National Institute on Alcohol Abuse and Alcoholism

National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC- III)

Source and Accuracy Statement

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Table of Contents

Tables (continued) **Page**

Figures **Page**

Exhibits

Introduction 1

1.1 Introduction

The National Epidemiologic Survey on Alcohol and Related Conditions-III was sponsored by the National Institute on Alcohol Abuse and Alcoholism (NIAAA). The fieldwork was conducted by Westat through a contract under the data collection authorization of Title 42 USC 285n. The NESARC-III collected information on alcohol use and disorders and related physical and mental disabilities in addition to DNA to be obtained through saliva samples. The semi-structured Diagnostic Interview used to collect information was the NIAAA Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS-5). The final sample size was 36,309. The target population of the NESARC-III was the civilian noninstitutionalized population, 18 years and older, residing in the contiguous United States (U.S.) and Alaska and Hawaii. The sample included persons living in households and select noninstitutionalized group quarters. Veterans of the United States Armed Forces were included in the sample. Persons on active duty with the military were excluded because they are not offered protection under Certificates of Confidentiality.

The NESARC-III is the fourth national survey conducted by NIAAA. The objectives and content areas of the NESARC-III are similar to those of the three prior NIAAA surveys, with the exception of the NESARC-III's provision for collecting saliva samples. Prior NIAAA national surveys included the 1988 Alcohol Supplement of the National Household Interview Survey (fielded by the National Center for Health Statistics), the 1991-1992 National Longitudinal Alcohol Epidemiologic Survey, the 2001-2002 Wave 1 NESARC, and the 2004-2005 Wave 2 NESARC.

Field Test 2

2.1 Introduction

In May–June 2011, Westat conducted a small field test in preparation for the NESARC-III main study data collection. The objectives of this field test were: (1) to test interviewer training procedures and materials; (2) to test the interview and DNA consent process; (3) to test the DNA collection in a household setting; () to test data processing; (5) to test the incentive procedures; (6) to test interaction and communication flow between Columbia University and Westat's Telephone Research Center (TRC) as part of the Validity Study; and (7) to test the Reliability Study procedures.

A total of 35 AUDADIS-5 interviews and completed saliva samples were collected as part of the field test. Additionally, five Reliability Study and five Validity Study interviews were conducted. All interviews were conducted in English and took place in the Washington, DC metropolitan area over a 2-week period. This location allowed Westat to draw upon field interviewers and sample persons (SPs) in Northern Virginia, Maryland, and Washington, DC. This location also allowed Westat and NIAAA staff to easily accompany field interviewers and observe field test interviews. Interviews took place in the respondents' homes.

A brief discussion of the sample design, data collection instruments, interviewer materials, interviewer recruitment and training, conduct of the data collection effort, and quality control measures are summarized below. Additionally, field test findings and suggested revisions for the main study are presented.

2.2 Data Collection

The field test served to replicate, as close as possible, the protocol, instruments, materials, and procedures developed for the main study. Although refinements were made to all study components following the field test and in preparation for the main study, they all mimicked what was used for the main data collection effort. This section provides more detail on the field test sample design, data collection instruments, and interviewer materials.

2.2.1 Sample Design

A local focus group service was used to recruit the respondents for the field test. Westat statistical staff set quotas for respondent recruitment based upon the following demographic criteria: age, gender, race/ethnicity, and education. These quotas were representative of the sample that would be selected in the main study. The 35 respondents represented a mix of these demographic criteria.

2.2.2 Data Collection Instruments

The field test employed the most current version of each of the CAPI instruments designed for the main study: screener, consent, AUDADIS-5, incentives, re-contact module, and saliva collection. See Section 4.4.1 for a full description of the data collection instruments.

A fully functional Interviewer Management System (IMS) and Supervisor Management System (SMS) were developed and utilized for the field test as well.

2.2.3 Interviewer Materials

In preparation for the field test, Westat developed versions of all materials that would be used in the main study data collection. Similar to the main study, interviewers were given assignment-specific materials, as well as bulk supplies. These included:

- **Screener show card** that listed the race and ethnicity categories used in the screener categories;
- **Incentive envelope** to store and document the use of the cash incentives ($90 per SP);
- **AUDADIS-5 flashcard booklet** to help participants select the appropriate response to various AUDADIS-5 items;
- **Alcohol, Drug, and Medicine Guide** that listed the common alcohol brands, as well as brand names and slang terms for various medicines and drugs;
- **Saliva collection materials,** including instruction sheet, saliva kit, disposable gloves, hand sanitizer, paper towels, and specimen bag;
- **ID badge** to be worn at all times;

- **Tote bag** to carry all materials; and
- **Recordkeeping and shipping materials** such as time and expense reports, FedEx Clinical Paks, and other mailing supplies.

See Section 4.4.3 for a full description of these materials.

Additionally, due to the unique design and needs of the field test, several field test-specific materials were:

- **Assignment log** that listed the cases in the interviewer's assignment. Used to track the status of cases.
- **Appointment log.** Included information on interview date and time, as well as participant contact information.
- **Interview comment form** was completed by the interviewer for each completed interview. The form was designed to provide feedback on how well the instruments and procedures worked during the administration of the interview and any interviewer suggestions for improvement.

2.2.4 Interviewer Recruitment and Training

Field test interviewers were recruited from Westat's pool of interviewers who lived in the field test area and had positive evaluations from prior Westat assignments. A total of seven interviewers were recruited and trained for the field test. These interviewers were supervised directly by the field director, so no field supervisors were hired for the field test.

Training included an 8-hour home study package that the interviewers completed prior to attending the in-person training. The in-person training component consisted of 3 1/2 days of training conducted in Rockville, MD by experienced home office NESARC-III staff. Since the field-test participants were pre-recruited, the training did not have to cover some topics that were required for main study training, such as gaining cooperation, locating sampled address, and address verification procedures. For the instrument-specific training sessions, fully scripted sessions were developed and used as preparation for the development of similar materials for the main study.

2.2.5 Conduct of the Data Collection Effort

The field test was conducted during an approximate 2-week period in May and June 2011. Each interviewer completed five prescheduled interviews. Although all interviewing tasks mimicked the design for the main study, given the SP recruitment strategy and small sample size, the field test did not serve as a test of study response rates or ability to gain cooperation from sampled addresses. All field test interviews were conducted in the homes of the pre-recruited respondents. Respondents had agreed in advance to participate in the full interview and provide a saliva sample.

Once the AUDADIS-5 and saliva collection component of the field test was completed, Westat conducted five in-person Reliability Study interviews. This allowed Westat to assess post-interview processes of assigning Reliability Study cases to alternate interviewers. Additionally, Columbia University conducted five Validity Study interviews via telephone, providing a test of the communication and data exchange process.

2.2.6 Quality Control Measures and Feedback to Staff

Since the primary goal of the field test was to learn as much information as possible about the conduct of the interview protocol in a respondent's home, every field test interview was observed by a Westat staff member experienced in the design and implementation of the NESARC-III interview. This 100 percent observation effort also provided a unique opportunity to provide feedback to the interviewing staff.

The Westat observer completed a "NESARC-III Field Test Observation Evaluation Form" for each interview observed. The form evaluated the field test interviewer on the following aspects of interview administration:

- **Introduction and set-up:** availability of materials; proper introduction of interviewer and observer; professional and friendly demeanor; identification of proper interview location; efficient set-up of computer;
- **Screener:** conducted correct household enumeration procedures; read questions as appropriate; navigated CAPI as required; probed appropriately and used show card correctly;
- **Consent and incentive payments:** demonstrated ability to navigate IMS to begin consent process; provided respondent with consent document; read from computer

screen as worded; demonstrated ability to answer participant questions; correctly provided and documented incentive;

- **AUDADIS-5:** read questions and instructions as worded; maintained interview pace; used flashcards appropriately and maintained a professional demeanor while encouraging participation; managed all respondent reactions to questions, such as being unsure how to answer, repetitive or awkwardly worded, or too sensitive;
- **Recontact:** provided a copy of recontact consent; correctly answered participant questions; and
- **Saliva collection:** sample kit and materials readily available; played saliva collection video; correctly scanned barcode; handled sample correctly; used gloves/hand sanitizer/paper towel correctly; provided thank you letter to SP; and packed up equipment efficiently.

Additionally, observers wrote detailed summaries of each interview, focusing on the performance of the CAPI instruments, the hardcopy materials, and the respondents' reactions to various components of the interview. This was done in an attempt to identify elements to be revised and refined for the main study.

2.3 Evaluation of Field Test and Refinements for the Main Study

In addition to collecting questionnaire data, as much other information as possible was collected from the field test. The field test served as an evaluation of all components of the main study, including the interviewer recruitment and hiring process, training materials and presentations, IMS screen content and flow, and overall interview protocol and administration procedures. This section provides details on how the field test was evaluated and some of the general refinements made for the main study as a result of the field test.

Interviewers were asked to provide a detailed evaluation of the home study content and presentation, as well as the in-person training session. To inform improvements to the IMS, interviewers were given hardcopy screenshots of the main IMS features and screens, and asked to mark them up with suggested revisions. As discussed earlier, they also provided detailed feedback on each interview conducted, using the Interview Comment form.

Finally, at the end of the field period, Westat project staff conducted an extensive in-person debriefing with the field interviewers. The topics covered in this session included:

- **Recruiting:** whether the interviewers were adequately informed of the study subject matter; any knowledge that would have been helpful to know before agreeing to work on the study; other materials that could have been shared with potential interviewers;
- **Training:** how well training prepared interviewers for work in the field; recommendations for training topics needing more or less content, or different presentation technique; whether they got enough experience administering the **AUDADIS-5**; recommendations for improving saliva collection training; value of role plays and live respondent session; training length;
- **Introduction and set-up:** location where the interview was collected and whether there was sufficient privacy; if there was difficulty locating electrical outlet or running on battery power; insight into how interviewers packed their supplies in the tote and prepared for approach at door;
- **Screener:** issues completing the household enumeration; problems using the show card; recommendations for additional job aids; ease of screener navigation;
- **IMS:** ease of navigating IMS screens; recommendations for improvements;
- **Consent:** usability issues with consent screens, such as font size and screen layout; experience with respondents following along with hardcopy documentation; respondent questions about consent process;
- **Incentive modules:** issues administering the incentive modules; suggestions for improving incentive log;
- **AUDADIS-5:** reactions to flashcard booklet and suggestions for improvement; SP reactions to sensitive or personal items; preferred use of mouse vs. keyboard;
- **Recontact:** issues administering the recontact module; suggestions for improving consent document layout or presentation of screens in IMS; participant questions about potential recontact for followup substudies; willingness of SPs to provide contact information for friends/family members;
- **Saliva collection:** evaluation of whether interviewers read instructions directly from screen or used the instructions as a general guide to facilitate collection process as needed; issues with saliva instruction video; whether and how video transcript was used; which saliva instructions were used the most; insight into length and location of saliva collection process in the home; evaluation of barcode scanning process; adequacy of supplies such as gloves, paper towels, and trash bag;
- **Materials:** suggestions for organization of case-specific materials and bulk supplies; recommendations for additional materials;

- **Other systems issues:** issues with data transmission; ease of sending/receiving email and entering weekly time and expense data; availability and support provided by Help Desk; and
- **General:** adequacy of operations and systems support availability.

Interviewers were encouraged to provide as much input as possible regarding the revision of materials and CAPI/IMS programs to improve the full interview process for both interviewers and respondents in the main study. A full detailed summary of the results of the debriefing session was produced.

Following the field test, Westat and NIAAA worked together to refine the AUDADIS-5 instrument for the main study in an attempt to clarify question wording and avoid unnecessary duplication. Westat also incorporated the feedback gathered through the field test in its revision of all CAPI instrumentation, IMS features, hardcopy materials, and overall study procedures and protocol for the main study data collection.

Main Study Sample Design 3

3.1 Overview

The NESARC-III target population is the noninstitutionalized, civilian population 18 years or older living in the United States (the 50 states and the District of Columbia), including persons residing in noninstitutionalized group quarters such as college dormitories, group homes, group quarters, and dormitories for workers. Multistage probability sampling was used to randomly select persons from this population. Section 3.2 describes the selection of primary sampling units (PSUs), which were either individual counties or groups of contiguous counties. Section 3.3 describes the selection of secondary sampling units (SSUs) consisting of area segments, which were groups of census-defined blocks. In the third stage of sampling, described in Section 3.4, households within the sampled SSUs were selected. The last stage of sampling, described in Section 3.5, involved the random selection of eligible adults within the sampled households.

3.2 Selection of Primary Sampling Units

3.2.1 Creation of Primary Sampling Units

In general, the PSUs for NESARC-III were defined to be individual counties. However, some rural counties were so small in terms of population that they were combined with a nearby county to form an efficient unit for sampling purposes. The automated procedure described by Green, Chowdhury, and Krenzke (2002)[1] was used to group contiguous counties into PSUs in which the maximum within-PSU travel distance was less than or equal to 100 miles and the number of occupied housing units, according to the 2010 Census, was greater than or equal to 5,760 (the minimum number of housing units for a PSU). Following the execution of the automated procedures, maps of the PSUs were reviewed and, in a few instances, manual changes were made to the PSUs created by the automated procedure. These changes involved reconfiguring PSUs that appeared to have difficult or excessive travel requirements. For example, a PSU was reconfigured if

[1] Green, J., Chowdhury, S., and Krenzke, T. (2002). Developing primary sampling unit (PSU) formation software. *Proceedings of the Survey Research Section*, *American Statistical Association,* pp. 1239-1243.Alexandria, VA: American Statistical Association.

it contained counties on opposite sides of a large river or lake or if it contained only rural counties that could be included with an adjacent urban PSU so that the resulting PSU was more heterogeneous with respect to urbanicity. From the more than 3,100 counties in the United States, the final number of PSUs created for NESARC-III was 2,349. This excludes some remote and sparsely populated areas in Alaska and Hawaii, as discussed in Section 3.2.4.

3.2.2 Primary Sampling Unit Measure of Size

From the sampling frame of 2,349 PSUs, 150 were selected using stratified proportional-to-size (PPS) sampling. The measure of size (MOS) for the sampling of PSUs was a composite MOS, as described by Folsom, Potter, and Williams (1987).[2] The use of this composite MOS when applied to PSU sampling is designed to achieve self-weighting samples of ultimate sample units (i.e., dwelling units [DUs]) within specified substrata defined by minority status, while at the same time controlling PSU workloads by ensuring that approximately equal numbers of ultimate sampling units are selected per PSU. In particular, the use of the composite MOS in the sampling of PSUs was designed to reflect the subsequent oversampling of DUs in areas with a high prevalence of minorities (see Section 3.3.2).

The first step in calculating the composite MOS for each PSU was to use 2010 Census data to obtain the percentage of Black, Hispanic, or Asian population in every block in the United States (the 50 states and the District of Columbia). Next, the quintiles of these block-level percentages were determined and used to define five subgroups of blocks (each consisting of roughly equal numbers of occupied housing units) consisting of varying concentrations of minorities ranging from low to high. Finally, the composite MOS for each PSU was calculated as follows:

$$MOS = 2*H_1 + 1.5*H_2 + H_{234},$$

where H_1 is the number of occupied housing units in the PSU in blocks belonging to the subgroup corresponding to the highest quintile of minority prevalence, H_2 is the number of occupied housing units in the PSU in blocks belonging to the subgroup corresponding to the second highest quintile of minority prevalence, and H_{234} is the number of occupied housing units in the PSU in the remaining blocks.

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[2] Folsom, F., Potter, F., and Williams, S. (1987). Notes on a composite measure for self-weighting samples in multiple domains. *Proceedings of the Survey Research Methods Section*, *American Statistical Association,* pp. 792-796. Alexandria, VA: American Statistical Association.

3.2.3 Stratification and Sample Selection

Certainty PSUs or self-representing (SR) PSUs were selected with a probability of 1.0, whereas non-certainty PSUs or non-self-representing (NSR) PSUs were selected with a probability less than 1.0. Large-county-certainty PSUs were determined by the number of PSUs to be selected (150), the total MOS for all 2,349 PSUs in the sampling frame (denoted $MOS_{population}$), and the MOS for each PSU. A PSU was designated as a certainty PSU if its probability of selection under PPS sampling was expected to be two-thirds or greater. Thus, a PSU was a large-county-certainty PSU if its MOS satisfied

$$MOS > 0.67*MOS_{population}/150 = 676{,}969.$$

There were 26 large-county-certainty PSUs satisfying the above criterion. The remaining PSUs were assigned to PSU strata based on county-level demographic and geographic data. One of the county-level variables used to stratify single-county PSUs was whether or not the county belonged to a core-based statistical area (CBSA), which is a multicounty area that the Office of Management and Budget has defined as an area containing "a large population nucleus and adjacent communities that have a high degree of integration with that nucleus."[3] After removing the 26 large-county-certainty PSUs from the CBSAs in which they were originally located, the redefined CBSAs were sorted by total MOS and the 11 largest CBSAs were used to create CBSA-based strata. These 11 CBSAs collectively contained 135 single-county PSUs. The PSUs in each of the 11 largest CBSAs were substratified based on PSU-level prevalence of either minority population or below-poverty household incomes, such that the total MOS for each substratum determined whether one, two, or three PSUs were to be selected from the substratum. The substrata from which only one PSU was to be selected contained only one PSU, so this created 13 additional certainty PSUs (referred to as large-CBSA-based certainty PSUs). The CBSA-based substrata from which two or three PSUs were to be selected had approximately equal values of $MOS_{stratum}/n$, where $MOS_{stratum}$ was the total MOS for the substratum and n was the number of PSUs to be selected from the stratum.

The NSR PSUs that were not assigned to the large-CBSA-based strata were classified as rural PSUs if none of their counties belonged to a CBSA; otherwise, such PSUs were classified as urban PSUs. The rural PSUs were assigned to strata based on census division. The urban NSR PSUs not assigned to the large-CBSA-based strata were assigned to strata based on census region, CBSA size, and PSU-level prevalence of either minority population or households with incomes below

[3] Office of Management and Budget. (2010). 2010 Standards for delineating metropolitan and micropolitan statistical areas. *Federal Register*, 75(123), 37246-37252.

poverty levels. The strata for the NSR PSUs not assigned to the large-CBSA-based strata were formed so that the number of sampled PSUs, n, was either two or three and the corresponding total stratum MOS satisfied the condition that $MOS_{stratum}/n$ was approximately equal across all such strata.

The values of $MOS_{stratum}/n$ were smaller for the large-CBSA-based strata than for non-CBSA-based strata. This increased the number of PSUs sampled in large CBSAs; to compensate, fewer sample SSUs were allocated to these PSUs (see Section 3.3.4). It was believed that increasing the number of sample PSUs in large CBSAs, with a corresponding reduction in the number of SSUs, would reduce total field costs for data collection compared to a smaller sample of PSUs and a larger number of SSUs within them. The resulting numbers of self-representing and non-self-representing PSUs were 39 and 111, respectively.

3.2.4 Exclusion of Areas in Alaska and Hawaii

Alaska and Hawaii both contain remote areas in which travel costs per completed interview would be excessive because of long travel distances or the need to use expensive modes of transportation, such as boats or airplanes. Consequently, some remote areas were excluded from the PSUs that were created for Alaska and Hawaii using the process described in the preceding section.

Alaska

For purposes of tabulating the Decennial Census, the Census Bureau partitions Alaska into 29 census areas. Many of Alaska's census areas are one or more local-government jurisdictions, called boroughs. Alaska also has sparsely populated unincorporated areas that lack local governments, and services such as law enforcement and education are provided by the state. In Alaska's unincorporated areas, the census areas are creations of the Census Bureau, defined with input from the users of census data products for Alaska.

Table 3-1 contains information about Alaska's 29 census areas, arranged in decreasing order of adult population. In addition to listing the adult population of each census area, Table 3-1 indicates population density and the maximum distance between any two points in each census area. The census areas tabulated in the first seven rows of Table 3-1 contain 439,169 of Alaska's 522,853 adults. However, three of these seven areas—the Bethel Census Area, the Matanuska-Susitna Borough, and the Kenai Peninsula Borough—involve long travel distances, so they were excluded from Alaska's PSUs. The resulting set of PSUs included four of the seven most populous census

areas: Anchorage Municipality, Fairbanks North Star Borough, Juneau City and Borough, and Ketchikan Gateway Borough, which contain 62 percent of Alaska's adults. To improve coverage, a manual change was made to the Anchorage Municipality PSU so that it also included several populous census tracts in the southern part of Matanuska Borough. The result was that Alaska's PSUs contain 75 percent of Alaska's adults, 73 percent of its occupied housing units, and 41 percent of its American Indians/Alaska Natives while only covering 3 percent of its land area.

Table 3-1. All 29 census areas for Alaska, sorted by decreasing total number of adults

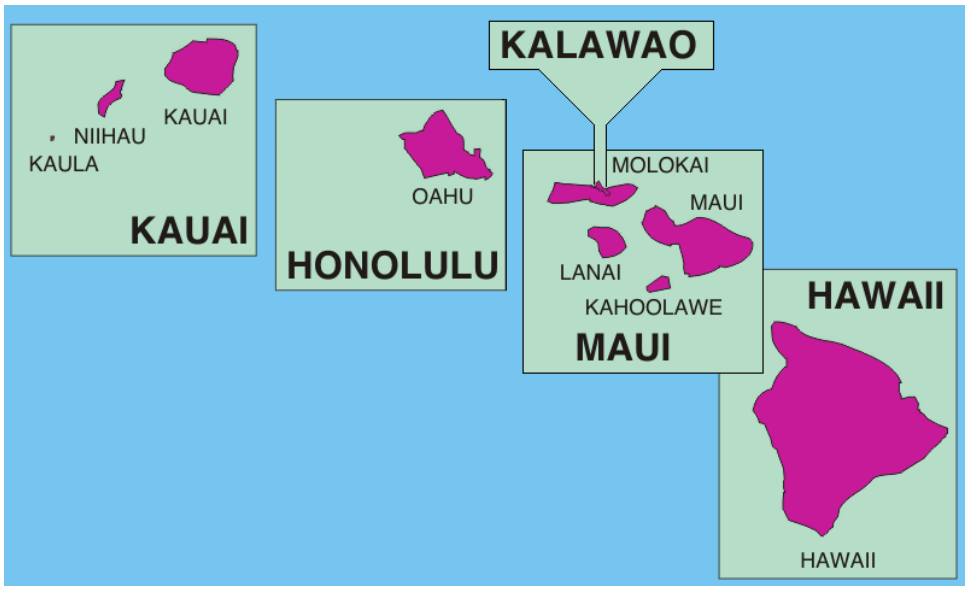
Census area	FIPS code	Occupied HUs	Total adults	AIANs	Area (mi²)	Distance (mi)	AIAN %	HUs/mi²
Anchorage Municipality	20	107,332	216,040	16,461	1,705	69	8	62.95
Fairbanks North Star Borough	90	36,441	72,580	4,896	7,338	145	7	4.97
Matanuska-Susitna Borough	170	31,824	63,276	3,270	24,608	252	5	1.29
Kenai Peninsula Borough	122	22,161	42,289	2,966	16,075	254	7	1.38
Juneau City and Borough	110	12,187	23,939	2,691	2,702	99	11	4.51
Bethel Census Area	50	4,651	10,795	8,604	40,570	678	80	0.11
Ketchikan Gateway Borough	130	5,305	10,250	1,362	4,858	122	13	1.09
Kodiak Island Borough	150	4,630	9,698	1,226	6,550	277	13	0.71
Valdez-Cordova Census Area	261	3,966	7,288	921	34,240	302	13	0.12
North Slope Borough	185	2,029	7,179	3,355	88,695	657	47	0.02
Sitka City and Borough	220	3,545	6,791	1,107	2,870	137	16	1.24
Nome Census Area	180	2,815	6,233	4,498	22,962	400	72	0.12
Southeast Fairbanks Census Area	240	2,567	5,180	568	24,769	274	11	0.10
Northwest Arctic Borough	188	1,919	4,868	3,807	35,573	315	78	0.05
Aleutians West Census Area	16	1,212	4,746	654	4,390	896	14	0.28
Wade Hampton Census Area	270	1,745	4,358	4,100	17,081	206	94	0.10
Prince of Wales-Hyder Census Area	198	2,194	4,135	1,574	3,923	173	38	0.56
Yukon-Koyukuk Census Area	290	2,217	4,036	2,819	145,505	728	70	0.02
Dillingham Census Area	70	1,563	3,252	2,233	18,569	246	69	0.08
Petersburg Census Area	195	1,599	2,924	474	3,282	136	16	0.49
Aleutians East Borough	13	553	2,770	628	6,982	354	23	0.08
Haines Borough	100	1,149	2,009	183	2,319	114	9	0.50
Wrangell City and Borough	275	1,053	1,849	280	2,541	88	15	0.41
Hoonah-Angoon Census Area	105	913	1,726	707	7,525	230	41	0.12
Denali Borough	68	806	1,415	52	12,751	213	4	0.06
Lake and Peninsula Borough	164	553	1,139	740	23,652	428	65	0.02
Skagway Municipality	230	436	816	28	452	36	3	0.96
Bristol Bay Borough	60	423	772	248	504	64	32	0.84
Yakutat City and Borough	282	270	500	178	7,649	237	36	0.04
Alaska total		258,058	522,853	70,630	570,640			
Alaska AIAN %							14	

HUs, housing units; AIANs, American Indians/Alaska Natives; mi, miles

Hawaii

For Hawaii, a similar process was used to determine areas to be excluded. Hawaii contains five counties: Hawaii County, Honolulu, Kalawao, Kauai, and Maui. Figure 3-1 shows how each county consists of one or more islands. (Figure 3-1 excludes the uninhabited Northwestern Islands, which are part of Honolulu County.) Table 3-2 contains descriptive information about each county and its associated islands. The last row of Table 3-2 indicates that Hawaii County has 16.7 housing units per square mile; however, Figure 3-2 shows that some parts of Hawaii County are very densely populated, whereas other parts have a very low population density.

