2014 NATIONAL SURVEY ON DRUG USE AND HEALTH

METHODOLOGICAL RESOURCE BOOK SECTION 14: SAMPLE EXPERIENCE REPORT

Substance Abuse and Mental Health Services Administration
Center for Behavioral Health Statistics and Quality
Rockville, Maryland

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RTI Authors:
Katherine B. Morton
Harper Gordek
Peilan C. Martin
Dexter McNutt

SAMHSA Authors:
Arthur Hughes
Matthew Williams

Project Director:
David Hunter

SAMHSA Project Officer:
Peter Tice

For questions about this report, please e-mail Peter.Tice@samhsa.hhs.gov.

Prepared for Substance Abuse and Mental Health Services Administration, Rockville, Maryland

Prepared by RTI International, Research Triangle Park, North Carolina

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1. Introduction

A coordinated sample design was developed for the 2014 through 2017 National Surveys on Drug Use and Health (NSDUHs).[1] The multiyear design consists of a deeply stratified, multistage area probability design. The 2014 sample design is thoroughly documented in the 2014 NSDUH sample design report (Center for Behavioral Health Statistics and Quality, 2015a). The goal of this report is to further document the 2014 NSDUH sample experiences, including a comparison of actual sample yields to state and quarter targets, a comparison of achieved and expected design effects (DEFFs) and relative standard errors (RSEs), and documentation of any issues encountered during sample implementation. In addition, any unforeseen issues related to the 2014 sample redesign will be documented.

This report is organized as follows. Chapter 2 summarizes the 2014 sample design. Chapters 3, 4, and 5 document the sample experiences at the third, fourth, and fifth stages of sample selection, respectively. Chapter 6 describes the sample experience for the text-to-speech field test. Chapter 7 includes a comparison of the observed precisions with the expected precisions and a comparison of median and mean DEFFs. Finally, two issues encountered during sample implementation are described in Chapter 8.

[1] This report presents information from the 2014 NSDUH. Prior to 2002, the survey was called the National Household Survey on Drug Abuse (NHSDA).

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2. Overview of the 2014 Sample Design

2.1 Target Population

The respondent universe for the 2014 National Survey on Drug Use and Health (NSDUH) was the civilian, noninstitutionalized population aged 12 years or older residing in the United States. Consistent with the NSDUH designs since 1991, the 2014 NSDUH universe included residents of noninstitutional group quarters (e.g., shelters, rooming houses, dormitories, and group homes), residents of Alaska and Hawaii, and civilians residing on military bases in the United States. Persons excluded from the 2014 universe included those with no fixed household address (e.g., homeless transient persons not in shelters) and residents of institutional group quarters, such as jails and hospitals.

2.2 Design Overview

The Substance Abuse and Mental Health Services Administration (SAMHSA) implemented major changes in the way that NSDUH would be conducted beginning in 1999 and continuing through subsequent years. The survey is conducted using computer-assisted interviewing (CAI) methods and provides state estimates based on minimum sample sizes per state. Furthermore, NSDUH was redesigned in 2014 to allow for a more cost-efficient sample allocation to the largest states while maintaining adequate sample sizes in smaller states to support reliable state and substate estimates based on the small area estimation (SAE) methodology. Reliable direct state estimates are also possible (in any state) by pooling multiple years of data. The target national sample size of 67,507 is distributed across five age groups as follows: 25 percent for youths aged 12 to 17, 25 percent for young adults aged 18 to 25, 15 percent for adults aged 26 to 34, 20 percent for adults aged 35 to 49, and 15 percent for adults aged 50 or older. This large sample size allows SAMHSA to continue reporting precise estimates for demographic subgroups at the national level without needing to oversample specially targeted demographics, as was required prior to 1999. This large sample is referred to as the "main sample." The achieved sample for the 2014 NSDUH was 67,901 persons.

Beginning with the 2002 NSDUH and continuing through the 2014 NSDUH, survey respondents were given a $30 incentive for participation. As expected, the incentive had the effect of increasing response rates, thereby requiring fewer selected households than previous surveys. In recent years, however, response rates have been slowly declining, which has required the number of selected households to increase. In 2014, this increase was offset by selecting fewer youths aged 12 to 17, requiring fewer selected households per completed interview. That is, with more proportional sampling by age group, fewer households are needed to support the oversample of youths aged 12 to 17.

An additional design change was made in 2002 and continued through 2013. A new pair sampling strategy was implemented that increased the number of pairs selected in dwelling units (DUs) with older persons on the roster (Chromy & Penne, 2002). With the increase in the number of pairs came a moderate decrease in the response rate for older persons. Changes to the

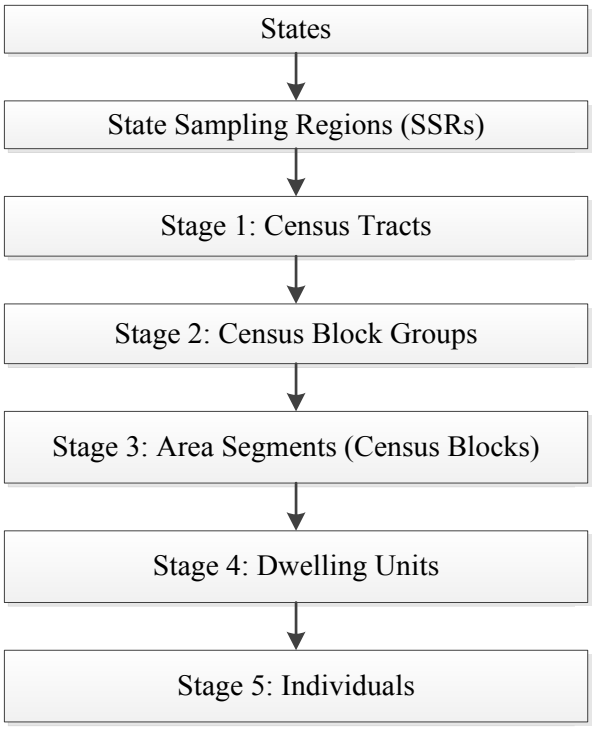
2014 sample design with respect to age group and state necessitated a review of the pair sampling strategy. As a result, slightly fewer pairs were selected for the 2014 NSDUH.

Finally, a text-to-speech (TTS) field test that was separate from the main study was conducted in late 2014. The TTS field test was designed to test the comprehensibility of TTS on NSDUH with the general population and to identify any issues with timing or missing data. (For details, see the discussion in Chapter 6.)

2.2.1 4-Year Coordinated Design

A coordinated sample design was developed for the 2014 through 2017 NSDUHs. Exhibit 1 summarizes the multistage design. The coordinated design facilitates 50 percent overlap in third-stage units (area segments) within each successive 2-year period from 2014 through 2017. This designed sample overlap slightly increases the precision of estimates of year-to-year trends because of the expected small but positive correlation resulting from the overlapping sample between successive survey years. The 50 percent overlap of segments significantly reduces segment listing costs because only one half of the segments will need to be listed for the 2015 through 2017 surveys.

Exhibit 1. Summary of the 2014 through 2017 NSDUH Design



The 2014 design provides for estimates by state in all 50 states plus the District of Columbia. States may therefore be viewed as the first level of stratification and as a reporting variable. In the 2005 through 2013 NSDUH design, the sample was divided into 8 "large" states and 43 "small" states (including the District of Columbia), with the large and small sample states designed to yield 3,600 and 900 respondents per state, respectively. Beginning in 2014, the survey's sample was designed to yield the following:

- 4,560 completed interviews in California;
- 3,300 completed interviews each in Florida, New York, and Texas;
- 2,400 completed interviews each in Illinois, Michigan, Ohio, and Pennsylvania;
- 1,500 completed interviews each in Georgia, New Jersey, North Carolina, and Virginia;
- 967 completed interviews in Hawaii; and
- 960 completed interviews in each of the remaining 37 states and the District of Columbia.

To accommodate state and local policymakers' need for substate estimates in Kauai County, Hawaii, the sample was designed to yield a minimum of 200 completed interviews in this county over a 3-year period. This allows for Kauai County to be included as a separate entity in the production of substate estimates that are produced biennially and typically based on 3 years of data. To achieve this goal while maintaining precision at the state level, Kauai County was treated separately from the remainder of Hawaii for sample allocation and sample size management purposes. The target annual sample in Hawaii consisted of 67 completed interviews in Kauai County and 900 completed interviews in the remainder of the state, for an expected total of approximately 967 completed interviews each year.

In all states, the sample sizes were sufficient to support reliable direct estimates or estimates based on the SAE methodology for selected outcomes while maintaining efficiency for national estimates. All state estimates are typically produced by pooling multiple years of data to increase precision, especially for estimates of change over time.

Within each state, state sampling regions (SSRs) were formed. Based on a composite size measure, each state was geographically partitioned into roughly equal-sized regions according to population. In other words, regions were formed such that each area yielded, in expectation, roughly the same number of interviews within each state during each quarterly data collection period. This partitioning divided the United States into 750 SSRs.

