandler, K. (1997). *An Experiment in Random-Digit-Dial Screening*. (NCES 98-255). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Brick, J.M., Hagedorn, M.C., Montaquila, J., Roth, S.B., and Chapman, C. (2006). *Impact of Monetary Incentives and Mailing Procedures: An Experiment in a Federally Sponsored Telephone Survey* (NCES 2006-066). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Brick, J.M., Tubbs, E., Collins, M.A., Nolin, M.J., Cantor, D., Levin, K., and Carnes, Y. (1997). *Telephone Coverage Bias and Recorded Interviews in the 1993 National Household Education Survey (NHES:93)* (NCES 96-029). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Brick, J.M., Waksberg, J., Kulp, D., and Starer, A. (1995). Bias in List-Assisted Telephone Samples. *Public Opinion Quarterly*, 59(2): 218-235.
- Brick, J.M., Wernimont, J., and Montes, M. (1996). *The 1995 National Household Education Survey: Reinterview Results for the Adult Education Component, Technical Report* (NCES 96-14). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
-

- Brick, J.M., and West, J. (1992). Reinterview Program for the 1991 National Household Education Survey. *Proceedings of the Survey Research Methods Section, American Statistical Association*: 387-392.
- Broene, P., and Rust, K. (2000). *Strengths and Limitations of Using SUDAN, Stata, and WesVar PC for Computing Variance from NCES Data Sets* (NCES 2000-2003). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Casady, R.J., and Lepkowski, J.M. (1993). Stratified Telephone Survey Designs. *Survey Methodology*, 19(1), 103-113.
- Collins, M.A., Brick, J.M., Kim, K., and Gilmore, S. (1996). *NHES 95: Adult Education Data File User's Manual* (NCES 96-826) U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Curtin, R., Presser, S., and Singer, E. (2005). Changes in Telephone Survey Nonresponse Over the Past Quarter Century. *Public Opinion Quarterly*, 69: 87-98.
- Deming, W.E., and Stephan, F.F. (1940). On a Least Square Adjustment of a Sampled Frequency Table When the Expected Marginal Totals Are Known. *Annals of Mathematical Statistics*, 11: 427-444.
- Forsman, G., and Schreiner, I. (1991). The Design and Analysis of Reinterview: An Overview. In P. Biemer, R. Groves, L. Lyberg, N. Mathiewetz, and S. Sudman (Eds.), *Measurement Error in Surveys*, 279-302. New York: John Wiley & Sons, Inc.
- Giesbrecht, L.H., Kulp, D.W., and Starer, A.W. (1996). Estimating Coverage Bias in RDD Samples with Current Population Survey Data. *Proceedings of the Survey Research Methods Section, American Statistical Association*: 503-508.
- Groves, R.M. (1989). *Survey Errors and Survey Costs*. New York: John Wiley & Sons, Inc.
- Groves, R.M., and Kahn, R.L. (1979). *Surveys by Telephone*. New York: Academic Press.
- Hagedorn, M., Montaquila, J., Kwang, K., Li, L., Vaden-Kiernan, N., and Chapman, C. (2005). *National Household Education Surveys Program: 2003: Methodology Report*. Rockville, MD: Westat.
- Hansen, M.H., Hurwitz, W.N., and Pritzker, L. (1964). The Estimation and Interpretation of Gross Differences and Simple Response Variance. In C.R. Rao (Ed.), *Contributions to Statistics*: 111-136. Calcutta: Pergamon Press, Ltd.
- Hogan, D.P. and Park, J.M. (2000). "Family Factors and Social Support I the Development Outcomes of Very Low Birth Weight Children." *Clinics in Perinatology*, 27:2.
- Kim, J.K., Navarro, A., and Fuller, W. (2000). Variance Estimation for 2000 Census Coverage Estimates. *Proceedings of the Survey Research Methods Section, American Statistical Association*.
- Kish, L. (1965). *Survey Sampling*. New York: John Wiley & Sons, Inc.
- Lillard, L., Smith, J.P., and Welch, F. (1986). What Do We Really Know about Wages? The Importance of Nonreporting and Census Imputation. *Journal of Political Economy*, 94(3): 489-506.

-
- Little, R.J.A. (1986). Survey Nonresponse Adjustments for Estimates of Means. *International Statistical Review*, 54: 139-157.
- Mathews, T.J., Menacker, F., and MacDorman, M.F. (2003). "Infant Mortality Statistics from the 2001 Period: Linked Birth/Infant Death Data Set." *National Vital Statistics Reports*, 52:2.
- Montaquila, J.M., Brick, J.M., and Brock, S.P. (1997a). *Reinterview Results for the Parent and Youth Components of the 1996 National Household Education Survey, Technical Report* (NCES 97-38). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Montaquila, J.M., Brick, J.M., and Brock, S.P. (1997b). *Undercoverage Bias in Estimates of Characteristics of Households and Adults in the 1996 National Household Education Survey*. (NCES 97-39). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Nolin, M.J., Montaquila, J., Nicchitta, P., Kim, K., Kleiner, B., Lennon, J., Chapman, C., Creighton, S., and Bielick, S. (2000). *National Household Education Survey of 1999: NHES:1999 Methodology Report* (NCES 2000-078). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Piekarski, L., Kaplan, G., and Prestegaard, J. (1999, May). *Telephony and Telephone Sampling: The Dynamics of Change*. Paper presented at the annual conference of the American Association of Public Opinion Research, St. Petersburg, FL.
- Rao, J.N.K., and Shao, J. (1992). Jackknife Variance Estimation with Survey Data Under Hot Deck Imputation. *Biometrika*, 79, 811-822.
- Rubin, D.R. (1987). *Multiple Imputation for Nonresponse in Surveys*. New York: John Wiley & Sons.
- Shah, B.V., Barnwell, B.G., Hunt, P.N., and LaVange, L.M. (1995). *SUDAAN User's Manual*. Research Triangle Park, NC: Research Triangle Institute.
- Thornberry, O.T., and Massey, J.T. (1988). Trends in United States Telephone Coverage Across Time and Subgroups In R.M. Groves, P.P. Biemer, J.T. Massey, L.E. Lyberg, W.L. Nicholls, and J. Waksberg (Eds.), *Telephone Survey Methodology*. New York: John Wiley & Sons, Inc.
- Tucker, C., Lepkowski, J.M., and Piekarski, L. (2002). The Current Efficiency of List-Assisted Telephone Sampling Designs. *Public Opinion Quarterly*, 66(3): 321-338.
- U.S. Bureau of the Census. (1985). *Evaluation of Censuses of Population and Housing* (STD-ISP-TR-5). Washington, DC: U.S. Bureau of the Census.
- U.S. Department of Education. (2005). *The Condition of Education 2006*. Washington, DC.
- Van de Kerckhove, W., Montaquila, J.M., Hagedorn, M., Carver, P. R., and Brick, J.M. (forthcoming). *NHES: 2007 Bias Study*. U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Wolter, K. (1985). *Introduction to Variance Estimation*, Chapter 4. New York: Springer-Verlag.
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