Figure 3-1. Hawaii counties and islands



Based on the information in Table 3-2 and the realization that inclusion of the smaller islands might require field staff to travel by boat or airplane, the small islands of Niihau, Molokai, and Lanai were excluded from Hawaii's PSUs. (Kaula and Kahoolawe were also excluded, because they are uninhabited.) The leper colony on Kalawao was excluded because of its small size. The areas of low population density in Hawaii County were excluded based on field staff knowledge that data collection in these areas would require the use of four-wheel drive vehicles. The end result of these exclusions is that Hawaii's PSUs contained 98 percent of Hawaii's adults and did not include areas in which data collection would be much more expensive than in other parts of Hawaii.

Table 3-2. Population and distance for all areas of Hawaii

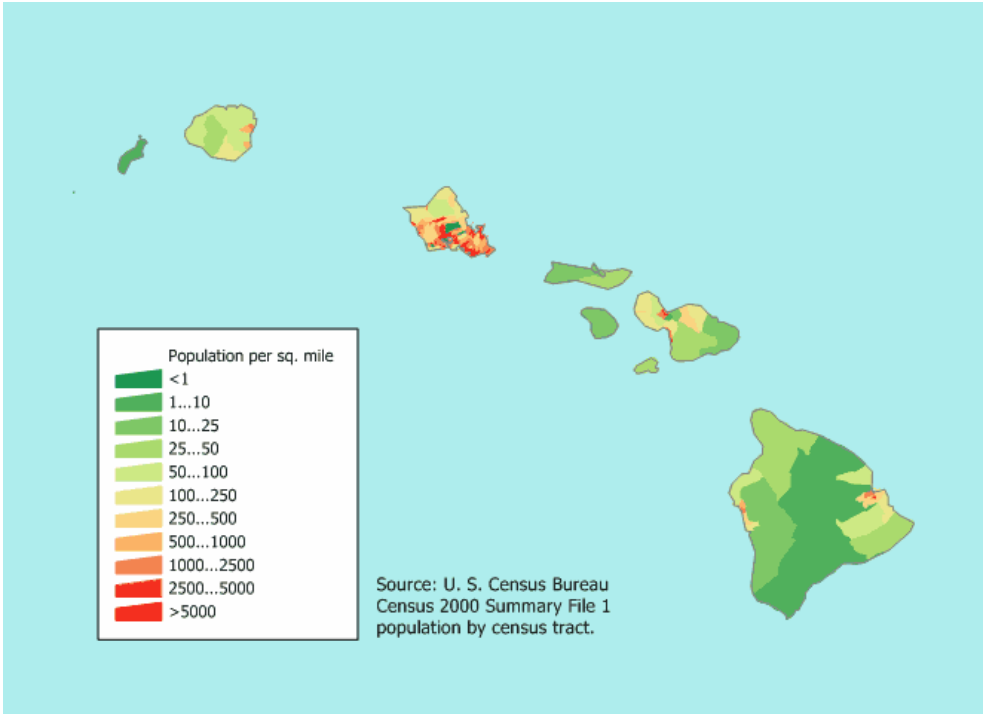
PSU/ County(s)	PSU distance (mi)	Islands/Sub-counties*	Occupied HUs	Total adults	Area (mi²)	Distance (mi)	HUs/ mi²
Kauai	94	Niihau	27	112	70	17	0.4
		Kauai	23,213	51,868	550	34	42.2
Honolulu†	50	Oahu	311,047	742,707	601	50†	517.5
Maui/Kalawao	97	Kalawao	69	90	13	12	5.3
		Molokai	2,513	5,311	260	40	9.7
		Lanai	1,158	2,322	141	16	8.2
		Maui	50,215	111,386	761	51	66.0
Hawaii	101	Hawaii	67,096	142,799	4,028	101	16.7
			455,338	1,056,595			

mi, miles; HUs, housing units

*No occupied housing units on Kaula and Kahoolawe.

†Excludes the uninhabited Northwestern Islands that are part of Honolulu County.

Figure 3-2. Population density for Hawaii



3.3 Selection of Secondary Sampling Units

The SSUs were area segments consisting of census-defined blocks or groups of blocks within the sampled PSUs. Census blocks are detailed partitions of the United States, formed by using visible semi-permanent features (such as roads, railroad tracks, mountain ridges, bodies of water, and power lines) and invisible boundaries (such as county, state, and national boundaries). The following sections describe the construction of the segment sampling frame, stratification of the area segments by minority status, calculation and assignment of a segment-level measure of size (SMOS) to each segment in the frame, and selection of the segments for the study.

3.3.1 Sampling Frame for Segments

For the second stage of sampling, the Census 2010 Summary File (SF1) block data file[4] was used to create a complete list of segments (i.e., a sampling frame) within each of the 150 sample PSUs. The entire SF1 summary file contains more than 11 million blocks in the United States, including approximately 3 million blocks that, according to the 2010 Census, have no population or occupied housing units. For NESARC-III, a segment generally consisted of an individual census block or a combination of two or more nearby blocks.

Segments were created using proprietary software developed by Westat for the purpose of segment formation. Before segment creation, the block records from the 2010 Census SF1 files were sorted by census tract, block group, and block number within each PSU. The block number uniquely identifies census blocks in the SF1 data file. A block group is an aggregation of contiguous census blocks. A census tract is a collection of contiguous block groups within the same county. Note that the term "block group" is an official census designation and should not be confused with the generic phrase "group of blocks" that is used to describe the formation of area segments for NESARC-III. A single block was used as a segment when the number of occupied housing units in the block exceeded 60. Smaller blocks were combined with neighboring blocks to reach the required minimum of 60 occupied housing units per segment. Blocks that were found to have no occupied housing units and no population according to the 2010 Census were included in the formation of segments to ensure that housing units constructed after the census would be given a chance of selection under the quality control/coverage enhancement procedures implemented in the study (see

[4] U.S. Census Bureau. (2011). 2010 Census Summary File 1 [United States].

Section 4.2). A total of 418,239 segments were formed within the 150 NESARC PSUs. The segments included a total of 1,420,950 blocks, for an average of 3.4 blocks per segment.

3.3.2 Stratification of Segments

Within each PSU, segments were stratified based on the percentage of the population in the segment who were Hispanic, Black, or Asian. This percentage was derived by first summing the minority counts (Hispanic, Black, or Asian) across the blocks within the segment and then dividing the sum by the total population in the segment. As described in Section 3.2.2, the PSU sampling process involved the assignment of individual blocks (rather than segments) to quintile-based subgroups according to the block-level minority population prevalence. Based on the block-level assignments, the highest quintile, corresponding to a minority population prevalence of more than 59 percent, was used to define the "high-minority" stratum, or "group A." The next highest quintile, corresponding to a minority population prevalence of between 26 and 59 percent, was used to specify the "moderate-minority" stratum, or "group B." The lowest three quintiles, corresponding to a minority population prevalence of less than 26 percent, were used to collectively define the "low-minority" stratum, or "group C." However, these quintiles were developed using national P.L. 94-171 *block*-level data[5] rather than segment-level data. Therefore, they were not appropriate for *segment*-level minority stratification. Instead, the block-level quintiles were used as a guide to develop the appropriate cutoffs for stratification of segments within PSUs, as described below.

The first step involved, within each PSU, computation of the weighted percentage of blocks (weighted by number of housing units) included in the groups (A, B, and C) originally defined for PSU sampling. These weighted percentages were used as "benchmarks" to establish new PSU-specific segment-level cutoffs for the A, B, and C groups. The new cutoffs were designed to approximate the segment-level cutoffs that would have been obtained if segments (rather than blocks) had been used to derive the quintiles for PSU sampling. The segments were sorted in descending order of their percentage of minority population to establish the required PSU-specific segment-level cutoffs for the A, B, and C groups. This was done by dividing the sorted segment file for each PSU into three parts corresponding to the A, B, and C groups. The cutoffs for the A, B, and C groups were chosen so that the weighted percentage of segments (weighted by number of housing units) for each of the three groups closely matched the corresponding weighted percentage computed at the block level. Table 3-3 summarizes the resulting distribution of 418,239 area

[5] U.S. Census Bureau. (February 3–March 24, 2011). Redistricting Data (P.L. 94-171) Summary File.

segments in the sampling frame by minority status (groups A, B, and C). The following sections discuss the numbers of segments selected for the study, as shown in the five right-most columns of this table.

Table 3-3. Unweighted counts of segments in NESARC PSUs, oversampling rates, and number of sample segments by minority group

Minority status of segment	No. of segments in PSUs*	Oversampling rate†	Sample segments				
			Total	Wave 1**	Wave 2	Wave 3	Wave 4
A High minority	130,707	2.00	2,140	589	620	514	417
B Moderate minority	103,104	1.50	1,654	410	492	420	332
C Low minority	184,428	1.00	3,406	801	1,048	866	691
Total	418,239	—	7,200	1,800	2,160	1,800	1,440

* Unweighted count of segments in 150 NESARC-III PSUs.

† See Section 3.3.3.

** Includes 27 segments on Indian reservations that were selected for Wave 1 but fielded in Wave 2.

3.3.3 Segment Measure of Size

A goal of the NESARC-III sample design was to oversample households in the high- and moderate-minority segments. To achieve this goal, a SMOS that depended on minority status was assigned to each segment in a PSU. Specifically, the segment-level sampling SMOS (M_{ki}) assigned to segment *i* in minority group *k* was set equal to

$$M_{ki} = A_k \; H_{ki},$$

where H_{ki} = the number of occupied housing units in segment *i* in minority group *k* and A_k = 2.0 for group A, 1.5 for group B, and 1.0 for group C (see Table 3-3). The factor A_k represents the rate at which segments in group *k* would be oversampled relative to the low-minority group (group C). The purpose of the oversampling factors in the formula for SMOS was to help ensure that a uniform workload (sample size) could be achieved across the sampled segments when these factors were used in conjunction with the PPS sampling described in the next section.

3.3.4 Selection of the Segment Sample

A total of 7,200 segments were selected, including exactly 48 segments from each of the noncertainty PSUs and varying numbers from the certainty PSUs. The number of segments selected from the certainty PSUs varied depending on PSU size but averaged 48 segments, to maintain the desired fixed total sample size of 7,200 segments. As indicated in Section 3.2.3, fewer than the desired 48 sample segments per PSU were allocated to PSUs in the large CBSA-based strata to offset the generally higher probabilities of selecting PSUs in these strata.

A systematic sample of segments was selected from each PSU based on the specified target sample size for the PSU. The sample of segments was selected with probabilities proportional to SMOS, as described in Section 3.3.3. Segments were implicitly stratified by geography, which was achieved by sorting the segments within each PSU by census block prior to systematic sampling. For multi-block segments, the block with the largest number of occupied housing units was used for sorting purposes. To spread the workload over the approximately 14-month data collection period, the sampled segments were randomly divided into four waves. Waves 1 and 3 contained 25 percent of the sample, Wave 2 contained 30 percent of the sample, and Wave 4 contained 20 percent of the sample. The allocation was made so that the segment sample for each wave was balanced with respect to PSU and minority status. The last four columns of Table 3-3 summarize the numbers of segments selected by wave.

3.3.5 Expected Impact of Oversampling on Variances

As indicated in Section 3.3.3, the oversampling rates, A_k, were used to calculate the segment-level SMOS. Since the segments were selected with probabilities proportional to SMOS, the subsequent oversampling of housing units could be accomplished without unduly increasing the workload in the sampled high-minority segments (see Section 3.4 for details of the within-segment sampling process). However, oversampling increases the variation of the household weights, which in turn will tend to increase the sampling variances of survey-based estimates. In other words, while the oversampling is effective in increasing the numbers of minority households in the sample, the achieved samples will, as a result of the variation in weights, have somewhat higher variances than an equal-probability sample of similar size. Table 3-4 illustrates the expected effects on the variance of (household-level) estimates under various scenarios corresponding to different rates of oversampling. The entries in the table represent the expected design effects due to unequal weighting, that is, the ratio of the variance of an estimate from a stratified sample design with

oversampling to the corresponding variance from an equal-probability sample of the same size. It can be seen that under Scenario 1 (the oversampling rates used in NESARC-III), variances can be expected to increase from 4 to 7 percent depending on race/ethnicity group. This represents a modest and tolerable increase in variance compared to the other two scenarios, in which the high- and moderate-minority segments are oversampled much more aggressively. Despite the higher yields of minority cases expected under Scenarios 2 and 3, Scenario 1 was chosen for NESARC-III because it offered a good balance between increased sample sizes for minority groups and acceptably low design effects.

Table 3-4. Expected unequal weighting design effects under various rates of oversampling

	Oversampling scenario*		
	1	2	3
Race/ethnicity of household	A = 2.00 B = 1.50 C = 1.00	A = 2.50 B = 1.75 C = 1.00	A = 3.00 B = 2.00 C = 1.00
Hispanic	1.06	1.11	1.16
Black	1.06	1.10	1.14
Asian	1.07	1.13	1.19
White	1.04	1.08	1.11

* A, B, and C designate the three minority strata (high, moderate, and low). Values correspond to relative oversampling rates under various scenarios.

It should be noted that the results in Table 3-4 apply only to the household component of the person-level sampling weight and are intended to illustrate the impact on variances resulting from the use of differential sampling rates in the various minority strata. In addition, variation in the sampling weights will result from aspects of the NESARC-III sample design other than oversampling, including (a) the restriction of the within-household samples to no more than two eligible adults; (b) the capping of the sample size for new or missed addresses found as a result of the address verification procedures; and (c) the occasional adjustment of the sampling weights to account for unanticipated multiple chances of selection. Moreover, the variability of the sampling weights will be further increased by the use of variable nonresponse adjustments to compensate for household and person nonresponse, as well as the use of poststratification adjustments to calibrate the weighted sample counts to known population totals.

3.3.6 Subsampling of Segments for Address Coverage Enhancement

To improve survey coverage, a subsample of segments was selected and assigned to field staff for the purpose of locating DUs not included on the lists of addresses associated with the sampled segments (i.e., the segment-level address frames described in Section 3.4.1). This subsample was selected by first assigning each of the 7,200 sampled segments to one of six categories based on urbanicity and the difference between the number of DUs in the segment as reported in the 2010 Census and the corresponding number of addresses in the address-based sampling frame. Urbanicity was defined by collapsing the nine-digit county-level Rural-Urban Continuum Codes (also referred to as Beale Codes) developed by the U.S. Department of Agriculture into two levels: urban (levels 1-3) and rural (levels 4-9). The six categories were defined as follows:

- **Category 1.** Segments to be listed (see Section 3.4.2).
- **Category 2.** Segments for which the count of geocoded addresses was greater than or equal to the census count of DUs.
- **Category 3.** Urban segments for which the census count of DUs was slightly greater than the count of geocoded addresses.
- **Category 4.** Urban segments for which the census count of DUs was much greater than the count of geocoded addresses.
- **Category 5.** Rural segments for which the census count of DUs was greater than the count of geocoded addresses.
- **Category 6.** Rural segments for which the census count of DUs was much greater than the count of geocoded addresses.

The six categories represented groups of segments for which the corresponding segment-level address lists used for sampling purposes were expected to provide varying levels of coverage. In particular, segments in Category 1 were expected to have the lowest coverage rates and thus were designated with certainty for manual listing by field staff (see Section 3.4.2). Segments in the remaining five categories were assigned varying probabilities of selection for address verification that depended on the magnitude of the difference between the segment-level census count and the corresponding address frame count and other factors. In general, segments with low expected coverage were assigned higher probabilities of selection than segments with high expected coverage. The procedures used to select the verification segments were modified in Waves 3 and 4 based on an analysis of results from Wave 1.

There were 118 Category 1 segments, all of which were completely listed in the field (see Section 3.4.2). From the other five categories, 691 segments were randomly selected at variable rates for address verification/coverage enhancement. In these segments, field interviewers were instructed to identify and record all addresses in the segment that were not originally included on the corresponding segment-level address list. Section 4.2 describes how the address verification/coverage enhancement procedures were implemented in the field.

3.4 Selection of Addresses/Dwelling Units

A total of 71,052 addresses/DUs were selected for NESARC-III. The selected DUs included those selected from segment-level address lists derived from master address files maintained by the U.S Postal Service (USPS), manually compiled listings of DUs in areas where the USPS address lists were unsuitable for sampling purposes, DUs found as a result of quality control and coverage enhancement procedures employed in the field, and a small number of separate DUs discovered during the initial screening of a sampled address. Table 3-5 summarizes the distribution of the sampled addresses/DUs by type of segment and type of unit. The following sections provide additional details about the procedures used to select the addresses and DUs for NESARC-III.

Table 3-5. Results of address/dwelling unit sampling by type of segment and type of sampled unit

	Sample units in drop points			Sample units in non-drop points		Addresses added in field			
Segment type	Drop points sampled	Units selected	Hidden DUs	Sampled from frame	Hidden DUs	Address verification	Other	Hidden DUs	Grand total
Non-verification	458	884	1	60,860	183	NA	0	0	61,928
Verification	54	99	0	5,070	12	2,714	0	13	7,908
Listed	0	0	0	0	0	0	1,214	2	1,216
All	512	983	1	65,930	195	2,714	1,214	15	71,052

DU, dwelling unit

3.4.1 Address-Based Sampling Frame

Except for the Category 1 segments (discussed in Section 3.4.2), the third-stage sampling units were residential addresses derived from commercially available address lists based on

information from the USPS's Address Management System (AMS). The AMS contains all residential and commercial addresses along a mail delivery route, excluding government and military addresses. These lists cannot be purchased directly from the USPS. Rather, an organization already having a list of residential addresses can obtain the delivery information for those addresses and thus confirm that they are correct, after qualifying for and purchasing a license from the USPS.

All of the addresses for the sampled segments were obtained from a vendor with a license to the Computerized Delivery Sequence (CDS) file. The CDS contains information on all delivery point addresses serviced by the USPS, with the exception of general delivery. (In cases where carrier route or post office box delivery is not available, general delivery mail is held at a main post office for recipients to claim within 30 days.) Each address record submitted by the vendor that matches the USPS file is assigned the ZIP+4 code, carrier route code, delivery sequence, delivery type, and seasonal delivery information. The USPS does not correct or add addresses to the vendor's list during the initial submission process. However, any erroneous addresses will be indirectly identified because they will lack delivery information after this process. The USPS makes updates to half the records on a vendor's list every month, and thus the file is updated completely every 2 months. The updates include adding or removing records as necessary, as well as making other corrections.

Each address obtained from the address vendor included a census block identifier (determined primarily by street-level geocoding, which assigns the census block associated with the street location of the address). For the addresses that could not be street-level geocoded, the census block was assigned based on the centroid of the nine-digit ZIP Code, if available, or otherwise on the centroid of the five-digit ZIP Code.

As a result of the geocoding methodology used to assign addresses to blocks (and hence to area segments), DUs may not be physically located in the census block to which they were assigned by the address vendor. The addresses used for the third stage of sampling were those associated with the sampled segments, as determined by the vendor based on census block geocoding. As a result, some sampled addresses may be physically located outside the boundary of the sampled segment. Also, some addresses within the boundary of the sampled segment may be assigned by the vendor to another segment. These differences between the census blocks based on physical locations and the vendor's census block assignments are referred to as *geocoding errors*. Geocoding errors are not a concern from a sampling perspective. Every address is assigned to one and only one segment, and thus every address has one and only one chance of selection. From a

data collection perspective, however, there is a decrease in efficiency because the addresses are more dispersed than was originally intended when the segments were created.

Almost all of the addresses in the sampling frame are associated with a single DU. However, slightly fewer than 1 percent of the addresses in the sample segments are associated with multiple DUs. This type of address is called a *drop point*. For drop points, the USPS delivers mail to one central location where residents pick up their mail or non-USPS personnel distribute the mail to the residents. Each individual unit associated with a drop point is called a *drop unit*. The address lists obtained for the sampled segments indicated which addresses were drop points and the count of the associated drop units.

3.4.2 Special Listing Procedure for Indian Reservations and Rural Segments

Although post office boxes and rural-route addresses are valid mailing addresses, such addresses were excluded from the third-stage sampling process because the linkage between the mailing address and the DU's physical location could not be determined in advance of sampling. As a result, some rural areas that rely on these types of addresses are not well represented in the lists of addresses used in the third stage of sampling. The same is true for certain areas on or near Indian reservations, where the use of city-style mailing addresses is less common than in more urbanized areas. Therefore, lists of DUs in these areas were manually compiled instead of using commercially available lists of addresses (see Section 4.3 for additional details about the listing procedures). The 118 segments designated for manual listing included all of the sampled segments in three rural counties. An average of 9 to 10 city-style addresses per segment were selected from the manually compiled lists.

3.4.3 Sampling of Addresses from Address Lists

Systematic samples of addresses were selected from the lists of addresses developed for each of the sampled segments. Except for the selection of drop points (which do not apply to the manually listed segments), the within-segment sampling procedures were generally the same for segments employing the (geocoded) address-based sampling frames and those for which the lists were compiled manually. In segments consisting of more than one census block, the addresses were implicitly stratified by sorting the segment-wide address lists by census block before sampling. Non-

drop point addresses were sampled with equal probability within a segment. Drop points were sampled with probability proportional to a MOS, where the MOS was based on the number of units associated with the drop point in the sampling frame. If there were three or fewer drop units associated with the drop point, the MOS of the drop point was set equal to 1.0. When the count of drop units was greater than three, the MOS was the number of units divided by 3. The divisor of 3 was used to compute the MOS for the larger drop points so that up to three units (or more than three in some rare circumstances) could be subsampled from each selected drop point.

The within-segment sampling rate used to select addresses varied by segment. It was designed to yield an expected sample of 9 to 10 addresses per segment prior to losses due to ineligibility or nonresponse. The following formula was used to compute the within-segment sampling rate for segment *s* in PSU *h*:

$$f_{hs}^{within} = (n/MOS_{population})\, A_{hs} \,/\, (P_h \;\; P_{hs}),$$

where

n = the total number of addresses to be sampled,
$MOS_{population}$ = the total PSU MOS for the universe of 2,349 PSUs (Section 3.2.2),
A_{hs} = the minority oversampling factor for segment *s* in PSU *h*,
P_h = the probability of selecting PSU *h*, and
P_{hs} = the conditional probability of selecting segment *s* in PSU *h*.

The values of n and $MOS_{population}$ used to compute the within-segment sampling rates were n = 65,000 and $MOS_{population}$ = 151,560,155.

The within-segment sampling rate and an address's MOS determined the probability that an address was included in the sample of selected addresses. Let M_{hsi} equal the address-level MOS assigned to drop-point address *i* in PSU *h* in segment *s*, and let M_{hsi} equal 1 for non-drop-point addresses. The probability of selecting address *i* in segment *s* in PSU *h*, denoted $P_{hsi}^{address}$, was

$$P_{hsi}^{address} = M_{hsi}\, f_{hs}^{within}.$$

Note that while the probability of selecting segments was based on segment-level counts of occupied housing units at the time of the 2010 Census, the addresses exposed to sampling in the selected segments were those on updated lists of geocoded addresses, which might contain geocoding errors. Therefore, there might be differences between census dwelling counts and

corresponding counts of addresses in the updated lists of geocoded addresses. As a result of these differences, the number of addresses sampled per segment can vary from segment to segment. On average, 9.3 addresses were sampled from each sampled segment. An address sample was selected prior to each data collection wave, to ensure that the most up-to-date address samples were assigned to data collection.

3.4.4 Subsampling of Drop Units and Added Units

A *drop point* is a postal address consisting of multiple DUs that has all of its mail delivered to a single physical location. A *drop unit* is an individual DU in a drop point. Some of the addresses selected from the lists of geocoded addresses were drop points. When a field interviewer visited a drop point to conduct a screening interview, the interviewer's first task was to identify all of the drop units. If the number of drop units was less than or equal to three, screening interviews were attempted with occupants of all the identified drop units. If the number of drop units was greater than three, however, the list of drop units was transmitted back to the home office, where the drop units were subsampled with equal probability.