Similar to the 2005 through 2013 NSDUHs, the first stage of selection for the 2014 through 2017 NSDUHs was census tracts.[2] This stage was included to contain sample segments within a single census tract to the extent possible.[3] Segments that cross census tract boundaries make merging to external data sources difficult.

The first stage of selection began with the construction of an area sample frame that contained one record for each census tract in the United States. If necessary, census tracts were aggregated within SSRs until each first-stage sampling unit met the minimum size requirement. In California, Florida, Georgia, Illinois, Michigan, New Jersey, New York, North Carolina,

[2] A census tract is a small, relatively permanent statistical subdivision of a county or equivalent entity that contains between 1,200 and 8,000 people, with an optimum size of 4,000 people (U.S. Census Bureau, Redistricting Data Office, 2009).

[3] Some census tracts had to be aggregated in order to meet the minimum DU requirement.

Ohio, Pennsylvania, Texas, and Virginia, this minimum size requirement was 250 DUs[4] in urban areas and 200 DUs in rural areas.[5] In the remaining states and the District of Columbia, the minimum requirement was 150 DUs in urban areas and 100 DUs in rural areas.

Before selecting census tracts,[6] additional implicit stratification was achieved by sorting the first-stage sampling units by a CBSA/SES[7] (core-based statistical area/socioeconomic status) indicator[8] and by the percentage of the population that is non-Hispanic and white.[9] From this well-ordered sample frame, 48 census tracts per SSR were sequentially selected with probabilities proportionate to a composite size measure and with minimum replacement (Chromy, 1979).

For the second stage of selection, adjacent census block groups were aggregated within selected census tracts as necessary to meet the minimum DU requirements (150 or 250 DUs in urban areas and 100 or 200 DUs in rural areas according to state). After the resulting second-stage sampling units were formed, they were sorted in the order they were formed (i.e., geographically), and one census block group[10] was selected per sampled census tract with probability proportionate to a composite size measure and with minimum replacement (Chromy, 1979). Compared with 2013 and prior years, the selection of census block groups is an additional stage of selection that was included to facilitate possible transitioning to an address-based sampling (ABS) design in the future.

The census block groups were generally larger than practical for building frames of housing units through field enumeration. Therefore, one smaller geographic region was selected within each sampled census block group. For this third stage of sampling, each selected census

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[4] DU counts were obtained from the 2010 census data supplemented with revised population counts from Nielsen Claritas, which is a market research firm headquartered in San Diego, California (see http://www.claritas.com/sitereports/Default.jsp).

[5] The basis for the differing minimum DU requirement in urban and rural areas is that it is more difficult to meet the requirement in rural areas, 100 DUs are sufficient to support one field test and two main study samples in the smaller states, and 200 DUs are sufficient to support three samples in the larger sample states.

[6] For the remainder of the discussion, first-stage sampling units are referred to as "census tracts" even though each first-stage sampling unit contains one or more census tracts.

[7] CBSAs include metropolitan and micropolitan statistical areas as defined by the Office of Management and Budget (2009).

[8] Four categories are defined as (1) CBSA/low SES, (2) CBSA/high SES, (3) non-CBSA/low SES, and (4) non-CBSA/high SES. To define SES, census tract-level median rents and property values obtained from the 2006 to 2010 American Community Survey (ACS) data were given a rank (1,…,5) based on state and CBSA quintiles. The rent and value ranks then were averaged, weighted by the percentages of renter- and owner-occupied DUs, respectively. If the resulting score fell in the lower 25th percentile by state and CBSA, the area was considered "low SES"; otherwise, it was considered "high SES."

[9] Although the large sample size eliminates the need for the oversampling of specially targeted demographic subgroups as was required prior to the 1999 National Household Survey on Drug Abuse (NHSDA), sorting by a CBSA/SES indicator and by the percentage of the population that is non-Hispanic and white ensures dispersion of the sample with respect to SES and race/ethnicity. Implicit stratification also has the potential to lower sampling error by reducing the selection of neighboring and possibly similar segments than if the selection was done completely at random.

[10] For the remainder of the discussion, second-stage sampling units are referred to as "census block groups" even though each second-stage sampling unit contains one or more census block groups.

block group was partitioned into compact clusters[11] of DUs by aggregating adjacent census blocks.[12] Consistent with the terminology used in previous NSDUHs, these geographic clusters of blocks are referred to as "segments." A sample DU in NSDUH refers to either a housing unit or a group quarters listing unit, such as a dormitory room or a shelter bed. Similar to census tracts and census block groups, segments were formed to contain a minimum of 150 or 250 DUs in urban areas and 100 or 200 DUs in rural areas according to state. This minimum DU requirement will support the overlapping sample design and any special supplemental samples or field tests that SAMHSA may wish to conduct.

Prior to selection, the segments were sorted in the order they were formed (i.e., geographically), and one segment was selected within each sampled census block group using Chromy's method of sequential random sampling (with probability proportionate to size and minimum replacement) (Chromy, 1979). The 48 selected segments within each SSR were randomly assigned to a survey year and quarter of data collection. Although 48 segments were selected, only 20 were needed to field the main survey across the 4-year period. The remaining segments are available to accommodate supplemental studies and other uses.

An equal probability subsample of eight segments per SSR is used for each NSDUH year. These eight segments are randomly assigned to quarters and to two panels within each quarter. For 2014, the first panel segments (panel A) were used for the 2014 survey year only. The second panel segments (panel B) were used for the 2014 survey and will be used again for the 2015 survey, constituting the overlap sample.

2.2.2 Sample Frame

Beginning in 2014, three changes related to the sample frame were implemented. First, whereas the sampling frame for the 2005 through 2013 NSDUHs was constructed using 2000 census data, the 2014 through 2017 sample frame was built using 2010 census data supplemented with 2013 population projections from Nielsen Claritas. Furthermore, because the Census Bureau's long-form data were no longer available, census tract-level median rents and property values were obtained from the 2006 to 2010 ACS. These data were used to form the CBSA/SES indicator that was used in the implicit stratification of the first-stage sampling units (census tracts). This change was confirmed to improve coverage and therefore require smaller poststratification adjustments in weighting (Center for Behavioral Health Statistics and Quality [CBHSQ], 2015c).

Next, the number and distribution of SSRs was revised in 2014. In the 2005 through 2013 design, the 8 large states were partitioned into 48 SSRs and the small states were partitioned into 12 SSRs, for a total of 900 SSRs. In 2014, the sampling frame was stratified into 750 SSRs with

[11] Although the entire cluster is compact, the final sample of DUs represents a noncompact cluster. Noncompact clusters (selection from a list) differ from compact clusters in that not all units within the cluster are included in the sample. Although compact cluster designs are less costly, a noncompact cluster design was used because it provides for greater heterogeneity of dwellings within the sample. Also, social interaction (contagion) among neighboring dwellings is sometimes introduced with compact clusters (Kish, 1965).

[12] A census block is a small statistical area bounded by visible features (streets, roads, streams, railroad tracks, etc.) and nonvisible boundaries (e.g., city, town, and county limits). A block group is a cluster of census blocks within the same census tract and generally contains between 300 and 6,000 people (U.S. Census Bureau, Redistricting Data Office, 2009).

the number of SSRs varying by state. In each of the eight large states, the total number of SSRs was reduced. In four of the small states, the total number of SSRs was increased, while there was no change in the number of SSRs in the remaining small states. Thus, the change in the number and distribution of SSRs affected only 12 states.

In general, the new SSR distribution in the affected states resulted in increased efficiency in the highly populated areas and efficiency losses in the less populated areas. In the highly populated areas, some efficiency was gained because the SSRs and segment locations were more compact and the work could be completed by fewer field interviewers (FIs). The concentrated locations reduced travel for the FIs, provided sufficient options for case assignments, and provided the option for FIs to work more hours, if desired. In some less populated areas, the decrease in SSRs created some inefficiencies because the SSRs were larger and the segment locations were not as central. In these areas, it was often challenging for an FI to cover all of the work in an SSR due to the varying location of segments and the location of an FI's home. Depending on the quarter, some SSRs experienced inefficiencies due to increased FI travel for the initial assignments and reduced FI options for conducting cleanup. Not all of the FIs were willing or available to travel longer distances, creating some inefficiencies in case assignments. In these areas, the use of borrowed FIs (BFIs) and sometimes traveling FIs (TFIs) was required.

In the states of Illinois, Michigan, Ohio, and Pennsylvania, the total number of SSRs was cut in half, and the average segment size was increased. As a result, these states experienced both gains and losses in efficiency. In the highly populated areas, these states not only gained due to increased yield and clustering, but in staffing selection. Field management for 2014 was able to reduce the number of field staff members in the highly populated areas of these states. With location being equal, the best, most proficient, more efficient, and dedicated field staff members were retained. In the less populated areas of these states, increased SSR sizes and varying segment locations caused inefficiencies. Some segments had no nearby FI and had to be worked by a BFI or TFI, thus increasing travel costs. Overall, the greater yields in these states resulted in gains in efficiency, but also kept the field staff members working in their local segments longer while waiting for that assignment to be finished and before sending them to another area to work or clean up.