The subsampling rate for the drop units associated with drop points having more than three drop units was chosen so that, if possible, the sampling weight for a sampled drop unit was equal to the sampling weight for sampled non-drop-point addresses in the same segment. When the number of identified drop units was *equal* to the expected number of drop units that was used to compute the drop point's MOS, the size of the drop-unit subsample was set equal to three regardless of the number of drop units in the drop point. However, if the number of confirmed drop units exceeded three but was *less* than the expected number of drop units, less than three drop units could be selected from the drop point without unduly increasing the sampling weights of the sampled drop units. If the number of identified drop units was much larger than the expected number of drop units, on the other hand, it would have been necessary for the drop-unit subsample to be much larger than three in order to maintain the desired weight for the segment. To reduce data collection costs and limit the clustering effect resulting when many interviews are conducted in the same drop point, special handling was needed if the number of identified drop units was much larger than the expected number of drop units. In such cases, the size of the drop-unit subsample was reduced so that the resulting sampling weights of the subsampled drop units did not exceed three times the sampling weight of a sampled non-drop-point address in the same segment.

Most, but not all, non-drop-point addresses were single-unit dwellings. If a field interviewer was assigned a non-drop-point address that turned out to be a multi-unit dwelling, then, as with the drop-point procedure described above, the interviewer performed an *add-unit* procedure to identify the individual units. If the number of identified units was less than or equal to three, screening interviews were attempted with the occupants of all identified units. If the number of identified units was greater than three, however, the list of identified units was transmitted to the home office for equal-probability subsampling in the same way that drop units were subsampled.

3.4.5 Sampling of Added Addresses in Verified Segments

In 691 segments, field interviewers conducted a verification operation in which they recorded addresses in the segment that were not included on the segment's list of geocoded addresses. These recorded addresses were then transmitted to the home office, where they were reviewed and then retransmitted to the address vendor to determine whether they were, in fact, on the address-based sampling frame. For example, an address recorded as being in a verification segment but not on the associated list of geocoded addresses might, in fact, be on the address-based sampling frame because of a geocoding error. The potential undercoverage of the address-based sampling frame was handled by subsampling those addresses confirmed by the vendor as not being on the address-based frame. Such addresses were referred to as *added addresses*.

When possible, the added addresses were sampled at a rate so that the sampling weight of a sampled added address was the same as the sampling weight of an original address sampled from the geocoded address list for the same segment. This was not possible, however, if the probability of selecting a segment for verification was less than the corresponding within-segment sampling rate for selecting addresses, in which case the sampling weight of the sampled added address was larger than the sampling weight of addresses sampled from the list of geocoded addresses. Another situation in which the sampled added addresses had a larger sampling weight than the addresses sampled from the geocoded list was when a segment had many added addresses and a lower sampling rate was used to reduce data collection costs or limit the clustering effect associated with conducting many interviews in the same segment. When it was necessary to use a lower sampling rate, it was chosen so that the sampling weight of the sampled added addresses did not exceed three times the sampling weight of addresses sampled from geocoded lists for the same segment.

3.4.6 Sampling of Hidden Addresses/DUs

At the conclusion of the screening interview, respondents were asked if any other persons/households resided at the sampled address that would otherwise not have any chances of being included in the study (see Section 4.4). Such separate living arrangements (e.g., a basement apartment or rented room) are referred to as *hidden DUs* or *hidden addresses*. Any such units found in the field were added to the DU sample at the time of screening. As Table 3-5 shows, 211 hidden DUs were added to the sample as a result of this procedure.[6]

3.5 Selection of Persons

The fourth and final-stage sampling units were eligible persons within the sampled responding households. To be eligible for sample selection, a person had to be 18 years or older at screening and not currently on active duty in the U.S. Armed Forces, Military Reserves, or National Guard. One sample person (SP) was selected from screened households with three or fewer eligible persons, and two SPs were selected from households with four or more eligible persons. Allowing the selection of more than one SP in the larger households was expected to be operationally efficient without unduly inflating design effects resulting from sample clustering. The procedures used to select SPs in multiple-SP households were designed to minimize potential clustering effects to the extent feasible, while giving minority household members somewhat higher chances of selection whenever possible. Section 3.5.1 describes the within-household sampling algorithm used to subsample persons for the study.

3.5.1 Sampling Algorithm

The selection of persons within households depended on both household size and household composition. In general, minority persons (Hispanic, Black, or Asian) in mixed-race households were given higher probabilities of selection than nonminority household members. This was accomplished using a within-household sampling measure of size (HMOS) and a probability-proportional-to-HMOS sampling algorithm, as described below.

[6] Table 3-5 shows that the 211 hidden DUs consist of 195 DUs in sampled non-drop-point DUs, 1 hidden DU in a drop unit, 13 hidden DUs in households added by the address verification process, and 2 hidden DUs in households sampled from the manually compiled lists of DUs.

The first step was to assign a minority status indicator (MINSTAT) to all eligible members of the screened household, as indicated in Table 3-6. Values of MINSTAT = 1 (minority) or MINSTAT = 2 (nonminority) were assigned for within-household sampling purposes based on responses to the ethnicity and race questions in the household enumeration (roster). When the ethnicity or race variables had values of "don't know" or "refused," the value of MINSTAT was unknown; in such cases, a value of MINSTAT = 1 was used for within-household sampling purposes.

Table 3-6. Values of MINSTAT (1 or 2) assigned for within-household sampling purposes based on race/ethnicity codes reported in the screener

	Reported race of household member*					
Reported ethnicity of household member	White	Black/ African American	Asian	AIAN, Native Hawaiian/ Pacific Islander, or other	Don't know	Refuse
Yes (Hispanic)	1	1	1	1	1	1
No (Not Hispanic)	2	1	1	2	1	1
Don't know	1	1	1	1	1	1
Refuse	1	1	1	1	1	1

AIAN, American Indian/Alaska Native

* Ethnicity and race are assigned in the screener through two questions. The first question is used to establish the Hispanic origin of the household member. The second is used to establish race. For the race question, the respondent can indicate multiple races. In this table, the columns "White," "Black/African American," and "Asian" refer to persons who were coded into one racial group only. For sampling purposes, persons who reported two or more races were assigned to the column "AIAN, Native Hawaiian/Pacific Islander, or other."

Next, a HMOS was assigned to each eligible household member according to the rules in Table 3-7. The value of HMOS—assigned to household members depending on the race/ethnicity of the household member, as well as the size and racial/ethnic composition of the household—was equal to the within-household selection probability of the household member. As Table 3-7 shows, a minority person often had a higher probability of selection than a nonminority person when both were present in the household. The HMOS provided a convenient way of specifying the desired within-household sampling rates, and the sampling algorithm described below was easily implemented on the laptop computers used in the field:

Prior to sample selection, eligible persons within the selected household were sorted as follows:

- If there were four or more eligible persons in the household, the eligible persons were sorted by MINSTAT (see Table 3-6), then by sex within MINSTAT, and finally by age groups within sex. The sorting by age group was from youngest to oldest for males and

from oldest to youngest for females. If the sex variable was missing, the person was treated as a female for sorting purposes.

- If there were fewer than four eligible persons in the household, no demographic sorting was done.

Starting at the beginning of the sorted roster within a household, random systematic sampling was used to select exactly one SP (if the household contained three or fewer eligible persons) or two SPs (if the household contained four or more eligible persons) with probabilities proportional to HMOS.

Table 3-7. Value of HMOS assigned for sampling persons within household

		HMOS		
N_{elig}	N_{min}	MINSTAT = 1 (minority)	MINSTAT = 2 (nonminority)	Comments
1	–	1	1	HMOS = 1 regardless of minority status
2	0	–	1/2	Select exactly 1 SP; minorities are selected at higher rates than nonminorities
	1	2/3	1/3	
	2	1/2	–	
3	0	–	1/3	Select exactly 1 SP; minorities are selected at higher rates than nonminorities except when N_{min} = 2
	1	1/2	1/4	
	2	1/3	1/3	
	3	1/3	–	
4	0	–	1/2	Select exactly 2 SPs; minorities are selected at higher rates than nonminorities except when N_{min} = 2
	1	1	1/3	
	2	1/2	1/2	
	3	1/2	1/2	
	4	1/2	–	
5	0	–	2/5	Select exactly 2 SPs; minorities are selected at higher rates than nonminorities except when N_{min} = 4
	1	1	1/4	
	2	1/2	1/3	
	3	1/3	1/2	
	4	2/5	2/5	
	5	2/5	–	
6+		$2/N_{elig}$	$2/N_{elig}$	Select exactly 2 SPs regardless of minority status

N_{elig} = number of eligible persons in household. N_{min} = number of eligible minority persons in household.

Main Study Data Collection 4

4.1 Overview

To collect information on the health of people across the nation for NESARC-III, trained staff interviewed a nationally representative sample of 36,309 adults, aged 18 and older, residing in private households and college dormitories across the United States. Sample persons were randomly selected to represent the adult population in the country as a whole. Black, Hispanic, and Asian adults were sampled at a higher rate than the remainder of the population to ensure reliable estimates of these groups.

The main study was conducted from April 2012 through June 2013. Approximately 1,000 trained interviewers visited sampled addresses to select and interview adults, and attempt to collect a saliva sample. Each sample person (SP) was asked questions about background and lifestyle, such as age and education; drinking practices; and related mood, anxiety, behavior, personality, and medical conditions. In the final component of the interview, for SPs who provided consent, a saliva sample was collected for research purposes.

Interviewers transmitted electronic data to Westat's home office on a daily basis. Collected saliva samples were sent to Westat via FedEx twice a week, where they were receipted, processed, and prepared for analysis. Final data were prepared for analysis.

4.2 Address Verification

Although research has shown that the address vendor's address lists, produced from the U.S. Postal Service (USPS) Computerized Delivery Sequence (CDS) file, were sufficiently accurate and complete for use as NESARC-III's survey sampling frame, the exact coverage of these address lists for any given geographic area was not altogether known. Therefore, to improve the survey coverage, a sample of segments was selected to undergo a coverage enhancement procedure, as described in Section 3.3.6. Sections 4.2.1 through 4.2.5 describe the procedures used to carry out the address coverage enhancement operation, called address verification (AV). The NESARC-III design involved 150 primary sampling units (PSUs) and 7,200 area segments. Just under 10 percent of these

segments were selected for the AV procedure, as described in Section 3.3.6. At four distinct periods throughout the NESARC-III data collection period, AV was conducted in a total of 691 segments.

4.2.1 Staff Organization for Address Verification

The AV operation was staffed by local NESARC-III field interviewers. During the data collection period, field supervisors selected approximately 200 field interviewers to be specially trained for the additional task of AV. The interviewers conducting AV were managed by the same regional field supervisors overseeing the interviewing in each PSU, and the same field structure was used to manage the AV work: The field supervisors reported to their designated field manager, who then reported to one of the two field directors. On average, each supervisor had one or two field interviewers trained as address verifiers in his/her region. Verifiers were selected based on their experience as listers or other similar work experience or skill sets. The entire AV operation was overseen by a home office manager.

4.2.2 Address Verification Materials

A segment folder was prepared for each sampled segment. The folder contained navigation, segment, and image maps and, where needed, one or more inset maps. All maps were printed on 11" x 17" paper, except that the navigation map was printed on 17" x 24" paper. The segment folder also included a form containing general comments and any special instructions.

The navigation map displayed a large geographic area surrounding the segments, showing routes of travel to the segment. This map gave the verifiers a geographic context to help them locate the segment. The segment and image maps in each folder defined and described the sample segments, permitting the verifiers to identify the exact boundaries of the sampled areas. The size of the segments varied substantially, depending on the urban or rural character of the area. In densely populated residential areas, segments consisted of one or more city blocks. In rural areas, segments covered many miles.

The segment map was a more detailed picture, showing all streets and other geographic features of the area to be verified. Occasionally, a section of the segment was too dense (i.e., included too many streets) or there was not enough space to print street names and other descriptive information on the map. In these circumstances, verifiers received one or more enlarged

portions of the segment map, called inset maps. Address verifiers were required to mark their segment maps with several annotations to assist with the home office quality review and help the interviewer locate sampled addresses. These annotations included the location where they began work in the segment, arrows that indicated their route of travel while canvassing the segment, and the location of added dwelling units (DUs) for which a complete address could not be determined.

The home office produced the navigation, segment, and inset maps using census-defined segment layers and incorporated them into a map design with the most current NAVTEQ geospatial data (i.e., roads, land, and water features). PDF files of the maps were generated. Each PDF was manually reviewed and altered, if necessary, to ensure that the automated mapping procedure resulted in an appropriately scaled representation of the area of interest.

The image map was a satellite (aerial view) photograph of the segment. Segment boundaries were overlaid onto the photographic image. These maps were often helpful, in tandem with the regular segment maps, for determining the exact location of the segment boundaries in relation to the physical features and topography of the area.

The Special Instructions and General Comments Form allowed the home office to communicate information to the verifier and enabled the verifier to note any special circumstances encountered in the segment.

In addition to the segment folder materials, the AV computer application was the primary tool for conducting AV activities. Using this program on the same laptop used for interviewing, the verifiers worked with a list of preloaded addresses for each segment. The addresses on this list were determined to be located within the segment boundaries by a process known as "geocoding" (as described in Section 3.4.1), which uses latitude and longitude coordinates to identify the physical location of the address.

In the AV application, the verifier assigned a status code indicating whether or not he/she was able to locate the preloaded address within the segment boundaries. Verifiers also used the AV application to add any DUs they found in the segment that were not on the address list. The software contained fields to record the complete address, including street name, house number, and, if appropriate, apartment number, of every DU that was added. In rural areas, where house numbers were not always available, verifiers used special features in the AV application to document the physical features of the unit and describe its location in relation to other landmarks so that it could later be identified by an interviewer if sampled.

4.2.3 Training Address Verifiers

Address verifiers were trained at two times during the data collection period. The training program covered the fundamental concepts and basic procedures of AV, challenging situations (e.g., procedures for working in rural areas), and administrative procedures. Trainers highlighted AV procedures unique to NESARC-III, including instructions for adding group quarters and other structures that did not qualify as DUs (e.g., military barracks, hospitals, and transient hotels or motel rooms).

The first group of 126 verifiers was trained in person the day after the April 2012 interviewer training session. Trainees completed a 2-hour home study package before attending the half day (4-hour) in-person training. The home study consisted of reading the NESARC-III AV manual and completing a set of practice exercises to acquaint the trainee with the nature of the job and the concepts and procedures that would be covered in detail at the in-person training. The in-person training included lectures with slides, a hands-on session using the AV application, and a final practice exercise that enabled the trainees to demonstrate their understanding of AV concepts and skills and provided more practice using the AV application. Trainees submitted the final exercise to home office staff for review. Trainees had to show an adequate understanding of the AV procedures on this final exercise before AV segments were assigned to them.

The second group of trainees (50 field interviewers), were selected and trained approximately halfway through the data collection period, in advance of the Wave 3 sample release. This second training was necessitated primarily by attrition in the first group of interviewers trained as address verifiers. Supervisors selected interviewers for the second AV training from among those who had joined the study since the initial training as well as from among interviewers who had been with NESARC-III from the beginning but who had not previously been trained on AV.

This second group of interviewers was trained on AV using a self-paced, Internet-based training course developed for NESARC-III. The course was developed both to provide a more cost-effective training approach and give the interviewers more time to work through the training material than the first group of AV trainees had received during the 4-hour in-person training. The second group of trainees was assigned the same 2-hour home study package and were then given instructions for accessing and progressing through the online training, which was provided through the home office's learning management system. The online training and the earlier in-person training provided the same content and opportunities for practice with the AV application. Trainees were

required to complete the final practice exercise and submit it to the home office for review before they were allowed to receive an AV assignment.

4.2.4 Address Verification Operation

AV was conducted in the field four times during the NESARC-III data collection period, at the beginning of each sample release wave. Address verifiers conducted AV in their assigned segments before beginning any newly assigned interviewing work for that wave. Most PSUs had an average of one to two AV segments per wave. Verifiers could reasonably complete AV in their assigned segments within the first several days to a week of the wave and then begin or return to interviewing.

To conduct AV, the verifier canvassed the entire segment on foot or by car, depending on geographic size and population density, based on a set of specific rules. He/she observed every structure in order to locate those that appeared to meet the definition of a DU. When a verifier observed a DU in the field, he/she searched for it on the segment's preloaded address list in the AV application. Verifiers assigned all preloaded addresses one of four status codes: (1) "Located in Segment," (2) "Located Out of Segment," (3) "Located Don't Know Segment," or (4) "Unable to Locate." If the verifier found a DU that he/she could not match to an address on the preloaded list, he/she followed the procedures for entering new addresses into the AV application. If no house or apartment number was evident for an added DU, the verifier recorded a detailed description of the unit and its location, using features of the AV application designed for this purpose. While canvassing the segment and recording address data, the verifiers also annotated and corrected their maps (if necessary), as described in Section 4.2.2.

Field directors, field managers, field supervisors, and home office staff monitored the AV effort using a suite of reports that could be generated on demand via the Supervisor Management System. Statisticians also monitored the AV operation to compare yield with census figures.

Verifiers transmitted data on completed AV segments from the field to the home office. The hard-copy segment folders containing all completed maps and forms were returned to the home office. The electronic data as well as the maps and other segment folder contents were reviewed by the home office for completeness, accuracy, and adherence to procedures. Segment assignment and completion were tracked using SMS reports.

As described in Section 3.4.5, after the data for completed segments had been reviewed and edited as necessary, all addresses added in the field were transmitted to the address vendor to determine if they were, in fact, on the address-based sampling frame. To improve the coverage of the survey estimates, the home office selected a subsample of the added addresses not found on the frame and fielded them for interviewing.

4.2.5 Quality Control Procedures

Specially trained home office staff conducted a thorough quality control check on each completed AV segment. Before the verifier transmitted the electronic data and sent back the maps and other segment folder materials, he/she participated in a report call with home office staff to review his/her work and make sure it was completed according to the AV protocol. After the segment data were received at the home office, staff reviewed each segment using a set of SMS reports describing various aspects of the address data collected in the field. Preloaded and added addresses were compared with the annotated segment maps and a variety of online databases to confirm that the address data collected by the verifier were accurate and complete. If this review uncovered problems or inconsistencies in the data, verifiers were consulted to resolve the issue. AV managers then edited the data for added addresses to correct any problems before these addresses were transferred to the address vendor for matching or to the statisticians for sampling. Throughout the quality control operation, verifiers received feedback on their completed segments in order to improve the quality of their work in future AV segments.

4.3 Listing

The vendor-supplied address lists from the USPS CDS file were determined to be inadequate for use as a sampling frame in 4 of the 150 NESARC-III PSUs. These PSUs contained a total of 118 segments. Therefore, these segments were manually listed in the field. Originally, listing was to be conducted by the same interviewers trained to conduct AV; however, during Wave 1, this model proved to be inefficient. Therefore, starting with Wave 2, listing was conducted by 12 specially trained listers, who, unlike the address verifiers, were not NESARC-III field interviewers and were dedicated to the task of listing.

All 12 listers had traditional listing experience within the previous 2 years. Listers were trained during a 1-day in-person training, preceded by a 2-hour home study. The listing training and home study were similar in content and design to the first AV training described in Section 4.2.3. Listers were trained to use the AV application to record addresses. The listers were managed directly by a home office staff member who reported listing progress to the project director. Listing for Wave 2 was conducted at the outset of the wave; for increased efficiency, listing for Waves 3 and 4 was conducted concurrently at the beginning of the Wave 3 sample release.

Field materials for listing were very similar to those used for AV, as described in Section 4.2.2. All maps and forms were the same. Compared to the original AV procedures, lister guidelines for canvassing the segment were more stringent, and the required map annotations were somewhat more detailed. The home office provided listers but not address verifiers with the number of DUs expected in the segment based on census data. The AV application functioned in a similar way for AV and for listing; however, since the objective of listing was to obtain a complete list of DUs in the segment, no addresses were preloaded for the listed segments. Listers were required to add all DUs located within the segment boundaries, thus creating the list of addresses for the segment.

Because the NESARC-III design was based on the 2010 Decennial Census data and the listing operation was carried out approximately 2 years after the census field operations, relatively few structural changes had occurred in the segments. Hence, in most segments, the difference between the expected and actual numbers of DUs was not great. For the most part, segment boundaries were also still intact and could be easily located.

The quality control procedures performed for the listed segments were virtually identical to those used for the AV segments. However, because there were no preloaded addresses for listed segments, there were no address checks with the address vendor and all listed addresses were sent directly to sampling.

4.4 Data Collection Instruments and Interviewer Materials

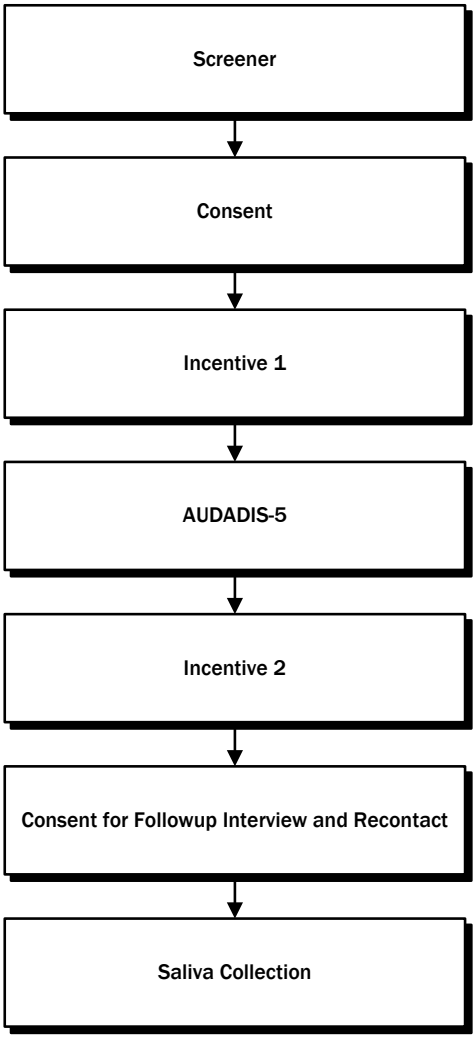
The NESARC-III study protocol incorporated several automated data collection instruments, as well as numerous materials, documents, and supplies. This section describes the content, features, and functionality of the automated systems developed for data collection, as well

as the materials designed to assist interviewers in conducting the interview and performing their other administrative tasks.

4.4.1 Data Collection Instruments for Computer-Assisted Personal Interviewing

The following subsections briefly describe the individual automated instruments (the screener, Consent module, Incentive modules, Alcohol Use Disorder and Associated Disabilities Interview Schedule – 5 [AUDADIS-5], Recontact module, and Saliva module), as well as the Interviewer and Supervisor Management Systems. Exhibit 4-1 shows the order in which the automated instruments were administered at a sampled address with at least one sample person (SP).

Exhibit 4-1. Flowchart of NESARC-III data collection tasks



Screener

The computer-assisted personal interviewing (CAPI) screener was used to collect household information and to select one or two members of the household for participation in the AUDADIS-5 interview and saliva collection. The screener began with a confirmation of the sampled address, followed by a household enumeration in which the interviewer recorded the first name of all household members. The interviewer then entered each household member's sex, age, race, and ethnicity. The interviewer asked about active-duty military status only for household members aged 17 and older. If an eligible household member was sampled, the interviewer collected the relationship of each household member to each SP. The screener could be administered to any household member aged 18 or older.

To facilitate interview validation as part of the quality control process, as well as case followup for SP-level data collection purposes, the respondent was asked to provide a telephone number where he/she (and the SP, if applicable) could be reached. Finally, if an address had been selected for the added-household procedure, the interviewer followed the procedures provided at the end of the screener.

The SP selection criteria were programmed into the screener instrument. The sampling procedure used to select the appropriate AUDADIS-5 interview respondent(s) at each sampled address was implemented by the CAPI system; the interviewer had no discretion about whom to include in the sample. The CAPI screener selected one respondent in households having one to three eligible members and two respondents in households having four or more eligible members.

A Spanish version of the screener was administered by a certified bilingual interviewer in households where the members spoke only Spanish.

Consent Module

The Consent module was used to document the SP's official consent to participate in the NESARC-III study and was administered as the first SP-level task. As part of this module, interviewers provided the hard-copy consent brochure to the SP and allowed time for the SP to read it. The consent brochure text was also accessible through this module as a PDF version, available in all study languages.

Once the interviewer had answered any questions, the SP was asked to indicate whether he/she (1) agreed to participate in the interview and provide a saliva sample, (2) agreed to participate in the interview only, or (3) preferred not to participate. The interviewer then indicated the SP's consent status in the CAPI system by selecting the appropriate response. SPs kept the consent brochure for their records.

Incentive 1 and Incentive 2

The incentive module was used to document the incentive payment provided to SPs who agreed to complete the AUDADIS-5 interview. Because two $45 incentive payments were made to each SP who completed the AUDADIS-5, there were two separate Incentive tasks: one immediately prior to the AUDADIS-5 task (enabled when the SP consented to participate in the interview) and the second that was enabled upon successful completion of the AUDADIS-5 interview.