Overall, the new SSR distribution resulted in a reduction of hours and miles per interview; however, miscellaneous travel expenses increased. The SSR distribution also affected scheduling because it was initially not known what the yield would be in an area or when an FI would be available to move on to another assignment. With the higher yield, FIs took longer to work their initial assignments and were delayed while working a travel assignment. Compared with previous designs when field staff members completed their assignments several weeks before the end of the quarter, FIs now worked late into each quarter. Without a short break at the end of the quarter, getting off to a strong start at the beginning of the following quarter was more challenging.

The third change, which was mentioned previously, is the addition of a sample selection stage by selecting census block groups from selected census tracts. The purpose of this change is to facilitate the possible transition to ABS. The introduction of census blocks as a sampling stage

was transparent in the area sampling results and should have little impact on the person-level analysis weight.

2.2.3 Sample Selection at Fourth and Fifth Stages

After sample segments for the 2014 NSDUH were selected, specially trained field household listers visited the areas and compiled complete lists of all eligible DUs within the sample segment boundaries. These lists served as the frames for the fourth stage of sample selection.

The primary objective of the fourth stage of sample selection (listing units) was to select the minimum number of DUs needed in each segment to meet the targeted sample sizes for all age groups. Thus, listing unit sample sizes for the segment were determined using the age group with the largest sampling rate, which is referred to as the "driving" age group. Using 2010 census data adjusted to more recent data from Nielsen Claritas, state- and age-specific sampling rates were computed. These rates then were adjusted by (a) the segment's probability of selection; (b) the subsegmentation inflation factor,[13] if any; (c) the probability of selecting a person in the age group (equal to the maximum, or 0.99, for the driving age group); and (d) an adjustment for the "maximum of two" rule.[14] In addition to these factors, historical data from the 2012, 2013, and 2014 NSDUHs were used to compute predicted screening and interviewing response rate adjustments. The final adjusted sampling rate then was multiplied by the actual number of DUs found in the field during counting and listing activities. The product represents the segment's listing unit sample size.

Some constraints were put on the listing unit sample sizes. First, to ensure adequate samples for supplemental studies, the listing unit sample size could not exceed 100 per segment or half of the actual listing unit count. Next, for cost-efficiency, if five unused listing units remained in the segment, a minimum of five listing units per segment was required.

Using a random start point and interval-based (systematic) selection, the actual listing units were selected from the segment frame. Prior to 2014, DUs that were selected from the overlap segments in the prior year were flagged as "used" and were not eligible for selection in the "current" year (i.e., two separate samples were selected with the complement of the prior year's sample serving as the DU frame in the "current" year).

Individuals selected in 2013 may be selected again in 2014 by chance. In 2015 and beyond, they may be selected in consecutive years if they move and their new residence is selected the year after their original DU was sampled. No mechanism is currently in place for identifying duplicate persons in a given year, but this number should be small, particularly in 2015 and beyond, given the restriction on DUs that were sampled in the previous year.

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[13] Segments found to be very large in the field are partitioned into *subsegments*. Then one subsegment is chosen at random with probability proportional to the size to be fielded. In some cases, a second-level subsegmenting was required if the census totals used in the initial subsegmenting were off and the selected subsegment was still too large for listing. The subsegmentation inflation factor accounts for reducing the size of the segment.

[14] Brewer's Selection Algorithm never allows for greater than two persons per household to be chosen. Thus, sampling rates are adjusted to satisfy this constraint.

After DU selections were made, an interviewer visited each selected DU to obtain a roster of all persons residing in the DU. Using the roster information obtained from an eligible member of the selected DU, 0, 1, or 2 persons were selected for the survey. Sampling rates were preset by age group and state. Roster information was entered directly into the electronic screening instrument, which automatically implemented this fifth stage of selection based on the state and age group sampling parameters.

One advantage of using an electronic screening instrument in NSDUH is the ability to impose a more complicated person-level selection algorithm on the fifth stage of the NSDUH design. Similar to the 1999 through 2013 designs, one feature that was included in the 2014 design was that any two survey-eligible persons within a DU had some chance of being selected (i.e., all survey-eligible pairs of persons had some nonzero chance of being selected). This design feature was of interest to NSDUH researchers because, for example, it allows analysts to examine how the drug use propensity of one individual in a family relates to the drug use propensity of another family member residing in the same DU (e.g., the relationship of drug use between a parent and his or her child). The pair sampling algorithm in NSDUH is based on the Chromy and Penne (2002) adaptation of the Brewer (1963, 1975) method for selecting samples of size two. Chromy and Penne (2002) also introduced a pair sampling parameter λ that governs the number of pairs selected. A simulation analysis was conducted to select the pair sampling parameter for the 2014 NSDUH (see 2014 NSDUH sample design report; CBHSQ, 2015a).

As in previous years, during the data collection period, if an interviewer encountered any new or missed DU on the premises of a sampled DU (e.g., a garage apartment), the new or missed dwelling was selected into the 2014 NSDUH. However, unlike the 2005 through 2013 NSDUHs, the half-open interval (HOI) procedure[15] was not implemented. An evaluation of 2010 NSDUH data found that the HOI procedure accounted for only 0.2 percent of the total DUs on the supplemented NSDUH frame (Iannacchione, McMichael, Shook-Sa, & Morton, 2012). Further, an analysis of cases added to the sample through the HOI procedure found that these respondents did not have an appreciable impact on the estimates (Cunningham et al., 2009). Excluding the HOI procedure decreases the burden on FIs and simplifies the screening process. This decrease in burden outweighs the small increase in coverage resulting from implementation of the HOI procedure. To minimize bias associated with large numbers of missed DUs, interviewers were instructed to call their supervisors if they noticed large differences in the segment listing and what they encountered in the field. Then special "bust" procedure were implemented (see 2014 NSDUH sample design report; CBHSQ, 2015a).

2.2.4 Creation of Variance Estimation Strata and Replicates

The nature of the stratified, clustered sampling design requires that the design structure be taken into consideration when computing variances of survey estimates. Key nesting variables representing the variance estimation strata and replicates were created to capture explicit stratification and to identify clustering. For the 2014 through 2017 NSDUHs, variance estimation

[15] In summary, the HOI technique states that, if a DU is selected and an interviewer observes any new or missed DUs between the selected DU and the DU appearing immediately after the selection on the counting and listing form, all new or missed dwellings falling in this interval will be selected. If a large number of new or missed DUs are encountered (greater than 10), a sample of the new or missing DUs is selected, and the sample weight is adjusted accordingly.

strata are defined at the SSR level, and each SSR is assigned to a different stratum every quarter in a pseudorandom fashion. Similar to the 2005 through 2013 definition of variance estimation strata, the 2014 through 2017 definition also has the effect of increasing the number of degrees of freedom (*df*) for state-level estimates while preserving the number of degrees of freedom for national estimates (750). Each of the smallest sample states is in 48 different strata (12 SSRs × 4 quarters); therefore, 48 degrees of freedom are available for state estimates in these states. At the other extreme, the largest sample state, California, is in 144 strata (36 SSRs × 4 quarters) and therefore has 144 degrees of freedom for estimation. Two replicates per year were defined within each variance stratum. Each variance replicate consists of four segments, one for each quarter of data collection. The first replicate consists of those segments that are "phasing out" or will not be used in the next survey year. The second replicate consists of those segments that are "phasing in" or will be fielded again the following year, thus constituting the 50 percent overlap between survey years.

Census tracts, block groups, and segments are nested within variance replicates, so the nesting variables cover the variance contributions of all three sampling units. Also, because one segment is selected per sampled census tract and block group, the selection of census tracts and block groups at the first stages of selection may reduce variance by controlling the sample distribution and minimizing the chance of selecting neighboring and possibly similar segments within the same census tract or block group. All weighted statistical analyses for which variance estimates are needed should use the stratum and replicate variables to identify nesting. Stratification reduces variances, while clustering increases them. Ignoring these design elements may produce standard errors that lead to false-positive or false-negative test outcomes. Variance estimates can be computed using a clustered data analysis software package such as SUDAAN® (CBHSQ, 2015a; RTI International, 2013).

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3. Segment (Third-Stage) Sample Experience

As mentioned in Chapter 2, the third stage of selection for the 2014 through 2017 National Surveys on Drug Use and Health (NSDUHs) was area segments. To form segments within sampled census block groups, adjacent census blocks were collapsed until the total number of dwelling units (DUs) within the area met the minimum requirement. In California, Florida, Georgia, Illinois, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Texas, and Virginia, this minimum size requirement was 250 DUs in urban areas and 200 DUs in rural areas. In the remaining states and the District of Columbia, the minimum requirement was 150 DUs in urban areas and 100 DUs in rural areas.

To control the geographic distribution of the sample, segments were sorted in the order they were formed (geographically within census block groups), and one segment was selected per sampled census block group using the probability proportional to size with minimal replacement sequential sampling method. As a result, 48 census tracts/segments per state sampling region (SSR) were chosen for a total of 36,000 segments. Although only 20 segments per SSR or 15,000 segments total were needed to support the 4-year study from 2014 through 2017, an additional 28 segments were selected to serve as replacements when segment DUs are depleted and/or to support any supplemental studies embedded within NSDUH. Among the 15,000 segments selected for the 4-year study, 14,605 (97.4 percent) were unique. Table 3.1 lists the duplicated segments in the 2014 NSDUH sample. (The segment naming convention is described below.)

Table 3.1 Duplicated Segments in the 2014 NSDUH Sample

Duplicated Segments	
AK06A3	AK06B2
DC07B1	DC07B2
DE05A1	DE05A2
HI08A3	HI08B4
MT07B2	MT07B3

The 48 sampled segments per SSR were randomly assigned to survey years by drawing equal probability subsamples of four segments. The first subsample of segments was assigned to the 2014 NSDUH and constituted the panel of segments to be used for 2014 only. The second subsample of segments was assigned to the 2014 NSDUH and is to be used again in the 2015 survey. Within each subsample, segments were assigned to survey quarters 1 through 4 in the order that they were selected.

Using the survey year and quarter assignments, a segment identification number (SEGID) then was assigned. The first two digits of the SEGID are the state abbreviation, the second two digits are the SSR within state, and the last two digits are called the "segment suffix," with the next-to-last digit being the panel identifier and the last digit being the original quarter assignment.

During field enumeration, a small number of segments are switched with another segment in the same SSR and panel due to difficult conditions during the winter months. In general, quarter 1 segments are switched with quarter 2 segments, and quarter 4 segments are switched with quarter 3 segments. Table 3.2 lists the quarter switches in the 2014 NSDUH sample.

Table 3.2 2014 NSDUH Segment Quarter Switches in the Field

Quarters 1 and 2		Quarters 3 and 4	
Assigned Segment in Quarter 1	**Switched Segment in Quarter 2**	**Assigned Segment in Quarter 4**	**Switched Segment in Quarter 3**
ME08A1	ME08A2	MO01B4	MO01B3
NH12A1	NH12A2	MO07B4	MO07B3
NY01A1	NY01A2	MO01A4	MO01A3
CO06B1	CO06B2	CO11B4	CO11B3
AK02A1	AK02A2	CO12B4	CO12B3
AK02B1	AK02B2	CO12A4	CO12A3
AK04B1	AK04B2	CO10A4	CO10A3
AK11A1	AK11A2	WY02A4	WY02A3
TN11A1	TN11A2	WY05A4	WY05A3
MO02A1	MO02A2	WY12A4	WY12A3
MO08B1	MO08B2	MT09B4	MT09B3
CT04A1	CT04A2	MT10A4	MT10A3
IA02B1	IA02B2	MT11B4	MT11B3
IA05B1	IA05B2	ID05A4	ID05A3
IA09B1	IA09B2	ID11A4	ID11A3
IA12B1	IA12B2	ID11B4	ID11B3
MT01B1	MT01B2	NV04A4	NV04A3
MT01A1	MT01A2	OR02B4	OR02B3
MT02B1	MT02B2	OR04B4	OR04B3
MT06A1	MT06A2	WA11A4	WA11A3
MT06B1	MT06B2	AK01A4	AK01A3
MT11B1	MT11B2	AK01B4	AK01B3
ID02A1	ID02A2	AK03A4	AK03A3
ID10A1	ID10A2	AK04A4	AK04A3
ID12B1	ID12B2	AK10B4	AK10B3
WY06A1	WY06A2	AK11A4	AK11A3
NE03A1	NE03A2	AK12B4	AK12B3
NE04A1	NE04A2	MO12A4	MO12A3
		MO12B4	MO12B3

4. Dwelling Unit (Fourth-Stage) Sample Experience

The process by which the dwelling unit (DU) frame is constructed is called "counting and listing." In summary, a certified lister visits the selected area and lists a detailed and accurate address (or description, if no address is available) for each DU within the segment boundaries. The list of DUs constructed during counting and listing is entered into a database and serves as the frame from which the fourth-stage sample is drawn.

As described in Section 2.2.3, after the DU frame was constructed, the next step was to determine the minimal number of DUs to select for each segment to meet the targeted sample sizes for all age groups. This sample size determination was performed on a quarterly basis to take advantage of both segment differences and, if necessary, make adjustments to design parameters (e.g., to use the most recent response rate experience). Table 4.1 provides the number of DUs that were enumerated during the counting and listing process and the number of DUs that were sampled. After accounting for anticipated screening and interview response rates using historical NSDUH data, an average of 30.68 sample dwelling units (SDUs) were selected per segment. The number of SDUs per segment varies by state according to the state's sample size, number of segments, and anticipated response rates.

Table 4.1 Segment and Dwelling Unit Summary

State	Total Segments	Listed DUs	SDUs	SDUs per Segment	Added DUs	Percent Increase in DUs	Total Selected DUs
Total Population	6,000	1,647,838	184,059	30.68	954	0.52	185,013
Alabama	96	22,511	2,631	27.41	9	0.34	2,640
Alaska	96	23,432	2,961	30.84	24	0.81	2,985
Arizona	96	22,997	2,509	26.14	5	0.20	2,514
Arkansas	96	20,657	2,670	27.81	4	0.15	2,674
California	288	98,752	10,189	35.38	50	0.49	10,239
Colorado	96	21,541	2,594	27.02	13	0.50	2,607
Connecticut	96	23,356	2,784	29.00	6	0.22	2,790
Delaware	96	22,754	2,769	28.84	3	0.11	2,772
District of Columbia	96	29,365	4,310	44.90	20	0.46	4,330
Florida	240	80,359	10,237	42.65	32	0.31	10,269
Georgia	120	42,545	3,681	30.68	12	0.33	3,693
Hawaii	96	27,652	2,878	29.98	64	2.22	2,942
Idaho	96	20,037	1,917	19.97	15	0.78	1,932
Illinois	192	64,747	6,871	35.79	33	0.48	6,904
Indiana	96	22,433	2,493	25.97	11	0.44	2,504
Iowa	96	20,434	2,484	25.88	12	0.48	2,496
Kansas	96	21,266	2,297	23.93	7	0.30	2,304
Kentucky	96	22,631	2,539	26.45	17	0.67	2,556
Louisiana	96	21,609	2,431	25.32	4	0.16	2,435
Maine	96	22,493	3,317	34.55	25	0.75	3,342

See notes at end of table. (continued)

Table 4.1 Segment and Dwelling Unit Summary (continued)

State	Total Segments	Listed DUs	SDUs	SDUs per Segment	Added DUs	Percent Increase in DUs	Total Selected DUs
Maryland	96	26,618	2,464	25.67	19	0.77	2,483
Massachusetts	96	22,504	2,923	30.45	25	0.86	2,948
Michigan	192	68,511	6,565	34.19	44	0.67	6,609
Minnesota	96	21,298	2,364	24.63	11	0.47	2,375
Mississippi	96	21,068	2,192	22.83	7	0.32	2,199
Missouri	96	23,312	2,574	26.81	4	0.16	2,578
Montana	96	17,927	2,816	29.33	13	0.46	2,829
Nebraska	96	20,092	2,441	25.43	18	0.74	2,459
Nevada	96	26,254	2,410	25.10	11	0.46	2,421
New Hampshire	96	23,113	3,007	31.32	37	1.23	3,044
New Jersey	120	43,416	4,394	36.62	9	0.20	4,403
New Mexico	96	23,280	2,303	23.99	10	0.43	2,313
New York	240	83,133	10,978	45.74	85	0.77	11,063
North Carolina	120	38,563	4,162	34.68	23	0.55	4,185
North Dakota	96	19,476	3,029	31.55	14	0.46	3,043
Ohio	192	65,653	6,311	32.87	11	0.17	6,322
Oklahoma	96	21,030	2,255	23.49	4	0.18	2,259
Oregon	96	21,159	2,513	26.18	16	0.64	2,529
Pennsylvania	192	68,513	7,058	36.76	43	0.61	7,101
Rhode Island	96	23,284	2,651	27.61	30	1.13	2,681
South Carolina	96	23,410	2,839	29.57	4	0.14	2,843
South Dakota	96	22,122	2,156	22.46	7	0.32	2,163
Tennessee	96	23,322	2,317	24.14	9	0.39	2,326
Texas	240	80,564	6,997	29.15	7	0.10	7,004
Utah	96	21,467	1,533	15.97	1	0.07	1,534
Vermont	96	21,098	3,244	33.79	51	1.57	3,295
Virginia	120	39,506	3,657	30.48	14	0.38	3,671
Washington	96	23,725	2,430	25.31	19	0.78	2,449
West Virginia	96	22,555	3,191	33.24	13	0.41	3,204
Wisconsin	96	21,551	2,917	30.39	7	0.24	2,924
Wyoming	96	18,743	2,806	29.23	22	0.78	2,828

DU = dwelling unit; SDU = sample dwelling unit.