As part of this module, interviewers were instructed to double-key the check number of each incentive check provided to an SP. The CAPI module also instructed the interviewers to complete the hard-copy documentation of the incentive process. Additionally, it included a field to indicate if the SP declined the incentive.

Alcohol Use Disorder and Associated Disabilities Interview Schedule – 5 (AUDADIS-5)

The AUDADIS-5 interview contained the following sections: Background Information (Section 1); Alcohol Consumption (Section 2A); Alcohol Experiences (Section 2B); Alcohol and Medicine/Drug Treatment Utilization (Sections 2C and 3D, respectively); various family history items (Sections 2D, 3E, 4C, 11B, and 15A); Background Questions (Section 2E); Tobacco and Nicotine Use (Section 3A); Medicine and Drug Use (Section 3B); Medicine and Drug Experiences (Section 3C); Low Mood I and II (Sections 4A and 4B, respectively); High Mood (Section 5); Anxiety (Section 6); Specific Anxiety (Section 6A); Social Situations (Section 7); Specific Situations (Section 8); General Anxiety (Section 9); Usual Feelings and Actions (Section 10); Behavior (Section 11A); Traumatic Experiences (Section 12); Background Section III (Section 13); Medical Conditions (Section 14); and Low Weight, Eating, and Overeating (Sections 17 and 18).

Demographic information collected for SPs during the screener interview (e.g., age, sex, race, and ethnicity) was directly imported into the AUDADIS-5 interview. The CAPI program controlled the AUDADIS-5 instrument flow by using answers to prior questions to determine which questions should be asked and which should be skipped for each respondent. Hard and soft edits were also programmed directly into the CAPI program, and inconsistencies were reconciled with the respondent during the interview.

Recontact

The Recontact module was enabled upon completion of the AUDADIS-5 interview. It included three components:

1. Collection/verification of the best time and telephone number(s) for recontacting the SP for standard quality control purposes;
2. Informed consent for the Reliability or Validity followup studies; and
3. Additional SP contact information for followup study purposes.

As with the AUDADIS-5 interview and saliva consent procedures, the Recontact module instructed interviewers to provide a hard-copy followup consent document for the SP to read. After answering any questions, the interviewer asked the SP if he/she would agree to take part in a second interview, if selected. Interviewers documented the SP's consent in the CAPI module. If the SP consented, the interviewer collected additional contact information, including the best telephone number at which to reach the SP; the name, address, and telephone number of a close family member or friend; and any plans to move within 6 weeks.

The consent and contact information associated with the followup studies was collected only for one-SP, non-Asian-language-speaking households.

Saliva

The Saliva module guided the interviewer through the collection of a saliva sample. This component was enabled upon completion of the Recontact task, based on the SP's consent status as documented in the Consent module. Early in the data collection period, the home office implemented a procedure that enabled the interviewer to attempt the Saliva module with SPs who

had initially not consented to saliva collection. Following completion of the AUDADIS-5 interview, interviewers were prompted by the CAPI system to offer SPs the opportunity to provide a saliva sample, building on the rapport established during the interview (see Section 4.8.3.6 for further discussion and results).

The Saliva module included steps for interviewers to complete before starting saliva collection, including plugging in the barcode scanner, setting up all materials, and putting on gloves. The CAPI module also included several modes for instructing interviewers on collection techniques. All SPs were shown a brief video before providing a sample; the video was embedded in the Saliva module. The CAPI module also included the functionality to view a transcript of the video and a PDF version of the saliva collection instructions.

The interviewer indicated in the Saliva module whether the SP provided a sample. If so, the interviewer was prompted to scan the barcode on the saliva collection tube. If the interviewer had difficulty using the scanner, the barcode could be entered manually. Once the barcode had been entered, the module presented interviewer instructions for sealing the sample in a plastic specimen bag and handing the thank you letter to the SP. If no sample was collected, the system prompted the interviewer to document the reason.

4.4.2 General Features of the Computer-Assisted Interviewing System

The CAPI data collection instruments described in Section 4.4.1 were incorporated into the Interviewer Management System (IMS). The Supervisor Management System (SMS) was a similar system designed for use by field managers and home office management staff. These two systems are described in Sections 4.4.2.1 and 4.4.2.2, respectively.

4.4.2.1 Interviewer Management System

The IMS was an integrated software system used to manage an interviewer's assigned cases and other study activities. This system was developed for the 2011 field test and enhanced for the main study. IMS features could be accessed on the laptop using one of two modes of operation: stand-alone mode or online mode. The online mode features required access to the home office's centralized database.

The IMS stand-alone mode provided the following capabilities:

- Case browse, allowing the interviewer to review assignments;
- Status review for the case and its individual tasks;
- The ability to launch and administer all CAPI instruments;
- Entry of status codes and other information on an Electronic Record of Calls (EROC) and Electronic Non-Interview Report Form (ENIRF); and
- Added DU processing.

The IMS online mode provided the following capabilities:

- Data transmission;
- Time and expense reporting;
- Documentation of shipment of case materials and saliva samples to the home office;
- Hotline alerts;
- Review of finalized cases report; and
- Email.

The primary functions of the IMS were (1) Browse Case, (2) Browse Person, (3) Data Transmission, and (4) Email. Each function is briefly discussed in the following subsections.

Browse Case

The Browse Case window displayed the following information about each of the interviewer's assigned cases:

- Case identification (ID) number;
- Street address, city, state, and ZIP Code;
- Indication of whether the case was associated with a drop point, group quarters, or other multiple DU situation;
- Overall case status and status date;

- Screener instrument status;
- Date and time of any scheduled appointment (at either the address or SP level);
- AUDADIS-5 instrument status; and
- SP language preference (as determined in the screener).

The Browse Case window also contained the Activity Log, which displayed a history of previous EROC entries. This display included the following items:

- Contact date and time;
- Specific instrument or task;
- Contact status or result;
- Contact type (in-person or telephone);
- Who was contacted;
- Comments about the contact; and
- Appointment date and time, if applicable.

The EROC allowed the interviewer to enter interim status codes only. Finalized statuses were entered manually by the supervisor, using the SMS (see Section 4.4.2.2), or automatically by the CAPI system upon completion of each interview task.

The Browse Case window also provided the functionality for completing the added DU/household procedure. There were three types of situations in which interviewers were required to check for and add individual units associated with a sampled address: (1) drop-point addresses, (2) group quarters where residents reside in separate DUs, and (3) other "base" addresses found to contain multiple DUs. For addresses identified as drop points, the Add Unit functionality was enabled upon assignment of the case. For addresses determined to be group quarters and other situations where interviewers found multiple DUs associated with the sample address, the Add Unit functionality was enabled by the home office and transmitted to the interviewer's laptop.

The Add Unit module collected identifying address information about each unit found at the base address. Depending on the number of units added, the IMS either added the new cases to the interviewer's Browse Case assignment or sent information to the home office for sampling of

units. Interviewers were able to access identifying information about added units through the View Identifier feature on the Browse Case screen.

Browse Person

When an SP was identified during screening, SP-level data were added to the IMS. For completed screeners in which one or two SPs were selected, Browse Person was used to view SP-level information, such as SP ID number, first name, age, sex, telephone number, SP-level status, status date, and language preference.

Browse Person functionality was also used to complete the SP-level tasks, such as the AUDADIS-5 interview, Consent module, Incentive modules, Recontact module, and Saliva module. Finally, interviewers could enter SP-level EROC and ENIRF information from the Browse Person screen.

Data Transmission

The Transmit button was used by the interviewers to enter their time and expense data, transmit case data, record shipments of cases and saliva samples to the home office, access hotline alerts, and view a finalized cases report. These functions are discussed in more detail below.

Data transmission involved sending electronic information from the interviewer's laptop to the home office and sending new study data to the interviewer's laptop. Items sent from the home office to the interviewer's laptop included new or transferred assignments and case status code updates entered by the supervisor. Items sent from the interviewer's laptop to the home office included interview data for completed or partially worked cases, EROC entries, and data concerning finalized cases that were ready to be shipped to the home office.

As part of the preparation for shipping finalized case materials, interviewers indicated in the IMS which case folders and saliva samples would be included in each shipment, as well as the tracking number used for the mailing.

The Hotline Alert feature was used by the home office, field supervisors, and interviewers to exchange information about cases in a more secure environment than email.

Information shared via the Hotline Alert was typically related to calls from the selected addresses/SPs requesting or rescheduling appointments and similar issues. Additionally, this feature provided a safe way for the home office or supervisors to communicate personally identifiable information. Interviewers received alerts but could not send, initiate, or reply to them.

Email

Outlook Express was used to send and receive email. Interviewers were in frequent email communication with their supervisors.

4.4.2.2 Supervisor Management System

The SMS was designed for the 2011 field test and revised as necessary for the main study. Supervisors used the SMS to manage the case work within their region. The system included the following functions:

- Case review, assignment, reassignment, and unassignment to interviewers;
- Case search using the following criteria: PSU, wave, case ID, interviewer, status, and status date;
- Assignment of the final status of cases, at both the address and SP levels;
- Review of time and expense data recorded by interviewers; and
- Report production (see Section 4.9.2 for a detailed discussion of the reports).

4.4.3 Interviewer Materials

The administration of the NESARC-III interview required numerous hard-copy interviewer materials, including several advance materials, flashcard booklets, interviewer manuals, and other assorted items. These materials are discussed in Sections 4.4.3.1 through 4.4.3.6.

4.4.3.1 Advance Materials

During preparation for the main study, NESARC-III staff took considerable effort to develop introductory materials that would convince respondents of the study's legitimacy and importance. Consideration was also given to readability and comprehensibility to ensure that these materials could be easily understood by the general U.S. population. These materials were subjected to a "plain language" review as well as cognitive interviews to ensure that the intended message was effectively conveyed to household members.

Advance letter. Before the interviewer's first contact with the sampled address, the home office mailed an advance letter. The letter introduced the study, identified the sponsor, stated the study's purpose, and asked for cooperation. It was signed by the NIAAA Project Officer.

Brochure. The brochure explained the study in detail and emphasized the importance of participation. Interviewers could use this at the doorstep to help encourage participation and answer questions about the study.

Community authorization letter. This general letter was intended to be displayed to landlords, apartment managers, postal employees, police departments, or other professional people whom interviewers might encounter in the community. It provided assurances that the interviewer was not selling or soliciting but was a trained professional working on a government-sponsored health study.

Sorry-I-missed-you card. This card was left when the interviewer visited an address and no one was home. Interviewers often personalized the card with a brief message or left their name on the card; this provided some familiarity and recognition when the interviewer returned to the household.

Photo ID badge. All interviewers were required to wear their photo ID badge at all times when representing the NESARC-III study.

Business cards. Business cards personalized with the interviewers' names were given to respondents as needed. The cards were printed with the study's toll-free number and website address.

Nonresponse letters. Several versions of nonresponse letters were developed and sent to addresses and/or SPs that refused to participate in the study or that the interviewer had difficulty accessing. See Section 4.8.3.1 for a list of these letters.

Language identification card. This card was used in non-English-speaking households to identify the language spoken by the household. If the identified language was one of the NESARC-III study languages, interviewers used a second language card to introduce the study in the appropriate language and determine general availability for a callback attempt.

Spanish-language and Asian-language (Mandarin, Cantonese, Korean, and Vietnamese) versions of the advance letter, brochure, and sorry-I-missed-you-card were produced and distributed as well.

Most of the materials included the toll-free study hotline number as well as the NESARC-III website address. The website was developed for members of sampled addresses and contained information specific to the respondent's or SP's role in NESARC-III, including an overview of the study and answers to frequently asked questions.

4.4.3.2 Case Folder and Associated Contents

One case folder was produced for each sampled address in the study. The case folder helped the interviewers keep track of the status of all cases in their assignment.

A label on the cover specified the case ID, the street address of the sampled address, and the case control code (a unique code that helped ensure that interviewers entered the data in the correct case ID).

The front of the folder contained a study introduction, for convenient access at the doorstep, and included an address verification question. The Spanish translation of the study introduction was located on the inside front cover.

During assembly and assignment of the case folders, the home office inserted the consent brochure, followup consent document, and thank you letter (described below).

- **Consent brochure.** Interviewers were instructed to give the consent brochure to the selected SP, as the first step in the extended interview process. This document was referenced in the CAPI Consent module. The consent brochure contained information on the purpose of the study, uses of the data collected, confidentiality and data privacy issues, risks and benefits of participation, and contact information for further questions.

- **Followup consent document.** Interviewers were instructed to give the followup consent document to the selected SP, as prompted in the CAPI Recontact module. This document was similar to the consent brochure but focused solely on participation in the reliability and validity followup studies.

- **Thank you/help brochure.** At the end of the interview, the interviewer provided the SP with a brochure that thanked him/her and provided contact information for accessing health care in his/her community, if needed.

These materials were provided to SPs during the interview.

4.4.3.3 Flashcard Booklets

Three bound booklets were used throughout the interview to facilitate the flow of the data collections instruments: the AUDADIS-5 Flashcard Booklet; the Alcohol, Drug, and Medicine Guide; and the Job Aid Booklet. These are described in more detail below.

- **AUDADIS-5 Flashcard Booklet.** This booklet was used during the AUDADIS-5 interview to help the SP select the appropriate response to various instrument items.

- **Alcohol, Drug, and Medicine Guide.** This booklet listed common alcohol brands, as well as brand names and slang terms for various medicines and drugs, to assist the SP as needed during the AUDADIS-5 interview.

- **Job Aid Booklet.** The Job Aid Booklet included two flashcards for use during the screener instrument; frequently asked questions (FAQs) about the study; instructions for the added-unit and added-household procedures; and consent, saliva collection, and interview closing instructions in the non-English study languages.

4.4.3.4 Saliva Materials

Collection of the saliva sample required the following additional materials:

- **Saliva kit.** A specially designed saliva kit was used by the SP to collect the saliva sample. The kit was provided by DNA Genotek and was designed to be easy to use and noninvasive.

- **Disposable gloves, alcohol wipes, and paper towels.** The use of disposable vinyl gloves, prepackaged alcohol wipes, and paper towels ensured that the saliva collection process was carried out in a safe and sanitary manner.
- **Specimen bag.** After the sample was collected, the interviewer sealed it in a specimen bag before shipment to the home office.
- **Bubble wrap bags and cardboard boxes.** Interviewers enclosed the specimen bag containing the saliva sample in bubble wrap before putting it in the cardboard box. Up to two samples could be included in a cardboard box. The cardboard box was then enclosed in a FedEx Clinical Pak.

4.4.3.5 Interviewer Manual

The study-specific interviewer manual included an introduction to the study and an overview of interviewer responsibilities. The text covered field materials and procedures for locating sampled addresses; contacting respondents; administering the screener, AUDADIS-5 interview, and other CAPI components; and collecting the saliva sample. The interviewer manual also contained information on maintaining quality control procedures, using the IMS features, keeping records, completing the Time and Expense Report, and reporting to the supervisor. A detailed table of contents and section markers helped the interviewer locate specific information in the manual. Interviewers received the manual as part of their home study prior to training.

4.4.3.6 Supervisor Manual

The supervisor manual included study-specific information, as well as general field supervisory content. The manual covered interviewer recruiting guidelines, use of the NESARC-III SMS, monitoring of field progress, case reassignment and nonresponse, quality control, and performance evaluations. Supervisors received the manual prior to in-person supervisor training.

4.5 Field Staff Training

The following sections describe the comprehensive training program provided to the NESARC-III field supervisors and interviewers. The discussion focuses on the large-scale field interviewer training held before the launch of data collection in April 2012. Due to field interviewer

attrition, multiple attrition training sessions were conducted over the course of the field period. These supplementary training sessions are detailed in Section 4.5.3.6.

4.5.1 Approach to Training

A challenge of the training plan was to prepare field staff to conduct a traditional interview covering sensitive topics, while also mastering the steps involved in collecting a saliva sample. Interviewers were trained in proper survey administration techniques that applied to the full NESARC-III data collection process. Additionally, the training focused on the sensitive nature of the questions asked in the AUDADIS-5 interview and the heightened level of sensitivity required to administer that instrument. Interviewers served a much different role in the collection of the saliva sample, facilitating the SP collection process and using the collection materials and equipment according to study protocol.

The basic approach to interviewer training was to maximize trainees' active involvement and participation in the training, to provide ample opportunity for supervisory staff to observe and evaluate trainee performance, and to provide trainees with detailed reference documents.

Each training room had a lead trainer and an assistant trainer responsible for approximately 18 to 20 trainees, with interviewers divided into groups according to supervisory region. All training staff were Westat staff members. Lead trainers were drawn from NESARC-III project staff, NESARC-III field managers, and other Westat home office employees with proven training experience. The NESARC-III regional field supervisors served as the assistant trainers. A systems staff member was also assigned to each room to assist with all technical hardware and software issues associated with the laptop computers and NESARC-III interviewing software. The sessions were monitored by NESARC-III project staff from Westat's home office and NIAAA staff members.

During training, evening meetings were held with all lead and assistant trainers, other Westat home office staff, and NESARC-III field management staff to discuss any issues or problems that had arisen during the day. Minor modifications to the training program or schedule were discussed as a group. Any necessary changes or clarifications to the materials or protocols were made and distributed to the training staff.

Trainees with potential performance problems were identified throughout training, and remedial measures were discussed at these nightly meetings. Such trainees were closely observed and were paired during dyad role plays with a staff member who could assist them during the mock interview. They were also required to attend evening practice sessions during which they could focus on the element of the interview causing the most problems, such as navigating the screener enumeration grid, using the IMS, or mastering the procedures for proper saliva collection.

4.5.2 Interviewer Training Techniques

The general approach to NESARC-III training centered on five basic training techniques that have been extensively used and refined by survey operations professionals over the past 30 years. The following paragraphs briefly describe the five techniques and how they were used for training on NESARC-III.

Home study. About 2 weeks before training, interviewers received a 9-hour home study package and their laptop computer, as described in Section 4.5.3.3.

Demonstration. Early in the training session, interviewers watched a videotaped demonstration of the NESARC-III interview, from knocking at the door to attempt a screener through selection of an SP, administration of the AUDADIS-5 interview, and collection of a saliva sample. Although some portions of the interview were abbreviated (e.g., the AUDADIS-5 interview was not shown in its entirety), this demonstration interview introduced the trainees to the NESARC-III instruments and gave them an idea of their role and responsibilities on the project. The trainees were able to see the overall flow of the interview before receiving instruction on each individual instrument and component.

Interactive lecture. This technique provided trainees with detailed instructions for administering the data collection instruments. The lead trainer used a scripted lecture to present the basic concepts of the instrument to the entire group of trainees. Trainees took turns playing the role of interviewer and asking the questions, while the lead trainer provided responses from the script. The lead trainer's script included instructions to interrupt the script at appropriate times to review certain sections of the interviewer manual, point out some of the less obvious features of the instrument, or explain certain terms. All trainees were required to follow along on their computers and enter the responses provided by the trainer. A response was entered into a laptop by an experienced interviewer who served as the data display operator, and then the response was

projected on a screen so trainees could check their entry. Interactive lectures were used for the initial presentations of the screener, AUDADIS-5, saliva module, and other CAPI instruments (e.g., recontact, consent, and incentive tasks). The scripts used for the interactive lectures presented increasingly complex scenarios so trainees became familiar with the various types of cases they would encounter in the field.

Practice exercises. Written exercises reinforced and tested trainees' comprehension of certain concepts. They were particularly well-suited for evaluating the trainees' comprehension of some of the more complicated instrument issues, such as navigating the screener enumeration grid, determining the relationship of each household member to each SP, classifying children of interest in the AUDADIS-5 items, and entering ROCs and EROCs.

Dyad role playing. Role playing provided additional practice and gave trainees a feeling for the overall flow of the interview. Trainees were arranged in pairs (dyads), as designated by the training team. One member of each pair was given a scripted copy of the interview instruments, complete with data entry instructions, and played the role of the respondent; the other trainee played the role of the interviewer and administered the full interview. The script began with the screener and ended with collection of a saliva sample.

Additionally, paid respondents recruited by a local focus group facility were brought in toward the end of the training session. These respondents were very similar to the types of SPs the interviewers would encounter in working their real NESARC-III cases. Interviewers had the opportunity to work one on one with a respondent to conduct an unscripted interview. Interviewers gained a great deal of confidence from having this exposure to an actual respondent, who provided unscripted responses and asked unscripted questions in a "safe" training environment before the interviewer worked his/her first field assignment. Training staff observed these practice interviews and provided feedback after the interview.

Interviewer Training Materials

The training materials were carefully scripted to cover every concept that the interviewers needed to know, and the scripts were organized into training guides. The elaborate preparation of training materials accomplished two purposes. First, it achieved standardization, which is particularly important when a large staff of interviewers is being trained in separate sessions. Second, it allowed all trainers to study the training guides, rehearse their roles, and be

completely prepared for training. This was particularly important in a training effort that required a large training staff. The scripted materials eliminated the necessity for the trainer to improvise. This preparation allowed the NESARC-III training sessions to move smoothly and on schedule, which gave the interviewers confidence that they were being trained by knowledgeable staff.

4.5.3 Training Sessions

This section provides details on the individual training components developed for the NESARC-III training, including train-the-trainers sessions, supervisor training, interviewer home study, general interviewing techniques, in-person interviewer training, bilingual interviewer training, address verification training, and attrition training.

4.5.3.1 Train-the-Trainers Sessions

Approximately 45 lead and assistant trainers, as well as numerous systems support staff, were trained on the NESARC-III training program during a train-the-trainers session in March 2012. The 3-day training was a simulation of the interviewer training program, although the pace was accelerated because of the experience level of the group. Additionally, sessions that did not require direct instructional time in interviewer training (e.g., written exercises, dyad role plays) were not reviewed in detail.

The train-the-trainers session served three primary purposes:

1. To provide an opportunity to evaluate and refine the interviewer training materials;
2. To serve as a dress rehearsal for training staff; and
3. To give supervisors background knowledge about NESARC-III and details on all study procedures, equipment, and materials to prepare them for their field management responsibilities.

Following training, the NESARC-III team evaluated all training materials and made revisions, as necessary. Most of the changes were minor, although some new content was developed to fill identified gaps in the training program.

4.5.3.2 Supervisor Training

A 1½-day training was held for the NESARC-III field managers and supervisors immediately before the train-the-trainers session. This supervisor training, conducted by the NESARC-III field director, with support from the NESARC-III operations manager, focused on management techniques and duties specific to the NESARC-III data collection, as detailed in Table 4-1.

Table 4-1. Overview of the NESARC-III study-specific supervisor training session

Day	Topic	Presentation mode
1	Introduction and overview of the study	Lecture and PowerPoint slides
	Overview of field supervisory responsibilities	Lecture and PowerPoint slides
	Effective team communication	Lecture and PowerPoint slides
	Supervisor Management System	Hands-on practice on computer
	Managing cases and making assignments	Lecture and hands-on practice on computer
	Setting goals and monitoring field progress	Lecture and hands-on practice on computer
	Averting and converting refusals	Discussion
2	Monitoring production and cost reports	Lecture and hands-on practice on computer
	Quality control procedures	Lecture and hands-on practice on computer
	Interviewer travel guidelines	Lecture and discussion
	Address verification overview	Lecture and PowerPoint slides
	Field interviewer evaluations	Lecture and PowerPoint slides
	Use of email, Excel, Word	Hands-on practice on computer
	Administrative forms	Hands-on practice

A major focus of the training was the Supervisor Management System (SMS). Field supervisory staff spent a significant amount of time gaining hands-on exposure to the SMS, including using its functions to more efficiently manage their staff and assignments. They also learned how to use the various management reports produced through the SMS to support and facilitate their managerial responsibilities.

After completing the train-the-trainers and supervisor training sessions, field managers and supervisors returned home to prepare for their role at interviewer training and to assume supervisory responsibilities.

4.5.3.3 Interviewer Home Study

A comprehensive home study package was developed for NESARC-III. Interviewers were required to complete all portions of the home study training before attending the in-person session. The training content provided a solid introduction to the NESARC-III study, as well as exposure to the study terminology and selected study-specific protocols. Additionally, this training mode was used to deliver content that did not require in-person interaction and instruction.

The home study package incorporated a variety of instruction modes, including reading sections of the NESARC-III Interviewer Manual and other training content, answering quiz items, and watching videos. Interviewers gained exposure to and experience working with materials such as the Interviewer Manual and Flashcard Booklet, as well as hands-on practice with the laptop. As part of the home study package, all interviewers completed a self-administered, self-paced tutorial that introduced the procedures for conducting a computer-assisted interview. The tutorial instructed trainees on types of questions, function keys, and special commands. The training also included practice in logging on to the computer and using the keyboard, particularly the keys used to manage the flow of the instruments. Interviewers were also instructed on how to connect the computer to the Internet to send a practice email to their supervisor and conduct a practice data transmission.

Table 4-2 lists the topics included in the approximately 9-hour home study training.

Table 4-2. Content of interviewer home study package

Topic	Format
Welcome to NESARC-III and Westat Laptop orientation	Magazine Video and hands-on practice
Outlook Express email tutorial	Tutorial and hands-on practice
Westat background	Video and exercise
NESARC-III specific content from interviewer manual	Manual and exercise
Responding to frequently asked questions	Interactive practice
Saliva collection	Manual, video, and exercise
Basics of CAPI administration	Self-guided computer tutorial
Administrative topics (code of conduct, standards and ethics)	Video
NIH Information Security Awareness Online Training Affidavit of Nondisclosure	Online video Hard-copy form

Interviewers received the home study materials, laptop, equipment, and instructions approximately 2 weeks before the in-person training. The sessions were then completed at their own pace. Supervisory staff followed up with all interviewers in their region to answer questions, provide

guidance, and ensure that the home study was completed on schedule. The NESARC-III CAPI Help Desk staff were also available by telephone to assist with any equipment- or systems-related issues. Trainees brought their completed exercises and forms to the in-person interviewer training session for review by field supervisors and discussion at training.

During subsequent attrition training sessions, the home study content was gradually redeveloped for incorporation into Westat's Learning Management System (LMS). Many of the quizzes were administered electronically rather than in hard copy, and the LMS tracked completion of the various modules and provided feedback on the interviewer's performance.

4.5.3.4 General Interviewing Techniques

Interviewers new to Westat received 4 hours of in-person training on General Interviewer Techniques (GIT) before project-specific training. The in-person GIT training program included an audiovisual presentation, interactive participation, written exercises, and a question-and-answer period. The training introduced the interviewers to survey research; provided examples of survey questions, recording conventions, and interviewing terminology; and taught them basic listening and probing skills for obtaining accurate data. The interviewers completed exercises on applying probing techniques and answering respondent questions. The importance of data quality was also reviewed.

Starting with the January 2013 attrition training, the GIT component of training was integrated into the online LMS and completed as part of the home study package, rather than during in-person training.

4.5.3.5 In-Person Training

In April 2012, 471 interviewers completed a 4-day, in-person training program in Greensboro, North Carolina. Thirteen groups of interviewers were trained concurrently in two back-to-back sessions, for a total of 26 groups (i.e., 26 supervisory regions). Holding numerous simultaneous training sessions at one site allowed the NESARC-III field director, home office staff, and NIAAA staff to observe all training sessions while maintaining a manageable number of interviewers in each training room.

Most of the training was devoted to teaching procedures for administering the data collection instruments: screener, consent, AUDADIS-5, incentives, recontact, and saliva collection. In addition, trainers provided instruction on gaining respondent cooperation, locating addresses, and contacting households, using the IMS, assigning status codes, and completing administrative forms. Another major focus of the training was the procedures for collecting a saliva sample, to ensure that interviewers received hands-on experience with saliva collection and felt comfortable collecting, handling, packaging, and shipping samples. Table 4-3 presents an overview of the training program.

Table 4-3. Overview of the in-person interviewer training session

Day	Topic	Presentation mode
1	Introduction and overview of the study	Lecture and PowerPoint slides
	Demonstration of the NESARC-III interview	Video presentation
	Study materials	Lecture with hands-on use of materials
	Locating sampled addresses	Lecture with PowerPoint slides and hands-on use of maps
	Contacting households	Lecture with PowerPoint slides
	Use of IMS	Interactive lecture with hands-on use of computer
	Screener	Interactive lecture with hands-on use of computer
2	Screener	Interactive lecture with hands-on use of computer
	Screener enumeration grid practice	Individual exercise
	AUDADIS-5 interview	Interactive lecture with hands-on use of computer
	Gaining respondent cooperation	Video, interactive lecture, and dyad practice
3	AUDADIS-5 interview	Interactive lectures with hands-on use of computer
	Saliva collection	Interactive lectures incorporating CAPI and hands-on use of saliva collection materials
	Screener, AUDADIS-5, consent, incentives, recontact, saliva	Dyad role playing
4	Gaining respondent cooperation	Interactive game
	Paid respondent practice covering all interview components	One-on-one
	Administrative procedures	Lecture and PowerPoint slides
	Meeting with supervisors	Discussion

During the AUDADIS-5 lectures and interactive exercises, coverage was given to the sensitive nature of the interview questions. Interviewers were encouraged to remain very neutral during the administration of the items. Although they were asking about potentially embarrassing, illicit, or illegal activity, interviewers were instructed to read the questions as worded and not to apologize for them. As long as interviewers read the sensitive questions just like any other item, SPs

should generally answer them truthfully and without embarrassment. This was particularly true of the questions related to drug and medicine use and abuse.

Saliva Training Protocol

A major focus of the training was the protocol for properly collecting a saliva sample, from setup of materials through shipment to the home office. The saliva training sessions incorporated video, lecture, hands-on practice with the materials, interactive practice with the IMS saliva module, and a role play of a full saliva collection with another trainee. The groups reviewed all components of the saliva collection kit and other materials, discussed procedures to avoid compromising data quality, were instructed on quality control techniques to ensure proper collection, reviewed barcode scanning procedures, and learned the various features of the IMS module used to facilitate and track the saliva sample collection.

The trainees also received instruction in handling problem situations, including failure of the barcode scanner, SPs who initially provided consent but then refused to provide a sample, SPs unable to provide a sample and SPs who requested privacy.

Full interview role plays, as well as the live respondent session, provided interviewers with additional opportunities to practice saliva sample collection. This hands-on practice was the most effective method of ensuring that trainees understood proper collection techniques.

Evening Practice Sessions

Three evening practice sessions, or labs, were held during training. These labs focused on gaining cooperation; general CAPI help, including instrument and IMS issues; and data transmission. The labs were staffed, as appropriate, by NESARC-III project staff, lead and assistant trainers, and technical staff. Lab participation was mandatory for interviewers identified as requiring additional training time and optional for those who self-identified as needing additional practice and assistance. To the extent possible, one-on-one help was provided during the evening lab sessions.

4.5.3.6 Address Verification Training

Address verification (AV) training was conducted immediately after the NESARC-III in-person training. This 4-hour training instructed interviewers on the quality control process developed to check the address lists used for sampling against the residential addresses they located within the segment boundaries to determine the accuracy of the address list. Before coming to training, AV interviewers also completed a 2-hour home study tailored to AV content. See Section 4.2.3 for additional discussion of AV training.

4.5.3.7 Bilingual Interviewer Training

Immediately after the NESARC-III in-person training, bilingual training was held for bilingual interviewers certified to conduct interviews in any of the five non-English study languages (Spanish, Korean, Vietnamese, Mandarin. and Cantonese). Home office staff fluent in the study languages served as trainers for these 4-hour sessions. Spanish bilingual training took place in one room, while training for the Asian languages was combined.

During this training session, interviewers worked with the various advance materials as well as the CAPI translations of the screener and the AUDADIS-5. Trainees reviewed materials in the various languages, learned to toggle between English and the other study languages, and familiarized themselves with the instruments by reading through a scripted role play.

4.5.3.8 Attrition Training

Because of interviewer attrition, several supplemental or attrition trainings were held over the data collection period. These training programs were led by NESARC-III project staff, as well as staff who had served as trainers during the initial interviewer training session. Attrition trainings were almost identical to the instructional program used at the initial training session, with a few minor enhancements that were made between each session.

4.6 Conduct of the Field Work

The NESARC-III field period began in April 2012, immediately following the completion of the main interviewer training session, and lasted for approximately 15 months, until the end of June 2013. The following sections describe the field operations, including the general approach, the schedule and production, and the reporting systems used to manage the field effort.

4.6.1 Field Organization

The main study data collection was carried out by a large field organization, headed by the NESARC-III operations director, who was supported by two field directors, up to eight field managers, and up to 32 field supervisors across the United States. As additional interviewing staff was continually recruited and added to the field force throughout the data collection effort, the size and organization of the field management staff varied appropriately throughout. With the supervisors overseeing an interviewing staff of approximately 18-20 interviewers each, the field management staff expanded throughout, reaching the largest numbers after the January 2013 attrition training session, and then gradually reduced through the end of the field period as regions and work efforts were consolidated. This section presents a general description of the field organization and the responsibilities of the staff at each level.

4.6.1.1 Recruiting Field Staff

Field staff were recruited and hired directly by the NESARC-III recruitment team at Westat. This effort was headed by the NESARC-III operations manager, with the work supervised by the field managers and field directors. As interviewers were hired from the areas in which the interviewing assignments were located, field supervisors were primarily responsible for recruiting and hiring the interviewers needed in their own supervisory areas. As data collection progressed and the field management staff increasingly needed to focus their efforts on the day-to-day management of case production, NESARC-III adopted a model where field interviewer recruitment and hiring was handled through a central recruiting team staffed by NESARC-III field and home office staff who were dedicated to the hiring of field interviewers for NESARC-III.

A variety of recruitment methods were employed on NESARC-III. The primary source of potential field staff was Westat's web-based tool, which contains information about Westat data collectors, including prior Westat experience and performance evaluations. Recruitment staff were able to search by geographic area to identify available field personnel who met the qualifications for a project. In addition to this database of employees who have previously worked for Westat, NESARC-III recruiters also had access to a database of all persons who had previously applied for a Westat study, but had not yet been hired.

After exhausting these sources, recruiters expanded to the use of NESARC-III specific recruiting materials. For example, NESARC-III job descriptions were posted on www.westat.com and a variety of other recruitment websites in accordance with government regulations. Sources such as craigslist.com were employed, as were more traditional approaches such as newspaper advertisements and hardcopy flyers posted in community areas and sent to workforce and unemployment agencies. Finally, networking, referrals, and staff word-of-mouth was used to identify potential applicants. The recruitment approach was tailored to the specific area in which interviewers were needed.

In advertising for a field interviewer position on NESARC-III, the following duties and responsibilities were identified:

- Locate sampled households;
- Persuade respondents to be screened and interviewed;
- Conduct a screener to determine the eligibility of household members;
- Conduct interviews using a CAPI system;
- Obtain the saliva sample;
- Transmit data daily;
- Work a minimum number of hours per day and days per week;
- Follow project protocol for quality and efficiency;
- Complete administrative requirements; and
- Report progress to supervisor.

Interviewers were required to have a minimum of a high school diploma or GED, as well as previous interviewing or public contact experience. Additionally, NESARC-III interviewers were required to be able to lift and carry 15 pounds with or without a reasonable accommodation, be able to walk two blocks and climb a flight of stairs while carrying a laptop computer and other study equipment, with or without a reasonable accommodation, and be available to work a minimum number of hours, including evenings and weekends. Bilingual interviewers fluent in the following languages were encouraged to apply: Spanish, Cantonese, Mandarin, Vietnamese, and Korean. Finally, applicants were required to pass a background screening, including, at a minimum, criminal history records.

4.6.1.2 Field Staff Attrition and Replacement

The level of interviewer attrition experienced on NESARC-III was consistent with that found on recent field studies of similar size and length of field period. The leading causes of attrition were poor performance, such as inadequate interviewer production rates or a high number of hours per completed case; personal or family issues; and acceptance of a full-time position elsewhere. Different approaches were used to deal with attrition problems depending on when and where they occurred. In some areas, new interviewers were hired and trained. In other instances, other interviewers working in the PSU were able to complete the remaining work, or interviewers from other areas traveled to the PSUs where the attrition occurred.

To compensate for attrition and slow production in select areas, additional field interviewing staff was recruited for several attrition training sessions held throughout the field period. Nearly 500 interviewers were successfully trained through these attrition training sessions.

NESARC-III field interviewers' experience level is shown in Table 4-4 below. Approximately 25 percent of interviewers had previously worked for Westat, while about 35 percent had worked as interviewers for other social science research organizations. The remaining 40 percent had other relevant experience. Retention rates were highest among those with experience interviewing for other organizations.

Table 4-4. Experience type and retention rates of NESARC-III field interviewers

	Westat interviewing experience	Other interviewing experience	Other relevant experience	Total
Total interviewers hired by experience	230 (23.7%)	347 (35.8%)	393 (40.5%)	970
Retention (%)	65	74	65	68

4.6.2 Field Management

The management structure of the NESARC-III data collection effort included the Westat project director, deputy project director, director of field operations, field directors, field managers, and regional supervisors. The following sections describe the reporting structure of this organization, as well as the procedures and tools used to assist in the reporting.

4.6.2.1 Reporting Structure

The Westat home office staff who directly oversaw the NESARC-III field organization included the director of field operations and several supporting staff members. The field directors, field managers, and regional supervisors were located in the field. The field directors shared the responsibility of coordinating all activities related to field operations and kept in close touch with the field managers to address issues including production, cost, response rates, and interviewer retention, among others. The field directors worked very closely with the director of field operations. The director of field operations frequently met with the field directors, providing them guidance and direction on their tasks and supervisory responsibilities. They worked together to develop production goals, monitor progress, devise strategies for improving response rates, verify quality assurance, and ensure data collection was conducted according to study protocol.

For purposes of field operations, the 150 NESARC-III PSUs were divided into regions, each headed by a supervisor who typically lived in the region. Each field manager had responsibility for four or five regions and regional supervisors. The field supervisor's primary responsibility was overseeing the work of an average of 15 to 18 interviewers in his or her region.

An important part of the supervisor's job was determining the optimal flow of work to each interviewer. On the basis of the weekly conference call and other communication throughout

the week, as well as analysis of the field interviewers' current cases via the Supervisor Management System (SMS), the supervisor decided when the interviewer was ready for an additional assignment. Supervisors tried to maintain a balance between somewhat competing goals—keeping interviewers supplied with enough work to stay productive and not allowing cases to languish by giving an interviewer more work than he or she could close out in a reasonable time frame. This was complicated somewhat by the quarterly sample releases on NESARC-III.

4.6.2.2 Reporting Procedures and Tools

The smooth progress of field work depended on the ongoing monitoring of the interviewers' work and regular communication among all members of the NESARC-III project staff and NIAAA. The following sections describe the major mechanisms and procedures used for reporting during the NESARC-III field period.

Interviewers were required to contact their supervisors by telephone at a regularly scheduled time once a week to discuss all aspects of their work (response rates, production and cost performance, and quality control results). Each outstanding case in the interviewer's assignment was reviewed and a plan for its approach and finalization was discussed. The supervisor and interviewer discussed any problems reflected in the SMS-generated data collection reports, such as low response rates or a high number of hours per complete case. (See Section 4.9.2 for a discussion of these SMS reports.)

At least once a week, each supervisor had a telephone conference with his or her field manager to discuss progress in the region. Discussion centered on the week's SMS reports as well as on current progress as reported to the supervisor during the interviewers' weekly calls. The weekly conferences between field managers and supervisors were used to discuss problems in the region, the prospects and plans for completing the remaining work, and what help, if any, the supervisor needed in order to complete all work in the region by the end of the field period. Strategies for effectively completing the cases, such as implementing bonus programs or developing plans to travel in groups of experienced refusal conversion specialists for "blitz" periods, were discussed as well.

Similar weekly telephone calls were conducted between the director of field operations and field directors with the field managers, focusing on the issues and topics of particular importance that week. During these calls, the results of quality control procedures were also discussed. If the quality control reports indicated problems with the quality of an interviewer's work,

appropriate steps to correct the problem were determined. (See Section 4.9 for a full discussion of quality control procedures.) In addition to the standard weekly meetings, all NESARC-III field management and home office staff were in constant communication via email and individual phone calls, on a daily basis. Frequent communication was essential to the effective management of the data collection effort.

Once a week, a home office staff meeting was held with the project director, the operations manager, appropriate systems and statistical staff, and other home office staff members. The results for each region were reviewed, and any study-wide problems were reviewed (e.g., production figures and response rates, interviewer attrition, IMS software or hardware issues, or distribution of supplies and materials). Strategies for solving problems were discussed and passed on to the field managers and other staff for implementation.

A weekly operations meeting was also held with the field directors and home office operations staff, including representatives from the NESARC-III field room and address verification operations. This meeting focused on detailed issues arising from the field and the best way to identify and implement a solution. The development of revised procedures and materials were discussed in this meeting, as well as logistics related to attrition training sessions and saliva shipment procedures. The details related to the implementation of larger initiatives proposed in the higher-level meeting were worked out in this group.

Finally, once a month, NIAAA met with key Westat staff to discuss issues related to field progress, response rates, methods to increase and improve production, and the implementation of new data collection strategies. Any important changes in the field work strategy were discussed and agreed to with NIAAA before implementation.

4.7 Data Collection Operations

The following sections describe the general approach to the NESARC-III data collection operation, the schedule for production, and the detailed procedures used to effectively administer the interview.

4.7.1 General Approach

The NESARC-III field effort was designed to be implemented in quarterly waves. As described in Chapter 3, the sample was divided into four waves, each representing between 20-30 percent of the total sample. The first wave was the largest, to accommodate the large number of interviewers trained at the initial training session. Wave 1 also contained a larger proportion of cases in apartment buildings, etc. as these cases would likely require more time to work due to concerns about locked buildings and restricted access. Although all cases associated with Wave 1 were released at once, the cases in remaining waves were released on an as-needed basis throughout the quarter. NIAAA and Westat collaborated on a case release schedule that would ensure interviewers in the field had an adequate work load, while also ensuring that cases were thoroughly worked prior to being finalized. This typically resulted in cases being assigned throughout the quarter, based on response rates and interim caseloads monitored by PSU. Interviewers in individual PSUs could then be targeted as requiring additional cases.

In conjunction with to the release of cases by wave, the field effort used an approach that has been effective for many previous surveys involving large, complex, in-person data collection operations. Under this approach, the field effort occurs in three overlapping stages:

- **Initial Phase.** Cases are assigned by the regional supervisor to an interviewer, who follows certain rules in making a prescribed number of calls to every sampled address in his/her assignment.
- **Reassignment Phase.** Cases that do not result in completed interviews during the initial phase are reviewed by the regional supervisor, and a subset is selected for reassignment to another interviewer in the same or a nearby PSU.
- **Special Nonresponse Conversion Phase.** The field management team assembles a special traveling team of the most experienced or productive interviewers to perform a nonresponse conversion effort, under the supervision of the field supervisors.

The assignments in the initial phase are controlled by the regional field supervisor. In NESARC-III, the supervisors had 2-3 local interviewers available in most PSUs. Each area segment was assigned to one of the interviewers on the basis of the demographic composition of the area and the proximity of the segment to the interviewer's home.

During this initial phase, interviewers were instructed to make up to four in-person calls to the household to complete a screener, and up to four additional in-person contacts—after completing the screener—to administer the AUDADIS-5 interview and saliva collection, which

were typically completed during the same visit. After the prescribed number of in-person attempts to complete the instrument, the interviewer consulted with the supervisor to determine further attempt and contact strategies. The initial phase was considered complete when the interviewer reported a definitive outcome for the case or when the full complement of calls had been made.

To maximize the chances of finding respondents at home, most contacts were made during prime interviewing hours (3 p.m. to 9 p.m. on weekdays and 10 a.m. to 9 p.m. on Saturdays and Sundays). Contacts at each address were staggered on different days of the week and at different times of the day. All calls to complete the screener were made in person, with the exception of a small number of screeners administered via telephone or completed through a self-administered questionnaire mailed to the sampled address. If the screener was completed but the AUDADIS-5 interview could not be completed in the same visit, the interviewer was permitted to use the telephone to set an appointment to return to administer the interview in person.

Interviewers returned NESARC-III materials to the home office on a regular basis, following different shipping rules, requirements, and schedules as presented below:

- Saliva samples were shipped via FedEx Priority Overnight once a week. Interviewers were given bubble-wrap bags, small cardboard boxes, and FedEx Clinical Paks to ensure safe shipping of the samples. Due to concerns about extreme temperatures affecting the quality of the samples, interviewers were instructed to take the samples directly to a FedEx location or arrange for a pick-up from their homes; drop box use was not permitted.
- Once all cases in a segment were closed out, segment folders and associated maps and other materials were returned to the home office.
- Other materials such as expense reports were mailed as needed to the field supervisor, via USPS.

Interviewers used the *Shipments* screen in the SMS to document the shipment of saliva samples and case folders.

4.7.2 Schedule and Production

The original plan for the NESARC-III field effort envisioned a 52-week (12-month) field period in which the sample would be released in four quarterly waves, with each wave implementing the three-phase approach described above. To allow more time to increase response

rates and overall production numbers, a decision was made midway through data collection to extend the field period to approximately 15 months. Although cases were released on a quarterly basis, it was not a requirement that cases be finalized in the quarter in which they were released. Interviewers continued to work cases throughout the full field period, allowing more time for refusal conversion efforts and to attempt contact with those temporarily unavailable. There was a natural spike in closed-out cases at the end of the field period because nonresponse cases were not finalized until the end of the study.

4.7.3 Data Collection Procedures

The NESARC-III data collection procedures were complex and required interviewers to possess organizational skills, techniques for gaining cooperation, and skills in locating and contacting sampled addresses, in addition to a solid understanding of the CAPI instrumentation and protocol for saliva collection. The various elements that encompass the data collection procedures are detailed below.

Locating Sampled Addresses

As described in Chapter 3, the sample selection for NESARC-III involved multiple stages of selection, including the selection of PSUs, segments, addresses, and SPs. Interviewers entered the sample selection process after the third stage, the selection of addresses. Addresses were sampled by statistical staff and case assignments were made to interviewers. Upon receiving their assignment of addresses, interviewers were responsible for locating the sampled address and ensuring it met the definition of a residential dwelling unit to determine its eligibility for the study.

Interviewers followed the steps below in locating sampled addresses:

- **Locate the Segment.** To assist in the location of the sampled addresses, interviewers were provided with a set of materials for each segment, consisting primarily of hardcopy maps. If needed, they could also consult commercial maps, Internet maps, or personal GPS devices.
- **Determine Whether the Sampled Address is a Dwelling Unit (DU).** Interviewers were required to determine if the sampled address met the study's definition of a dwelling unit. If the address was not eligible for the study, it was finalized by the field supervisor and no further work at the address was attempted.

Once the addresses were located and confirmed to be eligible for NESARC-III data collection, interviewers attempted contact with the household, as described below.

Contacting Household Members

The goal of this phase of the data collection process was to gain the household's cooperation and identify a respondent for the screener interview. Interviewers were trained on techniques for effectively contacting the household members of the sampled addresses in their attempt to conduct the screener and AUDADIS-5 interview and build rapport. The project also specified guidelines for contact attempts, things to consider when making contact, and instructions for dealing with difficult contact situations.

At the doorstep, interviewers used a tailored version of the study introduction, as well as the advance letter and study brochure, to introduce themselves and the study to the household member. Interviewers were trained on the importance of a first impression and other skills for communicating interest and enthusiasm about the study.

After the initial study introductions, interviewers attempted to transition directly to the screener interview, assuming an appropriate screener respondent was identified. NESARC-III procedures required the screener respondent to be at least 18 years of age and a member of the household at the sampled address.

The study procedures required that screener contact attempts be made in-person. If the household requested an appointment through the toll-free line, the appointment was scheduled over the telephone, but the screener interview itself was conducted in-person. [However, in December 2012, the project team implemented a mailed paper screener approach to be tried with select households in which numerous unsuccessful in-person contact attempts had been made (see Section 4.8.3.3).]

To ensure efficient contact attempts, interviewers were instructed to develop a strategy for visiting addresses, including varying the day and time of the visits and limiting the number of overall visits made. At the beginning of the field period, the general rule was for the interviewer to make approximately four contact attempts to complete the screener, and an additional four attempts to complete the SP-level tasks. Additional contact attempts were frequently authorized following a discussion with the supervisor, in continued attempts to find the household at home or to convert

interim refusals. In July 2012, the project team instituted a maximum of 10 contacts at both the screener and AUDADIS-5 levels. All cases that had more than 10 contacts were put on hold to be examined as a later time, as it was determined to be inefficient to continue their pursuit.

If a sampled address was visited several times and no one was found to be home, a Sorry I Missed You card was left in an inconspicuous spot (e.g., under a door mat with a corner of the card exposed; between a screen door and front door; in a door jamb).

Conducting the Screener

Once contact was established and an eligible screener respondent identified, the interviewer's first task was to conduct an in-person screening interview with a respondent at each occupied sampled addresses. Interviewers administered the CAPI screener to a household member aged 18 or older, in order to identify eligible sample persons in the household (the final stage in the sample selection process).

Areas of the country with a high percentage of Spanish-speaking and Asian-speaking households were sampled at a higher rate. Certified bilingual interviewers worked in many of these areas, using Spanish translations and four Asian language translations (Mandarin, Cantonese, Korean, and Vietnamese) of the AUDADIS-5 interview and associated interviewing and contact materials. At the screener level, if a non-bilingual interviewer encountered a non-English speaking household, a Language Identification Card (see Section 4.4.3.1) was shown to the household member to help identify the language spoken.