To compensate for quarterly variations in response rates and yields, a sample partitioning procedure was implemented in all quarters. The entire sample of DUs still would be selected, but only certain percentages of the total would be released into the field. An initial percentage would be released in all segments at the beginning of the quarter. Based on interquarter work projections, additional percentages would be released 1 month into the quarter as needed and if field staff could handle the added workload. Each partitioning of the sample is a valid sample and helps manage the sample sizes by state without jeopardizing the validity of the study. Incidentally, a reserve DU sample of 20 percent also was selected within each selected segment, over and above the required quarterly sample, to allow for supplemental releases within each quarter. These releases usually occur as a result of lower than expected response rates, but are also released for other reasons, including a large percentage of sample in controlled access areas and in college dormitories that are vacant during the summer months. In previous years, additional sample has also been released to compensate for sample lost to natural disasters and other emergency situations (e.g., following Hurricanes Katrina and Rita). Sample releases are

made at the state level and do not target any particular age group. In each quarter, the DU sample was allocated out to states in the following release percentages:

Release 1: 67 percent of entire sample (80/120, main sample + 20 percent reserve);
Release 2: 4 percent of entire sample (5/120, main sample + 20 percent reserve);
Release 3: 4 percent of entire sample (5/120, main sample + 20 percent reserve);
Release 4: 8 percent of entire sample (10/120, main sample + 20 percent reserve);
Release 5: 8 percent of entire sample (10/120, main sample + 20 percent reserve); and
Release 6: 8 percent of entire sample (10/120, main sample + 20 percent reserve).

As described in the 2014 NSDUH sample design report (Center for Behavioral Health Statistics and Quality [CBHSQ], 2015a), a weight adjustment is applied to all DUs within a segment to account for the partial release of sample. The DU release adjustment is equal to the inverse of the percentage of the sample that is released into the field. A summary of the quarterly sample sizes and percentages released is provided in Table 4.2. If the release plan was implemented with no changes, a percentage equal to 100/120 or 83.3 percent would be expected.

To ensure that most DUs had a chance of selection and to minimize bias associated with incomplete frames, a check for missed DUs was implemented at each sampled DU. During the screening interview, the field interviewer (FI) asked the screening respondent about other units on the property of the sampled DU (e.g., a garage apartment). When found on the property of a sampled DU, the unlisted units became part of the sample (added DUs) and were considered "linked" to that DU. If the number of added DUs linked to any particular sample DU did not exceed 5, and if the number for the entire segment was less than or equal to 10, the FI was instructed to consider these DUs as part of his or her assignment. If either of these limits was exceeded, special subsampling procedures were implemented (see the 2014 NSDUH sample design report; CBHSQ, 2015a).

In addition to checking for missed DUs at each sampled DU, interviewers were instructed to call their supervisors if they noticed large differences in the segment listing and what they encountered in the field. If the FI identified 150 or more missed DUs in a segment or 50 or more missed DUs following any DU, special "bust" procedures were implemented to minimize bias associated with large numbers of missed DUs. The bust procedures involve selecting a subsample of the missed DUs and adding them to the interview's assignment; these procedures are described in more detail in the 2014 NSDUH sample design report (CBHSQ, 2015a). The total number of added DUs identified during the screening interview or added through the bust procedures is summarized in Table 4.1. Overall, a 0.52 percent increase in sample was realized through the check for missed DUs. Larger increases in sample were realized in the state of Hawaii and in the Northeast states. In general, Hawaii had a large number of DUs on the property of other DUs that were difficult to see. Also, properties that were listed by mailbox may have had only one mailbox for several units. The Northeast states had a large number of garage apartments and single family homes converted into multiple units. Further, several bust situations occurred in the state of New Hampshire. The added DU information in Table 4.1 will be used in the sample size calculations for future NSDUHs.

Table 4.2 Quarterly Dwelling Unit Sample Sizes and Percentages Released

Region/State	Quarter 1			Quarter 2		
	# Selected	# Released	Percent	# Selected	# Released	Percent
Total Population	50,560	42,172	83.41	55,679	49,402	88.73
Northeast	10,995	9,168	83.38	11,834	10,861	91.78
Connecticut	629	528	83.94	753	753	100.00
Maine	892	750	84.08	857	853	99.53
Massachusetts	743	616	82.91	819	819	100.00
New Hampshire	870	722	82.99	894	782	87.47
New Jersey	1,224	1,023	83.58	1,338	1,284	95.96
New York	2,959	2,464	83.27	3,129	3,124	99.84
Pennsylvania	2,137	1,781	83.34	2,303	1,633	70.91
Rhode Island	658	548	83.28	714	714	100.00
Vermont	883	736	83.35	1,027	899	87.54
Midwest	11,545	9,638	83.48	12,847	11,645	90.64
Illinois	1,684	1,403	83.31	2,020	1,934	95.74
Indiana	706	591	83.71	800	634	79.25
Iowa	641	536	83.62	716	716	100.00
Kansas	626	521	83.23	661	551	83.36
Michigan	1,792	1,498	83.59	1,995	1,908	95.64
Minnesota	662	553	83.53	736	583	79.21
Missouri	769	640	83.22	815	682	83.68
Nebraska	684	571	83.48	760	635	83.55
North Dakota	907	751	82.80	956	793	82.95
Ohio	1,665	1,392	83.60	1,842	1,842	100.00
South Dakota	650	545	83.85	717	540	75.31
Wisconsin	759	637	83.93	829	827	99.76
South	17,133	14,289	83.40	19,007	16,122	84.82
Alabama	709	590	83.22	767	733	95.57
Arkansas	702	591	84.19	836	768	91.87
Delaware	744	620	83.33	873	872	99.89
District of Columbia	1,205	1,008	83.65	1,308	1,034	79.05
Florida	3,393	2,831	83.44	3,678	2,452	66.67
Georgia	989	826	83.52	1,128	891	78.99
Kentucky	719	594	82.61	803	670	83.44
Louisiana	660	550	83.33	756	692	91.53
Maryland	659	545	82.70	743	743	100.00
Mississippi	542	451	83.21	574	574	100.00
North Carolina	1,098	916	83.42	1,274	1,115	87.52
Oklahoma	668	556	83.23	634	505	79.65
South Carolina	697	578	82.93	815	781	95.83
Tennessee	708	596	84.18	747	624	83.53
Texas	1,892	1,578	83.40	2,171	1,810	83.37
Virginia	967	809	83.66	1,039	997	95.96
West Virginia	781	650	83.23	861	861	100.00
West	10,887	9,077	83.37	11,991	10,774	89.85
Alaska	777	646	83.14	905	755	83.43
Arizona	734	613	83.51	799	738	92.37
California	2,798	2,333	83.38	2,956	2,831	95.77
Colorado	623	522	83.79	817	678	82.99
Hawaii	846	709	83.81	851	831	97.65
Idaho	545	453	83.12	599	526	87.81
Montana	732	615	84.02	773	739	95.60
Nevada	628	523	83.28	680	680	100.00
New Mexico	692	572	82.66	770	578	75.06
Oregon	633	525	82.94	841	806	95.84
Utah	492	415	84.35	497	393	79.07
Washington	577	479	83.02	689	573	83.16
Wyoming	810	672	82.96	814	646	79.36

(continued)

Table 4.2 Quarterly Dwelling Unit Sample Sizes and Percentages Released (continued)

Region/State	Quarter 3			Quarter 4		
	# Selected	# Released	Percent	# Selected	# Released	Percent
Total Population	54,453	46,141	84.74	51,447	46,344	90.08
Northeast	11,575	10,100	87.26	11,056	10,227	92.50
Connecticut	780	780	100.00	723	723	100.00
Maine	817	817	100.00	1,021	897	87.86
Massachusetts	948	788	83.12	731	700	95.76
New Hampshire	803	734	91.41	769	769	100.00
New Jersey	1,155	962	83.29	1,228	1,125	91.61
New York	3,142	2,622	83.45	2,892	2,768	95.71
Pennsylvania	2,211	1,850	83.67	2,061	1,794	87.05
Rhode Island	710	710	100.00	707	679	96.04
Vermont	1,009	837	82.95	924	772	83.55
Midwest	12,271	10,350	84.35	11,901	10,869	91.33
Illinois	1,903	1,590	83.55	1,944	1,944	100.00
Indiana	792	663	83.71	726	605	83.33
Iowa	681	590	86.64	642	642	100.00
Kansas	681	565	82.97	660	660	100.00
Michigan	1,837	1,522	82.85	1,875	1,637	87.31
Minnesota	714	626	87.68	760	602	79.21
Missouri	779	584	74.97	668	668	100.00
Nebraska	742	617	83.15	618	618	100.00
North Dakota	972	771	79.32	856	714	83.41
Ohio	1,766	1,615	91.45	1,754	1,462	83.35
South Dakota	658	496	75.38	656	575	87.65
Wisconsin	746	711	95.31	742	742	100.00
South	18,753	15,481	82.55	17,417	15,450	88.71
Alabama	825	722	87.52	738	586	79.40
Arkansas	868	576	66.36	735	735	100.00
Delaware	972	688	70.78	884	589	66.63
District of Columbia	1,328	1,109	83.51	1,208	1,159	95.94
Florida	3,561	2,672	75.04	3,040	2,282	75.07
Georgia	1,076	1,032	95.91	1,121	932	83.14
Kentucky	792	658	83.08	674	617	91.54
Louisiana	801	599	74.78	707	590	83.45
Maryland	795	563	70.82	668	613	91.77
Mississippi	593	593	100.00	574	574	100.00
North Carolina	1,178	1,081	91.77	1,201	1,050	87.43
Oklahoma	585	585	100.00	609	609	100.00
South Carolina	767	666	86.83	814	814	100.00
Tennessee	736	553	75.14	648	544	83.95
Texas	2,053	1,718	83.68	1,891	1,891	100.00
Virginia	966	847	87.68	1,044	1,004	96.17
West Virginia	857	819	95.57	861	861	100.00
West	11,854	10,210	86.13	11,073	9,798	88.49
Alaska	917	837	91.28	754	723	95.89
Arizona	807	541	67.04	646	617	95.51
California	2,786	2,439	87.54	2,954	2,586	87.54
Colorado	775	775	100.00	709	619	87.31
Hawaii	931	693	74.44	748	645	86.23
Idaho	608	482	79.28	552	456	82.61
Montana	846	775	91.61	818	687	83.99
Nevada	700	609	87.00	687	598	87.05
New Mexico	732	577	78.83	660	576	87.27
Oregon	738	587	79.54	685	595	86.86
Utah	454	396	87.22	435	329	75.63
Washington	710	649	91.41	729	729	100.00
Wyoming	850	850	100.00	696	638	91.67