At the conclusion of the screener, 1-2 SPs were identified in most sampled addresses; in a small number of addresses, no SPs were selected. If no SPs were identified, no further NESARC-III activities were attempted with that address. If 1-2 SPs were identified and available, the interviewer attempted to transition to the extended-level interviewing tasks, or at a minimum, set an appointment for a return visit.

Conducting the Extended SP-Level Tasks

Following the completion of the screener interview, the interviewer attempted the administration of the extended-level, or SP tasks. Contact with the selected SP followed the flow described below:

- **Setting.** Interviewers ensured the SP was in an appropriate setting for the interview.
- **Consent.** Interviewers presented the SP with the consent material and documented the SP's response in the CAPI system. If no consent was obtained, no additional data collection activities with the SP were attempted.
- **Incentive 1.** Interviewers provided the SP with the first incentive payment, for all SPs who consented to the AUDADIS-5, or AUDADIS-5 and saliva collection.
- **AUDADIS-5.** Interviewers administered the AUDADIS-5 interview.
- **Incentive 2.** Following the completion of the AUDADIS-5 interview, interviewers provided the SP with the second incentive payment.
- **Recontact.** In this module, interviewers collected recontact information for quality control purposes. Interviewers also determined whether the SP agreed to be recontacted for the Reliability Study and Validity Study. If saliva consent was not obtained, the interview ended at this point.
- **Saliva Collection.** Following the procedures outlined in Section 4.7.4, interviewers collected a saliva sample from the SP.
- **Closing.** Interviewers provided the SP with the Thank you Letter and Help Brochure, packed up all materials, and left the residence.

Interviewers were encouraged to complete the AUDADIS-5 interview, saliva collection, and appropriate administrative tasks with the SP in the same visit. The interviewer informed the SP of the amount of time needed to complete all instruments and attempted to transition directly into the interview after completing the screener. In situations where this was not possible, the interviewer set an appointment time to conduct the interview and confirmed the appointment by telephone at a later date.

If a respondent demonstrated reluctance to participate, through either numerous broken appointments or a voiced refusal, the interviewer completed a noninterview report form (eNIRF) and discussed further contact strategies with the supervisor.

A toll-free hotline was established for respondents to call with any additional questions. The telephone number for this hotline was included on numerous study materials, such as the Advance letter, brochure, SIMY card and Community Authorization letter. A total of 5,319 calls were received by the hotline over the course of the study. Most of the calls were requests for study verification, appointment scheduling, or refusals. Calls were answered and tracked by the NESARC-III field room. Information that needed to be communicated to the field staff (e.g., requests for or changes to appointments) were sent to field managers via the Hotline Alert feature (see Section 4.4.2.1). A breakdown of the calls by reason is shown in Table 4-5.

Table 4-5. Calls to the respondent hotline, by reason for call

Reason	Number	Percentage
Refusal	1,642	30.9
Appointment Requested	3,100	58.3
Appointment Cancelled	188	3.5
Information Request	50	0.9
Other	339	6.4
Total	5,319	100.0

4.7.3.1 Interviewing in Other Languages

The NESARC-III attempted to accommodate as many non-English language speakers as possible. The CAPI AUDADIS-5 interview was available in English, Spanish, Korean, Vietnamese, Cantonese, and Mandarin. Only certified bilingual interviewers were permitted to administer the AUDADIS-5 interview in the study languages; outside translators, neighbors, or household members were not allowed to assist in the interview or attempt translation.

Table 4-6 below shows the percentage of screener and AUDADIS-5 interviews conducted by language of administration.

Table 4-6. Percentage of screener and AUDADIS-5 interviews, inducted by language of administration

Language of administration	Screener (%)	AUDADIS-5
English	94.1	92.7
Spanish	4.7	6.3
Korean	0.2	0.2
Mandarin	0.2	0.2
Cantonese	0.2	0.2
Vietnamese	0.2	0.2
Other = 0.5		
Total	100	100

Locked structures and gated communities presented a special challenge. When encountering these situations, interviewers attempted to locate a security guard, door person, building manager, or rental office staff member. If contact information was posted for the property management office or a security company, interviewers or their supervisors could attempt contact via phone to gain assistance.

Additionally, Westat used phone numbers available for sampled addresses, as determined through reverse directories and the ABS sample vendor, to contact sampled households in locked buildings and gated communities via telephone. This telephone contact was primarily to make contact with the household, introduce the study, and hopefully set an appointment for an in-person visit. Finally, as a last resort in these types of restricted access areas, Westat field staff were permitted to administer the screener instrument via telephone. The use of this practice was limited to locked buildings and gated communities only.

4.7.4 Saliva Collection Procedures

As discussed in Section 4.5.3.5, interviewers were thoroughly trained in the safe collection of saliva samples. SPs were given the option of providing a saliva sample in the Consent module, administered prior to the AUDADIS-5. Saliva collection was attempted for all SPs who agreed to provide a sample during the Consent module, as well as those who did not initially consent, but were persuaded by the interviewer following the administration of the AUDADIS-5 interview, building on the rapport established during the interview. (See discussion of this refusal conversion technique in Section 4.8.3.) Immediately following the administration of the Recontact Module, interviewers transitioned directly to the collection of the sample.

The CAPI Saliva module in the IMS facilitated the collection of the saliva samples. The saliva task included several components:

- Instructions to help the interviewer get set up with the appropriate materials and equipment;
- Text for the interviewer to read aloud to the SP;
- An instructional video for the SP, which includes step-by-step instructions for providing the saliva sample;
- A transcript of the video, allowing the interviewer to reference certain sections of the video instructions, as needed (available in all study languages);
- An electronic version of the laminated saliva collection instructions, in case the hard-copy version was not available (available in all study languages);
- Instructions to the interviewer regarding how to assist the SP during collection of the sample, as well as instructions for preparing the sample after it has been collected;
- A field for the entry of the barcode associated with the sample; and
- A mechanism to report the unsuccessful collection of the saliva sample due to the SP's refusal or inability to produce a sample.

To ensure that saliva samples were not contaminated by food particles from the mouth, SPs were instructed to not eat, drink, smoke, or chew gum for 30 minutes prior to giving the saliva sample. This instruction was given to all SPs approximately 25 minutes from the end of the AUDADIS-5 administration. To the extent possible, interviewers enforced this rule as necessary until the saliva collection was completed.

Steps in the Saliva Collection Process

For all SPs who consented to provide a saliva sample, following the completion of the Recontact module, interviewers launched the next available IMS task—Saliva. The first screen of the Saliva module displayed the four steps interviewers must follow to prepare for the saliva collection process:

1. Plug barcode scanner into computer;
2. Take out saliva collection materials (plastic bag with saliva collection kit, alcohol wipes, paper towels, vinyl gloves and plastic specimen bag);

3. Take out laminated saliva instruction card; and

4. Put on gloves.

Interviewers indicated their completion of each step in the CAPI module.

Next, interviewers removed the saliva collection kit from the plastic bag and opened the lid. The kit contained the following items:

- Saliva collection vial or tube with built-in funnel;
- Cap for sealing the tube after the saliva was collected;
- User pamphlet instructions, which the interviewer was instructed to discard, as they were not consistent with the NESARC-III saliva collection protocol (i.e., the instructions directed the SP to conduct some tasks that the interviewer was supposed to do); and
- User instructions in English printed on the inside cover of the kit.

Once the kit was prepared, interviewers played a brief 1-2 minute video for the SPs, launched directly from the Saliva task in the IMS. This video was developed by DNA Genotek and clearly demonstrated the steps the SP had to follow to provide a quality saliva sample. After answering any SP questions, the SP was instructed to relax and rub his or her cheeks gently for 30 seconds to stimulate the creation of saliva. SPs then removed the tube from the packaging and began to provide the sample, according to the following steps:

1. **Spit until the amount of liquid saliva (not bubbles) reaches the fill line.** The fill line was clearly indicated on the tube. As bubbles were not considered part of the liquid saliva, the full sample sometimes exceeded the fill line.

2. **Hold the tube upright with one hand. Check that the saliva reaches the fill line. If not, continue spitting.** When the SP finished, interviewers instructed the SP to ensure that an adequate supply of saliva had been collected. It was the interviewers' responsibility to check for an adequate collection and encourage the SP to attempt to produce more, if needed. The spitting was required to be completed within 30 minutes. If an adequate sample had not been collected and the SP was unable or unwilling to provide more saliva, the collection process ended.

3. **Once the saliva reaches the fill line, close the lid by firmly pushing the lid until you hear a loud click. The liquid in the lid will be released into the tube to mix with the saliva. Make sure that the lid is closed tightly.** Once the SP filled the tube with an adequate amount of saliva, the interviewer instructed the SP to hold the tube upright with one hand. The SP then used the other hand to close the lid by firmly

pushing it down until a loud click was heard. The click was the sound of the plastic seal of the funnel lid being popped; the liquid that was stored in the lid was then released into the tube and mixed with the saliva sample.

4. **Give the closed tube to the interviewer.** Once the lid was closed, the SP was instructed to give the tube back to the interviewer.

Interviewers were instructed to assist the SP with these steps as needed. In addition to answering questions, interviewers could read the instructions or play the video again. Although the interviewers were instructed to monitor and facilitate the collection of the saliva sample, they were reminded to not stare at the SP due to the "yuck factor" associated with spitting and the need to put the SP at ease during the process.

Once the SP completed the four steps outlined above and provided the sample to the interviewer, the interviewer completed the following final steps to prepare the sample for return to the data collection contractor. These steps were included as interviewer instructions in the CAPI module.

1. Holding the tube upright, the interviewer unscrewed the tube from the funnel.
2. The interviewer used the small cap to close the tube tightly.
3. The interviewer shook the capped tube for 5 seconds to ensure that the solution was adequately mixed with the sample.

Documenting and Packaging the Saliva Sample

After documenting the successful completion of the saliva collection in the Saliva module of the IMS, interviewers scanned the barcode on the tube into the CAPI application, using the external barcode wand scanner. If the scanner did not work properly, interviewers had the option of manually entering the barcode, as well. All barcodes were scanned or entered twice.

The tube was then enclosed in the plastic specimen bag and sealed. The specimen bag contained a small rectangular piece of absorbent material to absorb any saliva spills or leakage that might occur during shipment of the saliva. Finally, the interviewer cleaned up all materials associated with the saliva collection process, disposing of them outside of the SP's residence. Interviewers were instructed to ensure special handling of the saliva samples, meaning that samples and unused kits were stored at room temperature and never in the interviewers' cars.

Special Situations with Saliva Collection

At times, SPs had difficulty producing an adequate amount of saliva for the sample. This was especially true of older SPs or SPs using certain medications that may cause dry mouth. In this scenario, in addition to suggesting that an SP relax and rub his/her cheek for 30 seconds, interviewers were permitted to suggest that an SP put a small amount of sugar on his/her tongue. SPs were required to use their own table sugar; sugar was never provided by the interviewer.

If an SP did not understand the saliva collection procedures despite the video and other materials, interviewers were provided with a sample saliva collection kit that could be used to demonstrate the collection techniques to the SP. Interviewers, however, were instructed to not actually spit into the tube, but to use it for display purposes only.

Occasionally, successful saliva samples were not obtained from SPs who consented to provide a sample. Sometimes, the SP was simply unable to produce a sample. In other instances, the SP reconsidered and did not want to provide a sample. In these situations, interviewers documented in the CAPI system: (1) that the SP did not provide a sample; (2) the reason for not providing a sample (refusal, inability, or other); and (3) whether the kit had been handled by the SP.

Furthermore, interviewers encountered SPs who did not agree to the request to not eat, drink, smoke, or chew gum for 30 minutes prior to saliva collection. In this scenario, interviewers were instructed to continue with standard saliva collection procedures, but to indicate the behavior the SP exhibited in the Saliva comments field.

4.8 Building Response Rates

Response rates on household studies are influenced by three broad categories of factors:

- the ability of the interviewers to obtain cooperation;
- the effectiveness of "callback" procedures; and
- the efforts made by interviewers and supervisors to convert initial nonresponse cases to completed interviews.

These factors are described in the following subsections.

4.8.1 Interviewers' Ability to Obtain Cooperation

An important factor in maximizing response rates is the ability of the interviewers to encourage respondents to participate. Several sessions during the GIT home study and in-person interviewer training program focused specifically on techniques for effective presentation at the door, answering questions, handling reluctant respondents, and averting refusals. Before working with actual households, the interviewers progressed through several stages of practice during training. During the first stage, they conducted role-playing exercises with one another until they felt comfortable and could demonstrate an adequate level of skill in gaining cooperation. After reaching this point, the interviewers conducted a practice interview with a paid volunteer respondent. Following training, select interviewers received specialized training in refusal conversion techniques, prior to their involvement in any directed refusal conversion efforts in the field.

To assist the interviewers in gaining respondent cooperation, all sampled addresses received an advance letter and study brochure approximately 1-2 weeks before the interviewer attempted to visit the address to complete the screener.

Developing an effective strategy for visiting housing units is a fundamental of good interviewing. Interviewers were trained in the following rules to build response rates:

- make trips at different times of day (morning, afternoon, or evening), taking into account that late afternoons and evenings would be the most productive hours in most cases;
- make trips on different days of the week; and
- make trips on weekends (Saturday or Sunday).

If interviewers were unable to complete a screener during the first four visits to a sampled address, the interviewers were instructed to discuss the situation with their supervisor, who would either authorize more visits or assign the case to another interviewer.

Special Considerations with the Native American Population

Several months prior to the launch of the field period, Westat developed and implemented a strategy for notifying targeted Native American organizations and tribes about the NESARC-III study. Due to the NESARC-III subject matter and saliva collection, Westat and

NIAAA felt it necessary to notify tribes prior to interviewers attempting to gain access to the reservation, with the expectation that the advance work would help obtain cooperation from this population.

Westat began by identifying sampled segments that intersected with Indian reservation land. Based on this work, Westat selected ten tribes to notify about the NESARC-III study. Although the sampled segments intersected with the land of six additional tribes, Westat determined that these did not require targeted effort due to the small expected number of DUs on the reservation land.

In December 2011, letters were mailed and emailed to five national Native American organizations. The letter, signed by the Westat project director, explained the NESARC-III study sponsor, nature, purpose and importance of including American Indian tribes. It also offered the opportunity to inform the organization more about NESARC-III, with the hopes that the organization would encourage its membership to support the project. In early 2012, similar letters were sent to the health directors and tribal leaders of the ten identified tribes.

Data collection in areas identified as containing high concentrations of Native Americans did not begin until the second quarterly sample release, to allow more time for contacting efforts. Once data collection was initiated in these areas, the process was very smooth. As needed, Westat worked with individual tribes to process special paperwork or obtain clearance to work on their reservation land. However, in general, there were few issues with the ability to work in these areas.

4.8.2 Efforts to Convert Nonresponse

Each type of nonresponse required a different strategy for conversion. The conversion strategies are summarized in the following sections.

4.8.2.1 Refusals

Refusals are the most difficult type of nonresponse case to convert. When a respondent refused or broke off an interview, the interviewer entered an EROC and completed the electronic non-interview report form to capture information about the reason for the refusal. Using this information, the interviewer and supervisor could decide to send the respondent one of several

refusal conversion letters or postcards (see Sections 4.8.3.1 and 4.8.3.2) or transfer the case to a different interviewer. Before a different interviewer was sent, the case was given a "cooling-off period" prior to being approached again.

4.8.2.2 Not at Home

Interviewers are increasingly finding households to not be at home when the interviewer visits. Some of this "not at home" is actually a hidden refusal, where there is likely someone at the address, but the person simply does not answer the door and pretends to not be home. Interviewers were supplied with Sorry-I-Missed-You cards that could be left at the door when nobody was home. Interviewers were instructed to return to the home at different times of the day and on different days of the week to attempt to contact household members.

4.8.2.3 Illness

Whenever a respondent was too ill to participate, interviewers completed an EROC and ENIRF and discussed the situation with their supervisor. Given the length of the field period, interviewers were typically able to return to the address/sample person (SP) at a later time when the respondent was feeling better and able to participate.

4.8.2.4 Vacant Address

If an address was vacant during the interviewer's first visit, the case was closed out as vacant and no further contact attempts were made. If, however, the interviewer made initial contact with an address, but returned to find that the address was vacant or that a new family had moved in, the interviewer attempted to interview the household members who had lived at the address at the time of the original contact.

4.8.3 Strategies to Increase Response Rates

Many strategies were employed throughout the NESARC-III field period to increase response rates. They included sending nonresponse letters and postcards, mailing a hardcopy paper

version of the screener, administering the screener via telephone, revising the design of the interviewer badge, and implementing interviewer incentive programs. These strategies are discussed below.

4.8.3.1 Nonresponse Letters

Eleven refusal conversion letters were developed for the main data collection. Not all letters were available at the start of the field period; based on needs experienced in the field, additional letters were developed.

All letters were available in English and Spanish. The most frequently used letters were also translated into the Asian languages. Supervisors used a feature of the Supervisor Management System (SMS) to request specific letters to be sent to individual cases. Letters were then mailed from the NESARC-III field room via FedEx.

The letters were:

- general refusal letter, tailored to both the screener- and SP-level;
- a simple, short letter designed for those who were not expected to take the time to read a more detailed letter, tailored to both the screener- and SP-level;
- too busy letter, tailored to both the screener- and SP-level;
- broken appointment letter, tailored to both the screener- and SP-level;
- SP-level interview break-off letter;
- used to address concerns about participation in a government-sponsored study;
- used to explain why those who don't drink alcohol or do drugs are needed in the study;
- not a scam letter;
- unable to reach SP letter; and
- locked building/gated community letter.

4.8.3.2 Postcards

As an alternative to nonresponse letters, an attractive postcard matching the design and colors of the other NESARC-III study materials was designed and implemented in September 2012. Postcards were an attractive method of reaching potential respondents as they did not have to be opened and were quick and easy to read.

The message on the postcard was tailored to several specific scenarios: not home; screener refusal; AUDADIS-5 refusal; call back/no appointment; and unable to access. Supervisors tailored their requests for the postcard mailings to specific PSUs and cases with specific result codes.

4.8.3.3 Paper Screener

To help increase response rates, a hard-copy version of the CAPI screener was developed and implemented in December 2012. Non-finalized cases with a screener result of "interim refusal" were targeted for this effort. Sampled addresses received a mailing with an introductory letter and instructions on how to complete the form. When a completed paper screener was received at Westat, a copy was sent to the field interviewer to whom the case was assigned. The interviewer received instruction on how to enter the information from the paper screener into the CAPI screener to determine if anyone was sampled. If an SP was identified, the interviewer attempted in-person contact to conduct the AUDADIS-5 and saliva collection.

Nearly 4,000 paper screeners were mailed; 97 completed paper screeners were returned to Westat. As this technique was not found to be very beneficial in increasing response rates, it was not used extensively after February 2013.

4.8.3.4 Screeners Administered via Telephone

To help in situations where interviewers were unable to gain access to or make any initial contact with sampled addresses due to locked buildings and gated communities, the use of the telephone to administer the screener was implemented in June 2012. Telephone numbers were obtained from the ABS sample vendor, as well as reverse directories.

Restricted to just sampled addresses in restricted access situations, Westat interviewers were trained for techniques in administering the CAPI screener via the telephone. If anyone from the address was sampled, all SP-level tasks required in-person visits.

4.8.3.5 Identification Badges

To help interviewers in their approach at the door, a significantly larger identification badge was implemented in January 2013. This badge included a larger image of the interviewer, as well as larger-sized logos of the sponsoring organizations. The badge gave interviewers increased confidence in approaching a household, while also serving to verify the interviewers' legitimacy in the eyes of potential respondents.

4.8.3.6 Saliva Conversion after AUDADIS-5

In an effort to increase cooperation with saliva collection, and build in the rapport built during the administration of the AUDADIS-5 interview, Westat implemented an enhancement to the IMS in July 2012 that gave interviewers the ability to attempt to convert SPs who initially refused saliva collection. Following the Recontact module, interviewers were prompted to indicate if the SP now agreed to provide a saliva sample. If so, the Saliva module was enabled and collection attempted.

Of the 10,884 SPs who initially consented to AUDADIS-5 only (i.e., refused saliva collection), nearly 1,000 were converted and consented to provide saliva, for a conversion rate of 9.1 percent.

4.8.3.7 Interviewer Incentives

Several interviewer incentive plans aimed at increasing production were put into place throughout the data collection period. These plans encouraged interviewers to complete as many interviews as possible during periods when they were less likely to work, such as harsh weather conditions and the winter holiday season. These additional incentive plans were found to spur production. All interviews completed as part of an incentive plan were validated.

4.9 Quality Control Measures and Feedback to Staff

The NESARC-III quality control measures described in the following sections were implemented to ensure high-quality work in the data collection phase of the study. The numerous procedures and measures were designed to assess the quality and completeness of data as collected and provide timely feedback to the supervisors, the home office, and the interviewers.

4.9.1 Validation

Validation of finalized cases was the principal method of quality control on NESARC-III. Because falsification activity that goes undetected for a long time is very costly to correct, it is desirable to perform validation as soon after interviewing as possible. Validation efforts were conducted by both Westat's Telephone Research Center (TRC), as well as in-person by field supervisory and interviewing staff. These efforts are discussed in the following paragraphs.

Telephone Research Center

A random 10 percent subsample of all NESARC-III cases was preselected for validation. The assignment of cases for validation was conducted prior to the cases being assigned to field interviewers. Once a preselected case was finalized in the field, and if telephone number information was collected for the case or SP during the screener and/or recontact module, data associated with the case was sent directly to the TRC. Experienced and trained TRC staff attempted contact with the screener respondent or SP via telephone.

Different sets of questions were asked depending on which interview tasks were completed by the respondent or SP. For cases in which only the screener was completed, the screener respondent verified that in-person contact had been made and was asked: the number of household members on the date of the interview; his/her age; whether the interviewer entered his/her responses into a computer; and if the interviewer was polite.

For cases in which extended level tasks were also completed, the SP was additionally asked: whether the interviewer provided a consent document to read; if the interviewer used the AUDADIS-5 flashcard booklet; if the SP reported giving consent to the followup interview

(Reliability or Validity substudies); if an incentive payment was received, the amount and the form (cash or check); and an approximation of interview length. If the SP had agreed to provide a saliva sample, he/she was asked if the interviewer played the saliva video and if a saliva sample was provided. Additionally, the following questions from the AUDADIS-5 interview were asked again, as a direct comparison to data collected earlier: the SP's mother's country of birth; the SP's marital status; the number of brothers the SP had; and the SP's highest grade or year of school completed.

Based on the responses to the validation interview, an algorithm determined the overall status of the validation interview. One of the following codes was then assigned to the case: "validated acceptably"; "potential problem"; or "validated unacceptably." The results of the validation interview were available via the SMS, updated on a daily basis. The SMS validation module displayed the overall status of the validation case, as well as the individual item-by-item results of the validation interview. All cases assigned a status of "potential problem" or "validated unacceptably" required further investigation by the field management staff, as described below.

In addition to the 10 percent of cases preselected for validation, a feature in the SMS allowed supervisors to request validation for additional cases. Additional cases were selected for several reasons: (1) to ensure that at least 10 percent of each interviewer's cases were validated; (2) if there was reason to suspect falsification or some other issue with data quality; and (3) for cases done as part of an interviewer incentive program. Throughout the data collection period, more than 16,000 cases were sent to the TRC for attempted validation. Of this, the TRC successfully completed 7,560 validation interviews. Cases for which no telephone number was available, as well as cases for which the TRC experienced a refusal or was unable to reach despite repeated attempts, were sent to the field for in-person validation.

Field Validation

As described below, cases that could not be successfully contacted by the TRC, as well as those that did not validate acceptably through the TRC, were assigned to supervisors for in-person field validation. Using a hardcopy validation form very similar to the CAPI questionnaire used in the TRC, supervisors and trained field interviewers from the same or a nearby PSU made in-person visits to validate the cases. In-person visits were also made to cases finalized as ineligible, including vacants, etc., which could not be validated through other methods. Once field validation was completed, cases were finalized with a code of either "validated acceptably" or "validated unacceptably." All potential problem cases were resolved in the field. The results of the field

validation efforts were manually entered in the SMS by the field management staff and available through the SMS reporting mechanism.

At the end of data collection, approximately 12,400 cases had been validated either by telephone and/or in person, for an overall validation rate of just more than 17.4 percent of finalized screeners.

4.9.2 Computer-Generated Reports

The SMS was used to manage and monitor the progress of the field work and provided critical management information to field and home office staff. One of the SMS components was a reports mechanism. Reports were updated in real time as an interviewer or supervisor entered information or transmitted data.

The reports allowed all levels of management to monitor, on a daily basis, the progression of completion rates, response rates, and distribution of cases in pending codes by region, interviewer, PSU, and segment for each of the study instruments. Managers were also able to view the daily EROC information entered by interviewers. Costs were entered and monitored on a weekly basis as well.

Filters were available on all reports to allow users to tailor the reports to their interest. Home office users typically focused their review of reports at the nationwide level, while field managers and supervisors were more interested in their assigned areas and regions. The reports available to the management staff are discussed below.

The **Data Collection Reports** allowed home office and field management staff to view the overall status of production and response rates. This report showed production on a real-time basis for the screener, AUDADIS-5, saliva, consent, and recontact tasks.

The **Interviewer Reports** showed production results for interviewers on a daily basis for the screener and AUDADIS-5 interviews only. These reports were based on EROC data entered by the interviewers.

The **Interviewer Cost Summary Report** included cost per completed case, based on the completion of the AUDADIS-5. The report included detailed data on hours worked and local and long-distance mileage and expenses.

The **Transmission Report** showed the date and time of the prior five data transmissions conducted by the interviewer. Supervisors used this report to determine whether an interviewer was having difficulty in transmitting because of a problem in understanding the transmission process or a problem with the laptop. Supervisors monitored this report very closely because it affected the accuracy of all other reports.

The **Unassigned Cases Report** documented any unassigned cases and also allowed the supervisor to check for errors in assigning or transferring cases.

The **Validation Summary Report** and **Interviewer Validation Rate Report** summarized the dispositions of cases selected for validation. The reports provided the percentage of cases that had been selected for validation, as well as those that had been validated for each interviewer, by validation mode (telephone or field/in-person).

The **Finalized Cases Report** listed all finalized cases, including those finalized as completed, ineligible, and nonresponse. Interviewer name and date of case finalization was provided as well.

Sample Monitoring Reports were produced each week to allow the project statisticians to monitor the sample yield for various populations. Selected variables from the sample selection file were merged with production data from the SMS to allow a comparison of projected (i.e., Office of Management and Budget [OMB] targets) and actual results.

Several **Address Verification Reports** were developed to track the status of address verification in each region. This report displayed the number of addresses in a PSU and verification segment by address status (located in segment, located out of segment, located but segment unknown, and unable to locate).

Weekly reports including interview timing and scheduling data were produced for each interviewer. Field supervisors used the reports to look for anomalies within the data that might suggest evidence of interviewer falsification. Examples of these anomalies are very short or very long

instrument administration times, a short amount of time between interviews conducted at two different addresses, and interviews conducted very early in the morning or late in the evening.

NIAAA Reports

On a weekly basis, a summary of data collection progress was sent to the NIAAA Project Officer. Four reports were included in this weekly delivery, as described below:

- **NESARC-III Production Report.** This included a summary of case numbers and percentages for critical result code statuses, as well as response and completion rates. The report included cumulative values at the summary level, as well as broken down by quarterly sample release and field management region and area. Additionally, values were shown separately for each interview task, including at the address, screener, consent, AUDADIS-5, and saliva component levels.
- **NESARC-III Cumulative Regional Time and Expenses Report.** This report provided detailed information on field costs associated with NESARC-III data collection. The information provided at the field management region, area, and project total levels included: hours; wages; local and long-distance mileage and expenses; number of completed cases; and hours, expenses, and cost per completed case.
- **NESARC-III AUDADIS-5 Frequencies.** This report provided frequencies from the AUDADIS-5 data, including administration time statistics and key variables of analytic interest as identified by NIAAA.
- **NESARC-III Volume Deviation Total Counts.** This included a weekly breakdown of the number of processed saliva samples by various saliva volume levels, as reported by Rutgers.

4.9.3 Quality Control of Saliva Samples

Several methods were used to ensure the quality of the saliva samples collected in the field. Manual review of a subset of saliva collection kits was performed to ensure interviewers received the correct collection supplies. **Saliva Aging Reports** were used to track saliva samples that had been collected in the field, but not yet received in the field room. These reports looked at samples that were never documented as shipped in the IMS, as well as those never received from FedEx.

When the saliva samples were received by Westat, and prior to their shipment to the analysis lab, they were reviewed for various quality control indicators, as specified below:

- **Volume.** It was noted if the volume of the sample was not adequate.
- **Color.** Any saliva that did not appear as clear in color was noted, as this was an indication that the SP may have eaten or drunk something prior to the saliva collection.
- **Food Particles.** Any food particles observed in the sample were noted, as this was also an indication that the SP may have eaten or drank something prior to the saliva collection.
- **Damage.** Any damage to the tube was noted, as this was an indication that the interviewer may not have followed appropriate shipping procedures.

The analysis lab also assessed the samples for similar characteristics and provided weekly feedback to Westat. In addition to the four qualities stated above, the lab was able to determine if multiple samples were provided by the same person and if the gender based on the DNA analysis of the sample differed from the gender as reported in the AUDADIS-5 interview data.

Feedback on all samples not meeting the study standards was provided to the field interviewers in the form of email from the home office, based on the quality control review.

4.9.4 In-Person Observation

A small number of in-person interviewer observations were performed by the NESARC-III field managers and supervisors. Interviewer observations were performed to observe interviewers whose performance was of some concern, either because of their evaluation during training or because they were assigned to a particularly difficult area.

Interviewers were typically observed locating addresses, making screener contacts, setting appointments, and completing at least one AUDADIS-5 interview and saliva collection. During an interview, the observer listened but did not participate in any way. After the interview, when the observer and interviewer had left the respondent's home, the observer used an interviewer observation form to evaluate the quality of the interviewer's work. Interviewers were evaluated on the following points: ability to gain access to the dwelling unit, organization of material and

equipment, knowledge of the study, administration of the instruments, and general interviewing techniques.

4.9.5 CAPI Help Desk

A CAPI help desk was established and operated by staff specially trained in the NESARC-III instrumentation. If interviewers or supervisors experienced technical problems with the CAPI system, they could call the toll-free help desk number and receive assistance in resolving the problem. The help desk received 6,299 calls during the data collection period.

The largest number of calls to the help desk related to general SMS issues (e.g., assigning cases, study management reports); data cleanup (e.g., cases where data required editing or cleaning by the home office prior to delivery to NIAAA or before the case could be additionally worked); transmission and time and expense reporting (e.g., connecting the laptop to the home office, sending and receiving cases, and accessing or entering time and expense data); and the IMS or e-mail (problems with user names or passwords, launching CAPI instrumentation, or receiving e-mail messages).

4.9.6 Additional Quality Control Methods

Several other quality control measures related to systems issues were implemented on NESARC-III, as well. For instance a unique 4-digit case control code was assigned to each case and displayed on the corresponding case card. Interviewers were required to enter the correct case control code in order to access any interviewing tasks in the IMS. This safeguard prevented interviewers from entering data into the wrong case. Case control code entry was required every time a new interviewing session was started for a case.

Additionally, home office staff did extensive monitoring of all updates to the IMS that were transmitted to interviewers. Reports were developed and monitored to ensure that all interviewers received the IMS update on schedule. It was essential that the interviewers receive the 12 IMS updates in order to ensure they had the correct version of enhancements such as: instrument text changes; functionality for the computer systems to accommodate the expansion of the field management structure; and critical updates and behind-the-scenes enhancements required for systems management purposes.

4.10 Data Preparation and Processing

During the data collection period, interviewers returned many materials to the home office including collected saliva samples, hard-copy materials, and electronic data. The hard-copy materials returned included case folders and accompanying materials, and incentive check log envelopes. The electronic data consisted of instrument data (e.g., screener, AUDADIS-5) along with other operational data such as consent, interviewer task statuses, saliva collection, shipments, and tracking incentive payments.

The SMS was used to support the comprehensive management of the study, among other functions. The SMS consisted of three main components: the supervisor case assignment; monitoring and management; receipt control for shipping and receiving study materials; and the reports module. This section of the report focuses on the receipt control functions.

During the field period, interviewers typically transmitted interview data to the home office daily. During transmission, the updated status codes and questionnaire data for all completed and in-process cases were combined and sent to a server through a secure connection. Transmitted files were backed up and held on the server. Approximately every 5 minutes, an automatic process determined whether new transmissions had been received from the field interviewers. This process also created outing data for interviewers as supervisors made case assignments. This process was an ongoing operation during the field period.

The process that handled data transmissions performed two functions: It updated the SMS database with case status information, and it moved the completed interview data to processing directories on the project server. Once a day, the newly transmitted instrument data files created during the interview were decrypted and concatenated to create a cumulative database of all interview data for each instrument.

The study database was updated almost immediately after the transmitted data were received. Backup processes were in place to ensure that transmitted data were received successfully. While individual interview' study data were compiled into the cumulative instrument study databases, two other project-level data entities were created. The first was an interview data browse area that allowed project staff to locate data on individual cases within the cumulative instrument databases. This interview browse function was used primarily in resolving issues reported to the

technical support Help Desk. The second item was a set of SAS data files used for other reporting purposes, such as task timings, data frequencies, and sample monitoring reports.

4.10.1 Processing of Saliva Samples and Data

Interviewers were instructed to return saliva samples to the home office on a weekly basis. Case Folders associated with finalized cases were returned to the home office approximately twice a month. Both types of shipments were tracked electronically with the IMS. Before the interviewer mailed the items, the electronic shipping manifest module of the IMS was used to indicate each item included in the shipment to Westat.

For saliva samples, the IMS displayed the saliva tube barcodes and case IDs associated with the saliva samples that had been collected, but not yet shipped. To allow for the return of assigned saliva collection materials that were damaged or unused by the interviewer once he or she left the project, the screen also displayed the barcode of unused saliva kits assigned to each interviewer, under a separate heading. For Case Folders, the case ID for each assigned case that had been finalized since the last time materials were shipped was displayed. Interviewers had the ability to enter comments associated with the materials being shipped, as appropriate.

After marking each item being sent, the interviewer entered the shipping tracking number into the IMS. The home office was then able to see which materials were in transit. Once a case folder was receipted at Westat, it was filed by case ID. No other hard-copy materials were maintained.

Upon arrival, saliva samples were receipted in the SMS, and items received were compared against the list of items expected. Any discrepancies were brought to the attention of the field director and supervisors. Highest priority was given to the saliva samples. If saliva samples were indicated as shipped, but not received by the home office, immediate followup with the field management staff and individual interviewer occurred.

Saliva samples were typically received and receipted on a daily basis. As part of the receipting process, all samples went through a quality control step, as discussed in Section 4.9.3. Regardless of the volume of saliva contained in the tube or the quality of the sample, all collected saliva samples were prepared for shipment to the biospecimen lab. The only exception to this was if the tube had been damaged during shipment from the field and could not be sent for analysis. Once

receipted, saliva tubes were held in the home office and prepared for twice weekly shipment to the analysis contractor. Specially designed boxes and shipping materials were used for the shipment of samples to the analysis lab. Samples were typically sent once a week, on Wednesdays, for FedEx next day priority delivery.

Accompanying the weekly shipment of collected saliva samples was an electronic shipment manifest file containing the following variables: collection vial barcodes; saliva collection date as documented in the saliva module of the IMS; and SP age and gender as collected in the AUDADIS-5 instrument. Upon arrival at the specimen lab, the biospecimen contractor verified that all saliva samples included on the shipment manifest file were received. If there were any discrepancies, the data collection contractor was notified immediately and corrective action was taken.

Once the samples had been receipted by the analysis subcontractor, an electronic file was produced, containing the results of the quality control analysis conducted by the analysis lab. This was sent to the data collection contractor on a weekly basis. This file served as the source for additional quality control reports that were produced and tracked on an interviewer level. Interviewers whose saliva samples yielded too low volume or had other quality control concerns that exceeded a determined threshold were contacted through their field supervisors and remedial training actions were taken.

4.10.2 Quality Control of Data in the Study Database

As discussed above, a detailed reporting system, a module of the SMS, was used throughout the main study data collection. Information in these reports was reviewed by the field management and home office staff throughout the field period.

In addition, receipt control reports were used to track and verify that saliva samples were sent to the home office on a timely basis after collection. The receipt control system also tracked the saliva samples and saliva collection kits throughout the field period and through the process of shipment to the analysis lab.

At the end of the field period, an extensive reconciliation process was completed to ensure that interview data existed for each completed case in the SMS. Status codes were compared to ensure that each status within the SMS accurately reflected the existence of the study's interview

data. The CAPI instrument data were compared, and all discrepancies were documented, reviewed, and corrected, if feasible to do so, before delivery of the final data. In addition, some problem cases were restored from laptop backup disks to ensure the existence of data for all completed cases.

Weighting 5

5.1 Purpose of Weighting

In general, the analysis of survey data from complex sample designs requires the use of weights to compensate for variable probabilities of selection, differential nonresponse rates, and possible deficiencies in the sampling frame (e.g., undercoverage of certain population groups). The base weight associated with a sample person (SP) is equal to the reciprocal of including that person in the sample. The base weights are used to inflate the sample to population levels and are generally unbiased (or consistent) if there is no nonresponse or noncoverage in the sample (e.g., see Kish [1965], p. 67).[7]

Nonresponse is unavoidable in virtually all surveys of human populations. For NESARC-III, nonresponse can occur at different stages of data collection, for example, (1) before the enumeration of SPs in the household, (2) after household enumeration and SP selection but before completion of the Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS-5) interview, and (3) after completion of the AUDADIS-5 interview but before collection of a usable saliva specimen. Sections 5.3 and 5.4 describe the procedures used to compensate for nonresponse at each of the relevant stages of data collection.

Noncoverage arises when some members of the survey population have no chance of being selected for the sample. For NESARC-III, the following are possible sources of noncoverage:

- At the primary sampling unit (PSU) level, there is a small amount of undercoverage due to exclusion of remote areas of Alaska and Hawaii from the PSU sampling frame.
- At the dwelling unit (DU) level, many rural addresses in the U.S. Postal Service (USPS)-based sampling frame cannot be geocoded to a physical location within an area segment, resulting in undercoverage of rural areas. The address coverage enhancement procedure (Sections 3.3.6 and 3.4.5) and the use of manually prepared address lists (Section 3.4.2) are designed to address this problem, but under- or overcoverage can result if field operation or address-matching errors occur during the implementation of these procedures.

[7] Kish, L. (1965). *Survey sampling*. New York, NY: John Wiley & Sons.

- At the SP level, under- or overcoverage can occur in the event of respondent or interviewer errors during the enumeration of household members.

To compensate for the various types of frame imperfections indicated above, the poststratification procedures described in Section 5.4.4 are used to calibrate the weighted sample counts to "known" population totals for major subgroups defined by region, sex, age, and race/ethnicity.

5.2 Calculation of Dwelling Unit Weights

The first step in the weighting process was to assign a weight to each DU selected for the sample. The DU weight is an intermediate sampling weight that serves as the foundation for computing the person-level weights required for analysis of AUDADIS-5 survey data. Each sampled DU was assigned a base weight equal to the inverse of its overall selection probability. There were two types of sampled DUs: (1) DUs sampled directly from the various lists constructed for sample selection, including those selected from the USPS-based address frames and those developed by manual listing, address verification, and the drop-point or add-unit procedures, and (2) DUs that were selected indirectly as hidden DUs within a sampled DU. The former (the vast majority of the DUs selected for NESARC-III) are referred to as *nonhidden DUs*. This section describes the calculation of the base weights for this type of DU. Initial weights for hidden DUs were calculated after the nonresponse adjustments for nonhidden DUs had been developed as described in Section 5.3.2.

In general, the DU base weight for a nonhidden DU was computed from the formula

$$w_{lhij}^{base} = \mathrm{K}/(P_{lh}^{(1)}\, P_{lhi}^{(2)}\, f_{lhij}^{(3)}),$$

where

$P_{lh}^{(1)}$ = the probability of selecting PSU *h* in PSU stratum *l*;

$P_{lhi}^{(2)}$ = the conditional probability of selecting area segment *i* in PSU *h* in PSU stratum *l*;

$f_{lhij}^{(3)}$ = the conditional probability of selecting address (DU) *j* in segment *i* in PSU *h* in PSU stratum *l*; and

K = a factor that depends on the type of address list from which the DU was selected.

For non-drop-point addresses sampled directly from geocoded lists of addresses or from manually prepared lists, the multiplying factor, K, is equal to 1. For DUs that were selected as drop units or added units (see Section 3.4.4), $f_{lhij}^{(3)}$ is the within-segment probability of selecting the drop point (or address) in which the drop unit was located and K is the reciprocal of the (conditional) rate at which the drop units or added units associated with the sampled address were selected for assignment to data collection. For DUs in segment v that were added through the address coverage verification/enhancement procedures (see Section 3.4.5), the multiplying factor is $K = 1/P_v$, where P_v is the conditional probability of selecting segment v for verification and $f_{lhij}^{(3)}$ is the rate at which added addresses in the verification segment were selected for assignment to data collection.

For a small number of DUs, the associated base weights were reduced because the DU had more than one chance of being selected. This could occur, for example, if the screener respondent for a sampled added address in a verification segment provided a second residential address at which the household received mail and the second address was determined to be in the address frame. In such cases, the household had two chances of being selected: once from the list of geocoded addresses in the address frame and a second time from the lists of added addresses compiled from segment verification. In this case, the household's base weight, as calculated above, was multiplied by one-half to account for the dual chances of selection.

5.3 Screener Nonresponse Adjustment

The next step in weighting was to adjust the DU base weights for screener nonresponse. Sections 5.3.1 and 5.3.2 describe the screener nonresponse procedures for nonhidden DUs and hidden DUs, respectively.

5.3.1 Adjustment for Nonhidden Dwelling Units

In this step, the base weight for a responding nonhidden DU was adjusted to account for nonhidden DUs that did not complete the screening interview. The screener nonresponse-adjusted DU weight for nonhidden DU j in adjustment cell g, denoted w_{gj}^{NR}, was computed as

$$w_{gj}^{NR} = F_{gj}^{(1)} w_{gj}^{base},$$

where w_{gj}^{base} is the base weight for responding DU *j* in adjustment cell *g* and $F_{gj}^{(1)}$ is the reciprocal of the weighted screener response rate. $F_{gj}^{(1)}$ was computed from the formula

$$F_{gj}^{(1)} = \begin{cases} \dfrac{\sum_{i \in SC\_R \cup SC\_NR} w_{gi}^{base} \delta_i(g)}{\sum_{i \in SC\_R} w_{gi}^{base} \delta_i(g)} \; j \in SC\_R \\ 0 \; j \in SC\_NR \end{cases},$$

where the group SC_R is the set of eligible screener respondents, SC_NR is the set of eligible screener nonrespondents, and $\delta_i(g)$ is 1 if DU *i* is in screener nonresponse adjustment cell *g* and is 0 otherwise.

The variables used to construct the nonresponse adjustment cells included the data collection quarter, the segment-level stratification variable based on minority prevalence, and various segment-level characteristics computed from 2010 Census data. The adjustment cells were constructed separately for each sample PSU using a binary-classification algorithm similar to the Chi-squared Automatic Interaction Detector (CHAID)[8] to determine appropriate nonresponse adjustment cells within each PSU. Appendix 5A contains additional information about the variables considered in the binary classification algorithm and how often they were used to define the final adjustment cells. The number of significant predictors identified by the classification algorithm varied by PSU but generally ranged from one to nine per PSU, with the data collection quarter and proportion of renters in the segment as the most prevalent predictors of nonresponse.

5.3.2 Adjustment for Hidden Dwelling Units

Since a hidden DU could be identified only after completion of the screening interview for the "parent" DU in which it was located, both the initial weights (i.e., the equivalent of the DU base weights defined in Section 5.2) and the nonresponse-adjusted weights for the hidden DUs had to be computed after the nonresponse-adjusted weights for the nonhidden DUs had been constructed. The most general form of the initial weight for the hidden DUs is given by

$$w_j^{Init} = Q_j^{HDU} w_j^{NR},$$

[8] Kass, G.V. (1980). An exploratory technique for investigating large quantities of categorical data. *Applied Statistics,* 29(2), 119-127.

where Q_j^{HDU} is the inverse of the rate at which hidden DUs associated with responding parent DU *j* were selected and w_j^{NR} is the nonresponse-adjusted weight for the corresponding parent DU. The factor Q_j^{HDU} in the above formula can be greater than 1 to allow for the subsampling of hidden DUs from the same parent DU; however, for NESARC-III, no subsampling was done and $Q_j^{HDU} = 1$ for all hidden DUs.

The nonresponse-adjusted weight for a hidden DU *k* in household *j* in weight adjustment cell *g*, denoted w_{gjk}^{HDU}, was then calculated as

$$w_{gjk}^{HDU} = F_{gjk}^{HDU}\, w_{gjk}^{Init},$$

where the nonresponse adjustment factor, F_{gjk}^{HDU}, was calculated as follows:

$$F_{gjk}^{HDU} = \begin{cases} \dfrac{\sum_{h,i \in SC\_R \cup SC\_NR} w_{gi}^{Init} \delta_{hi}(g)}{\sum_{h,i \in SC\_R} w_{gi}^{Init} \delta_{hi}(g)} \; j,k \in SC\_R^{HDU} \\ 0 \; j,k \in SC\_NR^{HDU} \end{cases},$$

where SC_R is the set of eligible hidden DUs for which a completed screener was obtained (respondents), SC_NR is the set of eligible hidden DUs for which a completed screener was not obtained (nonrespondents), and $\delta_{hi}(g)$ is 1 if hidden DU *i* in household *h* is in nonresponse adjustment cell *g* and is 0 otherwise.

A binary classification algorithm was used to create the weighting cells required for nonresponse adjustment. In addition to the segment-level variables used to adjust the weights of the nonhidden DUs, selected variables from the parent DU screener were specified as possible predictors for the binary classification algorithm. The results of the binary classification algorithm indicated a strong relationship between response rates for hidden DUs and the following two characteristics (both based on screener information reported by the parent DU): (1) presence of a Black adult in the parent household and (2) households containing only adults aged 25 or older. Because of the small number of hidden DUs, only three weighting cells defined by these characteristics were used in nonresponse adjustment.

There were 71,052 sampled addresses in the NESARC-III. Of the 71,052 sampled addresses, 11,327 were classified as out of scope, i.e., vacant and inaccessible dwelling units. Of the remaining 59,725 inscope households, there were 42,692 responding households and 17,033 nonresponding households for a total screener response of 72.0 percent.

5.4 Person-Level Weight

The starting point for the development of the person-level weights is the set of nonresponse-adjusted weights previously constructed for DUs completing the household screener. As described in Sections 5.4.1 and 5.4.2, construction of the final person-level weights involved the following three major steps: (1) assignment of an initial person weight that reflects the probability of selecting the person for the study after compensating for DU nonresponse; (2) adjustment of the initial person-level weights to compensate for nonresponse to the AUDADIS-5 interview; and (3) poststratification of the nonresponse-adjusted weights to known population counts derived from the 2012 American Community Survey (ACS).

5.4.1 Initial Person Weight

If the screening interview was completed and one or more adults living in the household were eligible for the AUDADIS-5 interview, software on the interviewer's handheld device executed the SP sampling algorithm described in Section 3.5.1. If there were four or more eligible adults in the household, two SPs were selected; otherwise, only one SP was selected.

Initial person weights, denoted by w_{hp}^{person}, were calculated for SP *p* in each screened household (DU) *h* as follows:

$$w_{hp}^{person} = w_h^{HH} / P_{hp}^{cond},$$

where w_h^{HH} is the nonresponse-adjusted household weight for responding household *h* and P_{hp}^{cond} is the conditional probability of selecting SP *p* in household *h* for the AUDADIS-5 interview. The selection probability P_{hp}^{cond} depended on household composition and is equal to the value of household sampling measure of size in Table 3-7. For example, if a household contained three non-minority adults, P_{hp}^{cond} = ⅓ (Table 3-7, line 5); however, if the household contained four non-minority adults, P_{hp}^{cond} = ½ (Table 3-7, line 9).

5.4.2 AUDADIS-5 Nonresponse Adjustment

There were 44,931 SPs selected for NESARC-III. Not all of the persons selected for the study completed the AUDADIS-5 interview. About 3.5 percent (n=1567) of the SPs were ineligible for the study (e.g., disabled, deceased, institutionalized) and were excluded from the nonresponse

adjustment weighting process. Of the remaining 43,364 SPs, 36,309 completed the AUDADIS-5. To compensate for nonresponse losses, person-level adjustment factors, R_{gp}, were computed as

$$R_{gp} = \begin{cases} \dfrac{\sum_{i \in AUD\_R \cup AUD\_NR} w_{gi}^{person} \delta_i(g)}{\sum_{i \in AUD\_R} w_{gi}^{person} \delta_i(g)} \; p \in AUD\_R \\ 0 \; p \in AUD\_NR \end{cases},$$

where AUD_R is the set of eligible AUDADIS-5 respondents, AUD_NR is the set of eligible AUDADIS-5 nonrespondents, and $\delta_i(g)$ is 1 if person *i* is in AUDADIS-5 nonresponse adjustment cell *g* and is 0 otherwise. The nonresponse adjustment cells denoted by subscript *g* were created separately within each PSU using a binary classification algorithm. In addition to segment-level characteristics, variables from the household screener were considered as candidates to define the final adjustment cells. Appendix 5A summarizes information about the variables considered in the binary classification algorithm and their frequency of use in defining the final person-level nonresponse adjustment cells.