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5. Person (Fifth-Stage) Sample Experience

Compared with previous designs, the 2014 through 2017 National Survey on Drug Use and Health (NSDUH) design places more sample in the 26 or older age groups to estimate drug use and related mental health measures more accurately among the aging drug use population. As noted previously, the target national sample size of 67,507 was distributed across five age groups as follows: 25 percent for youths aged 12 to 17, 25 percent for young adults aged 18 to 25, 15 percent for adults aged 26 to 34, 20 percent for adults aged 35 to 49, and 15 percent for adults aged 50 or older. Further, the sample was designed to yield minimum sample sizes in each state as described in Section 2.2.1. Table 5.1 displays the desired and achieved sample yields by age group and state. In general, the sample allocation and sample size management procedures were effective at achieving the numerous sample size targets.

Table 5.1 Yields, by Age Group and State

Age Group and State	Targeted	Achieved	Percent Difference
Total	67,507	67,901	0.58
12-17	16,877	17,046	1.00
18-25	16,877	16,570	-1.82
26-34	10,126	10,159	0.33
35-49	13,501	13,581	0.59
50+	10,126	10,545	4.14
Alabama	960	964	0.42
Alaska	960	947	-1.35
Arizona	960	971	1.15
Arkansas	960	964	0.42
California	4,560	4,664	2.28
Colorado	960	1,008	5.00
Connecticut	960	980	2.08
Delaware	960	951	-0.94
District of Columbia	960	935	-2.60
Florida	3,300	3,331	0.94
Georgia	1,500	1,549	3.27
Hawaii	967	968	0.10
Idaho	960	987	2.81
Illinois	2,400	2,397	-0.13
Indiana	960	967	0.73
Iowa	960	912	-5.00
Kansas	960	982	2.29
Kentucky	960	946	-1.46
Louisiana	960	992	3.33
Maine	960	940	-2.08
Maryland	960	971	1.15
Massachusetts	960	1,000	4.17
Michigan	2,400	2,418	0.75
Minnesota	960	967	0.73

(continued)

Table 5.1 Yields, by Age Group and State (continued)

Age Group and State	Targeted	Achieved	Percent Difference
Mississippi	960	909	-5.31
Missouri	960	934	-2.71
Montana	960	977	1.77
Nebraska	960	938	-2.29
Nevada	960	961	0.10
New Hampshire	960	932	-2.92
New Jersey	1,500	1,536	2.40
New Mexico	960	959	-0.10
New York	3,300	3,284	-0.48
North Carolina	1,500	1,533	2.20
North Dakota	960	969	0.94
Ohio	2,400	2,415	0.63
Oklahoma	960	937	-2.40
Oregon	960	992	3.33
Pennsylvania	2,400	2,388	-0.50
Rhode Island	960	991	3.23
South Carolina	960	998	3.96
South Dakota	960	981	2.19
Tennessee	960	946	-1.46
Texas	3,300	3,383	2.52
Utah	960	972	1.25
Vermont	960	948	-1.25
Virginia	1,500	1,539	2.60
Washington	960	935	-2.60
West Virginia	960	933	-2.81
Wisconsin	960	945	-1.56
Wyoming	960	955	-0.52

In addition to the shift in sample to the older age groups, a new pair sampling parameter was selected for the 2014 NSDUH. The pair sampling algorithm in NSDUH is based on the Chromy and Penne (2002) adaptation of the Brewer (1963, 1975) method for selecting samples of size 2 as a means of selecting samples of 0, 1, or 2 people within a selected dwelling unit (DU) containing at least 1 eligible person. Chromy and Penne's adaptation includes a pair sampling parameter, λ, that governs the number of pairs selected. Simulation analyses resulted in the selection of $\lambda = 0.50$ for the 2002 to 2013 NSDUH sample designs because this selection increased the number of pairs by about 20 percent (relative to the selection of $\lambda = 0.00$) with only moderate impact on response rates by age group.

For the 2014 NSDUH, simulation analyses based on the 2012 screening data, modified to reflect the 2014 age group sample proportions, were conducted, and $\lambda = 0.25$ was selected (Center for Behavioral Health Statistics and Quality, 2013). As a result, fewer pairs were projected to be selected in the 2014 NSDUH than were selected in the 2013 NSDUH. However, as a result of increasing the older adult sample, a lambda value of 0.25 yielded a large projected number of adolescent-adult pairs in 2014 compared with 2013 and earlier years. Tables 5.2 and 5.3 provide projected and observed pair selection counts and response rates, respectively, by age

group pairs for the three age groups: 12 to 17, 18 to 25, and 26 or older. Observed selection counts in 2014 were considerably larger than their projected counterparts overall and in most age group pairs. This is partially because the observed counts are based on an overall sample of 67,901 interviews and the projected counts are based on 67,507 interviews. Further, response rates were lower than anticipated, requiring more selections to achieve the desired sample. Finally, the projection models may require updating.

Table 5.2 Projected and Observed Pair Selection Counts, by Age Group Pairs (Three Age Groups: 12 to 17, 18 to 25, and 26 or Older)

Age Group Pair	2014 Projected Count (λ = 0.25)	2014 Observed Count (λ = 0.25)
12+, 12+	22,752	26,844
12-17, 12-17	3,041	3,070
12-17, 18-25	2,326	2,443
12-17, 26+	6,208	7,959
18-25, 18-25	3,185	3,743
18-25, 26+	3,833	4,547
26+, 26+	4,160	5,082

[1] Observed counts in 2014 sum to 67,901, whereas simulated counts sum to 67,507.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2012 and 2014.

Table 5.3 Projected and Observed Pair Response Rates, by Age Group Pairs (Three Age Groups: 12 to 17, 18 to 25, and 26 or Older)

Age Group Pair	2014 Projected Response Rate (λ = 0.25)	2014 Observed Response Rate (λ = 0.25)
12+, 12+	71.4	67.9
12-17, 12-17	81.4	78.4
12-17, 18-25	76.1	75.0
12-17, 26+	74.8	71.1
18-25, 18-25	71.2	69.1
18-25, 26+	67.1	61.6
26+, 26+	60.7	58.0

[1] Observed response rates based on questionnaire age.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2012 and 2014.

Departures from the planned sample sizes occur for several reasons, including sampling variability, access problems (e.g., in gated communities or college dormitories), and departures from expected response rates. Table 5.4 provides weighted screening and interview response rates by state for the 2014 NSDUH. These rates will be used to fine-tune the sample size calculations for the 2015 NSDUH.

Table 5.4 Weighted Screening and Interview Response Rates, by State

State	Total Selected DUs	Total Eligible DUs	Weighted DU Eligibility Rate	Total Completed Screeners	Weighted DU Screening Response Rate	Total Selected	Total Respondents	Weighted Interview Response Rate	Weighted Overall Response Rate
Overall	185,013	154,533	83.67	127,605	81.94	91,640	67,901	71.20	58.34
Alabama	2,640	2,083	76.38	1,730	82.92	1,272	964	71.97	59.67
Alaska	2,985	2,346	78.92	1,950	83.13	1,386	947	67.80	56.37
Arizona	2,514	1,912	75.20	1,659	86.87	1,269	971	74.84	65.01
Arkansas	2,674	2,203	82.03	1,946	88.05	1,262	964	72.68	63.99
California	10,239	9,203	89.38	7,083	76.31	6,403	4,664	69.82	53.28
Colorado	2,607	2,254	86.23	1,843	81.83	1,357	1,008	72.95	59.70
Connecticut	2,790	2,484	89.05	1,997	80.29	1,438	980	64.87	52.08
Delaware	2,772	2,401	86.31	1,855	77.44	1,264	951	73.66	57.05
District of Columbia	4,330	3,706	85.54	2,802	75.60	1,219	935	72.83	55.06
Florida	10,269	8,222	77.48	6,823	82.44	4,385	3,331	70.33	57.98
Georgia	3,693	3,089	83.56	2,567	83.01	2,029	1,549	74.40	61.76
Hawaii	2,942	2,469	83.15	1,934	77.80	1,339	968	71.50	55.63
Idaho	1,932	1,690	87.46	1,477	87.33	1,267	987	75.54	65.97
Illinois	6,904	5,866	83.90	4,407	75.00	3,488	2,397	67.24	50.43
Indiana	2,504	2,078	82.96	1,782	85.70	1,294	967	72.26	61.93
Iowa	2,496	2,101	83.98	1,851	87.94	1,240	912	71.52	62.89
Kansas	2,304	1,990	86.65	1,705	85.58	1,296	982	73.83	63.19
Kentucky	2,556	2,080	81.51	1,827	87.74	1,284	946	69.25	60.76
Louisiana	2,435	1,987	82.28	1,742	87.36	1,302	992	73.51	64.22
Maine	3,342	2,364	67.74	2,106	89.08	1,230	940	75.33	67.10
Maryland	2,483	2,251	90.43	1,757	77.14	1,297	971	72.12	55.63
Massachusetts	2,948	2,541	83.07	2,068	81.37	1,437	1,000	66.32	53.97
Michigan	6,609	5,404	81.43	4,498	83.31	3,269	2,418	70.92	59.08
Minnesota	2,375	2,111	88.86	1,825	86.44	1,266	967	75.42	65.20
Mississippi	2,199	1,714	77.85	1,498	87.30	1,170	909	76.34	66.64
Missouri	2,578	2,116	81.96	1,839	86.82	1,218	934	75.64	65.67
Montana	2,829	2,270	79.57	2,036	89.64	1,287	977	72.51	65.00
Nebraska	2,459	2,102	85.63	1,842	87.61	1,268	938	73.47	64.36

(continued)

Table 5.4 2014 NSDUH Weighted Screening and Interview Response Rates by State (continued)

State	Total Selected DUs	Total Eligible DUs	Weighted DU Eligibility Rate	Total Completed Screeners	Weighted DU Screening Response Rate	Total Selected	Total Respondents	Weighted Interview Response Rate	Weighted Overall Response Rate
Nevada	2,421	2,047	84.17	1,592	77.33	1,279	961	72.75	56.25
New Hampshire	3,044	2,439	80.13	2,055	84.32	1,288	932	68.75	57.97
New Jersey	4,403	3,745	82.35	2,951	78.97	2,167	1,536	69.70	55.05
New Mexico	2,313	1,746	72.88	1,555	89.09	1,172	959	80.40	71.62
New York	11,063	9,562	86.23	6,603	68.76	4,835	3,284	64.15	44.11
North Carolina	4,185	3,443	82.26	2,972	86.23	1,956	1,533	76.58	66.03
North Dakota	3,043	2,363	77.58	2,136	90.40	1,240	969	77.32	69.89
Ohio	6,322	5,307	83.98	4,531	85.14	3,337	2,415	69.80	59.43
Oklahoma	2,259	1,828	80.96	1,609	88.21	1,284	937	68.47	60.40
Oregon	2,529	2,207	87.16	1,877	85.36	1,318	992	72.93	62.26
Pennsylvania	7,101	6,028	84.70	4,875	80.53	3,186	2,388	70.81	57.02
Rhode Island	2,681	2,251	83.49	1,859	82.83	1,334	991	72.13	59.74
South Carolina	2,843	2,307	80.92	1,958	84.71	1,308	998	75.19	63.69
South Dakota	2,163	1,779	82.32	1,679	94.39	1,275	981	75.06	70.85
Tennessee	2,326	1,939	83.42	1,676	86.31	1,204	946	78.68	67.91
Texas	7,004	5,857	83.41	5,066	86.53	4,581	3,383	70.38	60.90
Utah	1,534	1,344	87.42	1,275	94.87	1,186	972	80.57	76.44
Vermont	3,295	2,651	79.46	2,230	83.96	1,260	948	73.63	61.82
Virginia	3,671	3,261	88.71	2,678	82.32	2,020	1,539	73.13	60.20
Washington	2,449	2,173	89.05	1,705	78.75	1,241	935	74.01	58.28
West Virginia	3,204	2,612	81.28	2,282	87.55	1,355	933	67.70	59.27
Wisconsin	2,924	2,478	82.28	2,094	84.25	1,332	945	69.67	58.70
Wyoming	2,828	2,129	74.16	1,898	89.09	1,246	955	74.19	66.10

DU = dwelling unit.

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6. Text-to-Speech Field Test Sample Experience

An investigation into text-to-speech (TTS) software for use in the audio computer-assisted self-interviewing (ACASI) portion of the 2015 National Survey on Drug Use and Health (NSDUH) concluded that advances in TTS technology have enabled realistic, accurate, and human-sounding voices that were easily understood by evaluators. In order to test the comprehensibility of TTS on NSDUH with the general population, a TTS field test, separate from the main study, was conducted in late 2014. Because of the timing and small sample size, the TTS was not expected to have any impact on response rates and sample yields for the main NSDUH study.

In order to sufficiently test the impact of TTS software among subgroups most likely to be impacted, the TTS field test was designed to oversample Spanish-speaking respondents, youths, and older respondents. The goal was to include at least 20 interviews completed in English and at least 10 interviews completed in Spanish. Further, the sample was allocated to age groups as follows: 10 youths aged 12 to 17, 5 young adults aged 18 to 25, 4 adults aged 26 to 34, 4 adults aged 35 to 49, and 7 adults aged 50 or older.

The sample was allocated equally to three purposively selected and retired NSDUH segments: two in Los Angeles, California, and one in Miami, Florida. After accounting for eligibility, nonresponse, and the person-level sample selection procedures, it was estimated that approximately 107 selected dwelling units (DUs) would yield at least 30 completed interviews. People who refused to participate did not undergo refusal conversion procedures similar to the main study. Expected refusal rates were taken into account when selecting the sample, and an additional reserve sample of 37 DUs (35 percent) was also sampled in case the 107 selected DUs did not yield a sufficient number of interviews. The release of the additional sample was not needed.

Although sample size targets are generally harder to achieve with a small overall sample, all of the age group targets were met with the exception of the 50 or older target (see Table 6.1). Further, of the 43 interviews completed, 22 (51 percent) were completed in English, and 21 (49 percent) were completed in Spanish.

Table 6.1 Text-to-Speech Interview Respondents, by Age Group

Age Group	Target Interviews	Completed Interviews	Difference
12-17	10	19	9
18-25	5	5	0
26-34	4	8	4
35-49	4	6	2
50+	7	5	-2
Total	30	43	13

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7. Sampling Error

7.1 Computation of Relative Standard Errors and Design Effects

Several objectives were set for calculating relative standard errors (RSEs) and design effects (DEFFs) for the 2014 National Survey on Drug Use and Health (NSDUH). One objective was to provide a mechanism for comparing the expected precision of the 2014 design with the precision actually obtained. A second objective was to have a record of the magnitudes of the DEFFs for a future redesign of the survey.

The RSE of a domain *d* prevalence estimate $\hat{p}_d$ is the standard error (SE) of the estimate divided by the estimate, that is,

$$RSE(\hat{p}_d) = SE(\hat{p}_d) / \hat{p}_d \cdot \tag{1}$$

The DEFF for a prevalence estimate is its variance divided by the variance that would be observed if simple random sampling (SRS) had been used:

$$DEFF(d) = \frac{\mathrm{VAR}(\hat{p}_d)}{\mathrm{VAR}_{\mathrm{SRS}}(\hat{p}_d)}. \tag{2}$$

Hence, the SE of the estimated prevalence can be approximated as follows:

$$SE(\hat{p}_d) \cong [DEFF(d)\hat{p}_d(1-\hat{p}_d)/n_d]^{1/2}, \tag{3}$$

where $DEFF(d)$ and n_d are the median (or mean, as the case may be) DEFF and sample size of domain d, respectively.

As noted previously, the DEFF is the ratio of the design-based variance estimate divided by the variance estimate that would have been obtained from an SRS of the same size. Therefore, the DEFF summarizes the effects of stratification, clustering, and unequal weighting on the variance of a complex sample design. Because clustering and unequal weighting are expected to increase the variance and generally dominate the stratification effect, the DEFF is expected to be greater than 1 in most instances. However, DEFFs were sometimes less than 1 for prevalence rates near 0.

Note that the DEFF is based on the with-replacement (wr) variance estimate as obtained from SUDAAN, which properly accounts for clustering, stratification, and unequal weighting (RTI International, 2013). Prior to the 2000 survey, a more complex method of variance estimation was used; however, it was decided that only the standard SUDAAN wr SE, based on the primary sampling unit (PSU), would be used for the sake of simpler interpretation and for easier computation of the SE of functions of estimates, such as differences and ratios.