Using the calculated adjustment factors, R_{gp}, the nonresponse-adjusted weight, w_{gp}^{PNR}, for person *p* in weighting cell *g*, w_{gp}^{PNR}, was then computed as

$$w_{gp}^{PNR} = R_{gp} \, w_{gp}^{person}.$$

There were 44,931 sample persons selected to participate in the NESARC-III. Of these 44,931 sample persons, 1,567 were ineligible for interview (e.g., currently serving in the military, severe mental and/or physical disability). Of the remaining 43,364 eligible sample persons, 36,309 participated in the NESARC-III while 7,055 were classified as nonresponders, for a person-level response rate or 84.0 percent. Multiplying the screener response rate (72.0%) by the personal-level response rate (84.0%) yields the overall NESARC-III survey response rate of 60.1 percent.

Table 5-1 summarizes the sample size of the final selected NESARC-III sample by ethnicity, race, sex, and age.

Table 5-1. Distribution of NECARC-III sample persons by selected sociodemographic characteristics

Characteristic	N	%*
Total	36,309	100.0
Sex		
Male	15,862	43.69
Female	20,447	56.31
Ethnicity		
Hispanic (any race)	7,037	19.38
Non-Hispanic	29,272	80.62
Race		
White only	25,234	69.50
Black only	8,027	22.11
Asian only	1,606	4.42
Native Hawaiian/Pacific Islander	225	0.62
American Indian/Alaska Native	619	1.70
Multiple races	598	1.65
Age, years		
18-29	8,126	22.38
30-39	6,900	19.00
40-49	6,545	18.03
50-59	6,371	17.55
60-69	4,502	12.40
70+	3,865	10.64

5.4.3 Imputation of Variables Used in Weighting

The final step in the weighting process involves poststratification of the nonresponse-adjusted person weights to available external population counts. Before poststratification could be performed, however, it was necessary to replace missing data with imputed values for the variables to be used in the poststratification. These included the following demographic variables reported in the AUDADIS-5 interview: sex, age, ethnicity, and five "yes/no" race variables reported by the respondent (White, Black, Asian, Native Hawaiian/Pacific Islander, and American Indian/Alaska Native). In general, one of two "methods" was used to impute the missing values. The first method, referred to as the "assignment" method, involved replacing the missing value with a value reported or deduced from other information about the respondent in either the screener or the AUDADIS-5 interview. The second method was a "hot deck" procedure in which a missing value was replaced with a value from a similar randomly chosen respondent in the sample.

The imputation process consisted of the following steps:

- Missing sex was imputed either by assignment or by a hot deck procedure, if necessary.
- Missing age was imputed using one of the following procedures:
  - Assignment, using edit and imputation programs provided by NIAAA or
  - A hot deck procedure for remaining missing cases.
- Missing ethnicity (Hispanic origin) was imputed using one of the following procedures:
  - Assignment based on ethnicity data collected in the screener, if available;
  - Assignment based on selected respondent-reported ancestries; or
  - A hot deck procedure for any remaining missing cases.
- Missing values for the five race variables were imputed using one of the following procedures:
  - Assignment based on race data collected in the screener, if available;
  - Assignment based on selected respondent-reported ancestries; or
  - A hot deck procedure for any remaining missing cases.

Table 5-2 summarizes the number of cases imputed by variable and imputation method. As the table shows, most of the imputation was for the race variables. Additional details about the imputation process are provided in Appendix 5B.

Table 5-2. Number of cases imputed for weighting purposes by variable and imputation method

Variable	Method*	Number of cases imputed	Percent
Sex	Not applicable†	0	0.00
Age	Assignment based on NIAAA edit programs‡	9	0.02
	Hot deck	29	0.08
Ethnicity (Hispanic origin)	Assignment based on screener information	3	0.01
	Hot deck	1	0.00
Race variables	Assignment based on screener information	218	0.60
	Assignment based on ancestry	4	0.01
	Hot deck	144	0.40

* See Appendix 5B for additional details and results related to the imputation process.

† Although sex was not recorded in the AUDADIS-5 interview for a small number of cases, NIAAA was able to determine sex for all of these cases.

‡ In addition to these 9 cases, age was edited/calculated for another 374 cases using NIAAA edit programs. However, these 374 are not considered to be "imputations" since the "missing" age could be ascertained from other data in the AUDADIS-5 interview.

5.4.4 Poststratification

The final step in calculating the AUDADIS-5 weights was to poststratify the nonresponse-adjusted person weights so that the resulting weighted counts agreed with counts of the noninstitutionalized U.S. civilian population 18 years of age or older for designated subgroups of the population. Poststratification serves two main purposes: (1) It helps account for possible undercoverage in the sampling frame and (2) it can potentially reduce sampling variability through ratio estimation. The following variables were used to define the subgroups (i.e., poststratification cells) for weight adjustment purposes:

- Region: Northeast, Midwest, South, West;
- Sex: Male (M), Female (F);
- Race/ethnicity: White alone, non-Hispanic (W-NH); Black alone, non-Hispanic (B-NH); Asian alone, non-Hispanic (A-NH); other races (including multiple races), non-Hispanic (O-NH); Hispanic of any race (Hispanic); and
- Age group: 18-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65+ years.

Where possible, the poststratification cells were defined by cross-classifying the four variables listed above. However, if a cell was too small (i.e., contained fewer than 100 respondents), neighboring age groups (within the same region, sex, and race/ethnicity group) were collapsed until the sample size for the combined group was at least 95. In some instances, it was necessary to collapse race/ethnicity groups as well as age groups within the same region and sex in order to meet the minimum size criterion. For example, the total sample size for non-Hispanic Asian males in the Northeast region was much less than 100, even after all 10 age groups had been collapsed. In this case, the non-Hispanic Asians were collapsed with the "other non-Hispanic" group to reach the minimum cell size requirement.

The population counts, N_g , required for poststratification were derived from the 2012 ACS public use files. An adjustment factor, F_g^{PS}, within a poststratification cell *g* was calculated as

$$F_g^{PS} = {}^{N_g}\Big/{}_{\sum_g w_{gp}^{PNR}},$$

where N_g is the 2012 ACS population count for the given cell and $\sum_g w_{gp}^{PNR}$ is the sum of nonresponse-adjusted person weights, summed over the AUDADIS-5 respondents in cell *g*. The poststratified person weight, w_{gp}^{PS}, for person *p* in cell *g* was then calculated as

$$w_{gp}^{PS} = w_{gp}^{PNR} \times F_g^{PS}.$$

A comparison of AUDADIS-5 respondents after poststratification to the 2012 ACS U.S. population estimates by selected sociodemographic characteristics is shown in Table 5-3.

Table 5-3. Comparison of AUDADIS-5 respondents after poststratification to the 2012 ACS population estimates by selected characteristics

AUDADIS-5 respondent characteristic	2012 ACS		AUDADIS-5 respondents			
	No.	Percent	No.[1]	Weighted estimate[2]	Percent[3]	Relative difference (%)[4]
Total	235,411,957	100.0	36,309	235,411,957	100.0	
Ethnicity/race[5]	235,411,957	100.0	36,309	235,411,957	100.0	
Non-Hispanic – White only	155,813,816	66.2	19,194	155,813,816	66.2	0.0
Non-Hispanic – Black only	27,181,743	11.6	7,673	27,181,743	11.6	0.0
Non-Hispanic – Asian only	12,051,148	5.1	1,561	11,877,482	5.0	-2.0
Non-Hispanic – All other	5,673,419	2.4	844	5,847,085	2.5	4.2
Hispanic – All races	34,691,831	14.7	7,037	34,691,831	14.7	0.0
Sex	235,411,957	100.0	36,309	235,411,957	100.0	
Male	113,211,819	48.1	15,862	113,211,819	48.1	0.0
Female	122,200,138	51.9	20,447	122,200,138	51.9	0.0
Age (years)[5]	235,411,957	100.0	36,309	235,411,957	100.0	
18-24	30,621,965	13.0	4,496	30,722,228	13.0	0.0
25-29	20,583,101	8.7	3,630	20,300,634	8.6	-1.1
30-34	20,288,865	8.6	3,629	20,232,879	8.6	0.0
35-44	40,146,747	17.1	6,506	40,342,673	17.1	0.0
45-54	43,660,236	18.5	6,644	43,771,912	18.6	0.5
55-64	38,287,460	16.3	5,598	38,689,060	16.4	0.6
≥65	41,823,583	17.8	5,806	41,352,571	17.7	-0.6
Region	237,211,957	100.0	36,309	235,411,956	100.0	
Northeast	42,945,708	18.2	5,180	42,945,708	18.2	0.0
Midwest	50,555,900	21.5	7,566	50,555,900	21.5	0.0
South	87,231,834	37.1	14,532	87,231,834	37.1	0.0
West	56,478,515	23.2	9,031	54,678,515	23.2	0.0

AUDADIS-5, Alcohol Use Disorder and Associated Disabilities Interview Schedule

[1] Number of AUDADIS-5 respondents.

[2] Weighted sample counts using poststratified weights.

[3] Weighted percentages using poststratified weights.

[4] Relative difference defined to be 100*(Cw-A)/A, where A = 2012 ACS population count and Cw = person-level poststratified estimate based on AUDADIS-5 respondent sample.

[5] Reflects imputed values.

5.4.5 Estimated Coverage Ratios

As indicated in the previous section, one of the goals of poststratification is to adjust for possible undercoverage biases. A measure of the coverage of the selected sample can be obtained by computing the ratio of the sum of the nonresponse-adjusted weights (prior to poststratification) for a specified subgroup to the corresponding "actual" population count (in this case, obtained from the 2012 ACS). Such coverage ratios have been computed for the NESARC-III sample and are summarized in Table 5-4 for various population subgroups defined by age group and race/ethnicity. The table shows that, across the various race/ethnicity groups, coverage generally exceeds 80 percent for all age groups except the older (65+ years) age group. Coverage of females tends to exceed that of males, whereas coverage of Hispanics and Blacks generally exceeds that of Whites.

Table 5-4. Coverage ratios

	Hispanic		Black		White		Other		All		
Age group	M	F	M	F	M	F	M	F	M	F	TOTAL
18-24	0.846	0.960	0.879	1.049	0.800	0.757	0.752	0.778	0.816	0.844	0.830
25-29	0.742	0.934	0.935	1.094	0.848	0.961	0.552	0.711	0.809	0.949	0.880
30-34	0.830	0.993	0.991	1.061	0.808	0.918	0.667	0.703	0.821	0.931	0.877
35-39	0.811	0.986	0.953	1.008	0.755	0.970	0.717	0.615	0.786	0.943	0.866
40-44	0.775	0.970	0.881	1.095	0.684	0.864	0.870	0.837	0.738	0.910	0.826
45-49	0.792	1.020	0.966	1.048	0.780	0.875	0.525	0.842	0.784	0.916	0.851
50-54	0.836	0.835	0.923	1.072	0.825	0.867	0.757	0.845	0.833	0.887	0.860
55-59	0.888	1.100	1.009	0.945	0.711	0.884	0.852	0.766	0.768	0.904	0.839
60-64	0.701	0.902	0.883	0.859	0.786	0.809	0.834	0.694	0.791	0.815	0.803
65 +	0.740	0.741	0.706	0.784	0.788	0.768	0.765	0.625	0.777	0.760	0.768
18+	0.802	0.944	0.905	0.998	0.780	0.848	0.722	0.738	0.793	0.871	0.833

Several factors might explain the low coverage ratios indicated in Table 5-4. Although mentally or physically disabled persons are ineligible for NESARC-III, such individuals are included in the ACS population counts provided that they are not institutionalized. Persons whose only language is not one of the six languages covered in NESARC-III are also considered to be ineligible. About 3 percent of SPs were found to be ineligible because of disabilities and for other reasons. In addition, undercoverage of individuals can result from imperfect enumeration of household members. The poststratification adjustments are designed to offset, to some extent, any potential biases resulting from the undercoverage of certain subgroups of the population.

5.5 DNA Weights

Approximately 67 percent of the persons completing the AUDADIS-5 interview also provided saliva samples. However, a small number of the collected saliva samples did not provide usable DNA data for analysis. Of the 36,309 persons completing the AUDADIS-5 interview, 24,381 had usable DNA data.

A DNA weight was developed for each respondent with usable DNA data by applying an appropriate adjustment to the previously constructed nonresponse-adjusted AUDADIS-5 weights described in Section 5.4.2. Nonresponse in this case could occur if the respondent refused to provide a saliva sample or the laboratory procedures failed to obtain a usable DNA profile (e.g., due to contamination or insufficient volume). The weight cells for this phase of adjustment were developed using essentially the same procedures used to develop the nonresponse-adjusted AUDADIS-5 weights. Appendix 5A provides additional details about the variables used to develop the adjustment cells for DNA analysis nonresponse. The final step in calculating the DNA weights was to poststratify the nonresponse-adjusted person weights, using the same control totals and essentially the same procedures that were used to poststratify the AUDADIS-5 weights.

5.6 Variance Estimation

Two types of variance estimation procedures can be used to account for the complex sample design employed in NESARC-III. Using these procedures, factors such as the stratification and sampling of PSUs and area segments and the use of oversampling in the NESARC-III sample design can be appropriately reflected in the estimates of sampling errors. Taylor series approximation methods was the variance estimation procedure used in the NESARC-III. The book by Wolter (2007)[9] is a useful reference on the theory and applications of this method.

A Taylor series linearization of a statistic is formed and then substituted into the formula for calculating the variance of a linear estimate appropriate for the sample design. The Taylor series method relies on the simplicity associated with estimating the variance for a linear statistic even with a complex sample design. In most complex designs, such as the multistage sample design used in NESARC-III, the variance can be estimated by assuming that the first-stage sampling is performed with replacement (Wolter, 2007). In this formulation, the variance strata and sampling

[9] Wolter, K.M. (2007). *Introduction to variance estimation*, 2nd ed. New York, NY: Springer.

units for the first stage of sampling must be defined. The replicate weights are not used by the Taylor series method. Instead, the full-sample weights, along with variables defining the PSU strata (or pseudo-PSU strata) and PSUs (or pseudo-PSUs) within strata, can be used to calculate variance estimates based on the Taylor series approximation.

Many standard statistical software packages assume a simple random sample when computing estimates of variance. As a result, estimates of variance from these packages can seriously understate the true variability of the survey estimates. Specialized commercial software has been developed to analyze data from complex surveys, including the survey analysis procedures in SAS®, developed by the SAS Institute; SUDAAN® (Software for the Statistical Analysis of Correlated Data), developed by the Research Triangle Institute; and Stata®, developed by StataCorp.

The following is code used to conduct statistical analyses with these software:

SUDAAN CODE:

```
PROC SORT DATA=dsname;
BY VARSTRAT VARUNIT; RUN;

PROC procname DESIGN=WR DATA=dsname;
NEST varstrat varunit / MISSUNIT;
WEIGHT audweight;
```

SAS CODE:

```
PROC procname DATA=dsname VARMETHOD=TAYLOR;
WEIGHT audweight;
STRATA varstrat;
CLUSTER varunit;
```

STATA CODE:

```
svyset varunit [pweight=audweight], strata(varstrat) vce(linear)
```

Appendix 5A

Variables Considered for Defining Nonresponse Adjustment Cells

Appendix 5A
Variables Considered for Defining Nonresponse Adjustment Cells

Adjustment factors to compensate for total survey nonresponse were computed for each of the two phases of data collection: the screening interview and the Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS-5) interview. The adjustment factors were computed within defined subsets of the sample, referred to as *nonresponse adjustment cells*. A binary classification algorithm was used to determine the significant predictors of nonresponse within each primary sampling unit (PSU), and these results were applied to create the final nonresponse adjustment cells.

Segment-level variables were used to define the nonresponse adjustment cells associated with screener nonresponse. These variables included the data collection quarter, segment-level minority status based on the prevalence of minority populations in the segment, and other segment-level measures derived from the 2010 Census block-level data (see Table 5A-1). The numerical entries in Table 5A-1 indicate the number of PSUs (out of 150) in which each segment-level variable was found to be a significant predictor of screener nonresponse by the classification algorithm.

For the person-level nonresponse adjustments used to derive the AUDADIS-5 and DNA weights, both segment-level variables and the household-level variables reported by the screener respondent were used to define the nonresponse adjustment cells. The two rightmost columns of Table 5A-1 indicate how many times across the 150 PSUs each of these variables was used in nonresponse adjustment of the AUDADIS-5 and DNA weights, respectively.

Table 5A-1. Frequency of use of variables to define nonresponse adjustment cells in 150 PSUs

Characteristic	Number of PSUs in which variable was used		
	Screener	AUDADIS-5	DNA
Quarter of data collection	138	85	82
Age reported in screener	Not applicable	47	48
Sex reported in screener	Not applicable	37	19
Number of adults	Not applicable	29	20
Proportion of renters	57	26	15
Percent of households with children 0-17	50	23	13
Households with only adults 25+	Not applicable	23	15
Presence of children under 18	Not applicable	22	19
Race reported in screener	Not applicable	17	18
Presence of Black adult in household	Not applicable	16	2
Percent of population 65+	52	16	15
Minority status defined for sampling	58	15	17
Number of household members	Not applicable	15	23
Percent Asian population	39	14	9
Vacancy rate	44	12	13
Percent Black population	30	10	9
Percent Hispanic population	24	9	8
Presence of household members 65+	Not applicable	5	0
Presence of Hispanic adult in household	Not applicable	5	5
Ethnicity reported in screener	Not applicable	4	3
Population density of segment	19	4	7
AV segment vs. non-AV segment	8	4	2
Proportion of population in group quarters	5	1	1
Presence of AIAN reservation	1	0	0
Presence of Asian adult in household	Not applicable	0	0
Households with only young adults 18-24	Not applicable	0	0

AV, address verification; AIAN, American Indian/Alaska Native

Appendix 5B

Imputation Methodology and Results

Appendix 5B
Imputation Methodology and Results

5B.1 Introduction

The final step in computing the NESARC-III person weights was to apply a poststratification algorithm to adjust the weights so they aggregate to totals computed from the American Community Survey data within specified demographic subgroups. These subgroups, called *poststratification cells*, are defined by census region and survey (AUDADIS-5) variables for sex, race, ethnicity, and age. Poststratification requires non-missing respondent data for all survey variables that define the poststratification cells. Consequently, missing values were imputed for the following variables in the AUDADIS-5 data file:

- NSEX (sex);
- Race variables N1Q1F1 (White), N1Q1F2 (Black), N1Q1F3 (Asian), N1Q1F4 (Native Hawaiian or other Pacific Islander), and N1Q1F5 (American Indian or Alaska Native);
- N1Q1E (ethnicity); and
- NAGE (age).

The procedures used to impute missing values make use of data from the household screener enumeration as well as relevant data from the AUDADIS-5 data file. The variables from the household screener that were used for imputation purposes included sex, age, and race/ethnicity of the household members as reported by the screener respondent. Variables from the AUDADIS-5 data set that were used for imputation included ancestry (N1Q2A). The remainder of this appendix describes the procedures used to impute missing AUDADIS-5 data for sex, age, ethnicity, and race.

5B.2 Imputation Procedures and Results

Two general procedures were used to impute missing values. The first, referred to as the "assignment" method, involved replacing a missing value in the AUDADIS-5 dataset with the corresponding value reported in the screener (if available) or with a value that could be deduced with a high degree of certainty from other related variables in the AUDADIS-5 interview. The second approach, referred to as "random hot deck" imputation, was used when an imputed value could not

be obtained by assignment; this approach involved replacing the missing value with the corresponding reported value from a randomly chosen respondent ("donor") with similar characteristics. These and other imputation methods are described in greater detail in Kalton (1983).[10]

5B.2.1 Imputation of Sex

Procedures were established to impute missing values for sex by assignment first, using other information obtained in the interview (such as the sampled person's [SP's] first name if available) or by hot deck imputation for cases for which assignment was not possible. However, before receiving the finalized AUDADIS-5 data file for imputation purposes, NIAAA was able to ascertain the sex of all respondents in the data file, obviating the need to impute sex.

5B.2.2 Imputation of Age

Two steps were involved in the imputation of age. The first was to implement the age editing and imputation programs developed by NIAAA. This step corrected the reported age if it was inconsistent with (1) the age calculated using date of birth or (2) other age-related variables reported in the AUDADIS-5 interview. Using NIAAA's program, age was corrected for 374 cases. This initial step also assigned an age value to nine cases that had missing values in the AUDADIS-5 interview.

The remaining 29 missing age values were imputed using a hot deck procedure, in which imputed values were obtained from donor records randomly selected from groups of records referred to as *donor cells***.** If an age range was present in the screener, the donor cells were defined by sex and age range; otherwise, the donor cells were defined by sex and either the type and age of relatives living in the household (based on screener information) or the interviewer's observation of the SP's age. Note that the interviewer's observation of age was used to define the donor cell in the hot deck procedure and was not used as the imputed value. Results of the age editing and imputation process are summarized in Table 5B-1.

[10]Kalton, G. (1983). Chapter 4 in *Compensating for missing survey data*. Ann Arbor, MI: Survey Research Center, Institute for Social Research, University of Michigan.

Table 5B-1. Results of age editing and imputation process

Status of age variable and imputed values	Frequency	Percent
Non-missing values	36,271	99.90
Edited by NIAAA code	374	
Corrected based on other fields	2	
Computed from date of birth	372	
Missing values	38	
Determined by NIAAA code	9	0.02
18-24	1	
25-39	2	
40-59	4	
60+	2	
Imputed by hot deck	29	0.08
18-24	1	
25-39	5	
40-59	18	
60+	5	
Total	36,309	100.00

5B.2.3 Imputation of Ethnicity (Hispanic)

Four cases had a missing value for ethnicity. Three were imputed by assignment based on screener data, and one was imputed using the hot deck procedure. The variables used to create the donor cells for the hot deck imputation included a variable indicating whether the household contained any Hispanics, based on screener information or interviewer observation. Results of the ethnicity imputation are summarized in Table 5B-2.

Table 5B-2. Results of ethnicity imputation process

Status of ethnicity variable and imputed values	Frequency	Percent
Values after imputation		
1 (Hispanic)	7,037	19.38
2 (Non-Hispanic)	29,272	80.62
Imputed by assignment	3	<0.01
Hispanic	2	
Non-Hispanic	1	
Imputed by hot deck	1	0.00
Hispanic	0	
Non-Hispanic	1	
Total	36,309	100.00

5B.2.4 Imputation of Race

Section 5B.1 lists the five yes/no race variables corresponding to the five racial groups. Because of the way race was reported in the AUDADIS-5, race variables are either all missing or all present. Moreover, consistent with Office of Management and Budget guidelines, respondents could report more than one race if they desired. Before imputation, 366 cases (342 Hispanic and 24 non-Hispanic) had missing values for race. All of the remaining records had either a 1 ("yes") or 2 ("no") for all five race variables. The percentage of records with missing race is 1.01 percent of all AUDADIS-5 respondents. The following procedures were used to impute missing race:

- If the SP's race was missing in the AUDADIS-5 data but present on the screener, race was imputed by assigning the value from the screener. This procedure was used for 218 cases.

- If race could not be imputed by assignment but the value of ancestry reported by the respondent was consistent with one of three racial groups (Native Hawaiian/Pacific Islander, Asian, or Black), race was imputed by assignment based on the reported ancestry. Four records were imputed by assignment using ancestry.

- After imputation by assignment as described above, the remaining 144 cases were imputed using hot deck procedures. The imputation was performed separately for Hispanic and non-Hispanic persons. For each of the two imputation runs, the variables used to define the donor cells included a variable indicating the racial composition of the household based on screener information and reported ancestry. The following five categories of racial composition were used:

    4. Households with an American Indian or Alaska Native;

    5. Households with a Native Hawaiian or other Pacific Islander but no persons in (1);

    6. Households with an Asian but no persons in (1) or (2);

    7. Households with Black persons but none in (1), (2), or (3); and

    8. All other households.

Table 5B-3 summarizes the results of the race imputation by method used.

Table 5B-3. Results of race imputation

Status of race variables and imputed values	Frequency	Percent
Non-missing	35,943	98.99
Imputed by race reported on screener	218	0.60
White	177	
Black	25	
Asian	0	
Native Hawaiian/Pacific Islander	4	
American Indian/Alaska Native	11	
More than one race	1	
Imputed by ancestry	4	0.01
White	0	
Black	2	
Asian	2	
Native Hawaiian/Pacific Islander	0	
American Indian/Alaska Native	0	
More than one race	0	
Imputed by hot deck – Hispanic	134	0.37
White alone	126	
Black alone	2	
Asian alone	0	
Native Hawaiian/Pacific Islander alone	0	
American Indian/Alaska Native alone	5	
More than one race	1	
Imputed by hot deck – Non-Hispanic	10	0.03
White alone	10	
Black alone	0	
Asian alone	0	
Native Hawaiian/Pacific Islander alone	0	
American Indian/Alaska Native alone	0	
More than one race	0	
Total	36,309	100.00