Also note that, prior to 2004, the SEs were applied directly from SUDAAN to only a subset of tables. Since then, the process changed so that the decision about which method of calculation would be used for the SEs of estimated totals was made at the estimate level (e.g., the cell level) rather than at the marginal table level. In this way, the estimated totals would have consistent values for their variances throughout all reported tables. A specific set of domains used as covariates in the poststratification step of the NSDUH weighting process were designated as the "controlled" domains. The SE reported for estimates from these domains would be based on the original method. Estimates from all other domains would include the SE directly from the SUDAAN calculation. A more detailed discussion of the 2004 change in SE reporting can be found in Section B.2.1 of Section B in the 2014 NSDUH's methodological summary and definitions report (Center for Behavioral Health Statistics and Quality [CBHSQ], 2015b).

DEFFs associated with prevalence estimates below 0.00005 or greater than or equal to 0.99995 (an ad hoc rule representing 0 or 1 in practice) or prevalence estimates exhibiting low precision were not used for determining the medians. To identify estimates with low precision, the suppression rule used in earlier years was applied. Specifically, DEFFs or the corresponding prevalence estimates were not included if the corresponding RSE of $-\ln(\hat{p})$ satisfies

$$RSE[-\ln(\hat{p})] > 0.175 \text{ when } \hat{p} \le 0.5$$

or

$$RSE[-\ln(1-\hat{p})] > 0.175 \text{ when } \hat{p} > 0.5 .$$

Another way to identify estimates with potentially low precision is to find estimates where the nominal sample size is under 100 or the effective sample size is under 68. The effective sample size is defined as follows:

$$Effective\ n = \frac{n}{deff} = \frac{\hat{p}(1-\hat{p})}{[SE(\hat{p})]^2} .$$

This equation is part of the standard suppression rule that is used in the reporting of NSDUH estimates. See the 2014 NSDUH statistical inference report for more information (CBHSQ, in press).

It may be noted that, for a given sample size, the RSE increases as $\hat{p}$ decreases, and for a given $\hat{p}$, it increases as the sample size decreases. The above discussion pertains to $\hat{p} < 0.5$ Although the RSE of $\hat{p}$ is not symmetric about $\hat{p} = 0.5$, it makes logical sense for precision requirements to be identical for $\hat{p}$ and $1-\hat{p}$. Therefore, it is convenient to use the convention that the suppression rule for $\hat{p} < 0.5$ also applies for $\hat{p} > 0.5$ by replacing $\hat{p}$ with $1-\hat{p}$.

7.1.1 Derivation of the $RSE[-\ln(\hat{p})]$ Approximation

Define the first-order Taylor series of a function, $f\left(\hat{\theta}\right)$, about a point, θ, as

$$f\left(\hat{\theta}\right) \cong f\left(\theta\right) + \left[df\left(\hat{\theta}\right) / d\hat{\theta} \right]_{\hat{\theta}=\theta} \left(\hat{\theta} - \theta\right),$$

then $\left[f\left(\hat{\theta}\right) - f\left(\theta\right) \right] \cong \left[df\left(\hat{\theta}\right) \Big/ d\hat{\theta} \right]_{\hat{\theta}=\theta} \left(\hat{\theta} - \theta\right)$. If $E\left(\hat{\theta}\right) = \theta$, then

$$Var\left[f\left(\hat{\theta}\right) \right] = E\left[f\left(\hat{\theta}\right) - f\left(\theta\right) \right]^2 \cong \left[df\left(\hat{\theta}\right) \Big/ d\hat{\theta} \right]^2_{\hat{\theta}=\theta} Var\left(\hat{\theta}\right), \text{ where } Var\left(\hat{\theta}\right) = E\left(\hat{\theta} - \theta\right)^2.$$

Let

$$\hat{\theta} = \hat{p} \quad f(\hat{\theta}) = -\ln(\hat{p}) \quad d\ln(\hat{p}) / d\hat{p} = -1 \Big/ \hat{p},$$

then the approximation of the variance would be

$$Var[-\ln(\hat{p})] \cong Var(\hat{p}) \div (-\hat{p})^2 = [RSE(\hat{p})]^2,$$

and the approximation of the relative variance could be shown as

$$Relvar[-\ln(\hat{p})] \cong [RSE(\hat{p})]^2 \div [-\ln(\hat{p})]^2.$$

Taking the square root of both sides of the equation leads to the approximation of $RSE[-\ln(\hat{p})]$ as

$$RSE[-\ln(\hat{p})] \cong RSE(\hat{p}) \div [-\ln(\hat{p})]$$

The derivation of $RSE[-\ln(1-\hat{p})]$ follows a similar set of steps.

7.2 Comparison of Observed Precision with Expected Precision

In this chapter, benchmarks from the 2014 NSDUH design process are compared with the estimated achieved precision of important outcome measures. These benchmarks are the predicted precisions that the statisticians anticipated during the design of the survey.

Predicted precision requirements for the 2014 designs were specified in terms of targeted RSEs and minimum sample sizes. To obtain the targeted RSEs, RSEs were computed for 25 measures of interest for specific domains of interest. These 25 key NSDUH outcomes that the sample design optimization for the 2014 NSDUH was based on included recency-of-use estimates for both illicit and licit drugs, dependence on alcohol and illicit drug use, treatment for substance abuse, and mental health issues. Specifically, the following outcomes were used for 2014 (variable names on the NSDUH data files are in parentheses):

- alcohol use in the past month (ALCMON),
- binge alcohol use in the past month (BINGEDRK),
- marijuana use in the past month (MRJMON),
- cigarette use in the past month (CIGMON),
- nonmedical use of a pain reliever in the past month (ANLMON),

- alcohol use disorder in the past year (ABODALC),
- illicit drug use disorder in the past year (ABODILL),
- alcohol use disorder or illicit drug use disorder in the past year (ABODILAL),
- specialty substance use treatment in past year (SPILLALC),
- serious mental illness (SMI) in past year (SMIYR), and
- major depressive episode (MDE) in the past year (AMDEYR).

Table 7.1 shows a comparison of the projected and observed RSEs for the 25 outcomes from the 2014 sample design report's specified domain breakdowns (CBHSQ, 2015a).

7.2.1 Sample and Precision Requirements

Initial sample requirements for the 2014 NSDUH were defined in terms of the following:

- minimum sample sizes of 4,560 completed interviews in California; 3,300 completed interviews each in Florida, New York, and Texas; 2,400 completed interviews each in Illinois, Michigan, Ohio, and Pennsylvania; 1,500 completed interviews each in Georgia, New Jersey, North Carolina, and Virginia; 967 completed interviews in Hawaii; and 960 completed interviews in each of the remaining 37 States and the District of Columbia; and
- allocation to age groups as follows: 25 percent for youths aged 12 to 17, 25 percent for young adults aged 18 to 25, 15 percent for adults aged 26 to 34, 20 percent for adults aged 35 to 49, and 15 percent for adults aged 50 or older.

The 1999 sample was the first to reflect the objective of the Substance Abuse and Mental Health Services Administration (SAMHSA) to develop more reliable national estimates and representative state-level estimates using small area estimation (SAE) as well as direct estimation procedures. This objective continues to apply for 2014. To achieve this objective, the targeted sample size by state was set to be at least 960 completed interviews. In 13 states, the target was set greater than 960 completed interviews. The larger overall sample makes it possible to get adequate precision for Hispanic and non-Hispanic black or African-American populations without any targeted oversampling of high concentration areas of these populations or any oversampling through screening for these populations.

Unlike previous NSDUHs, no specific precision requirements were set for the 2014 NSDUH. Instead, the 2014 survey was designed to achieve acceptable precision for various subpopulations of interest, which accounted for the allocation of persons per state and the requirement to support direct estimation in some large sample states and SAE in the remaining states. Using the state and age group distribution, estimates and RSEs were modeled for 25 key outcomes measures and domains of interest.

Table 7.1 Comparisons of Projected and Observed Relative Standard Errors and Sample Sizes for Key Outcome Measures, by Demographic Domain

Data File Variable Name	Measure	Domain	2014 Prevalence	Projected RSE (2014-2017)	2014 RSE	Relative Change in RSE[1]	Expected Sample Size (2014-2017)	2014 Sample Size	Relative Change in Sample Size[2]
ALCMON	Past Month Alcohol Use	12+	0.5270	0.0067	0.0062	-0.0746	67,507	67,901	0.0058
ALCMON	Past Month Alcohol Use	12-20	0.2280	0.0208	0.0200	-0.0385	23,490	23,034	-0.0194
ALCMON	Past Month Alcohol Use	50+	0.5050	0.0129	0.0120	-0.0698	10,126	10,603	0.0471
ALCMON	Past Month Alcohol Use	API, 12+	0.3870	0.0422	0.0356	-0.1564	3,362	3,187	-0.0521
ALCMON	Past Month Alcohol Use	AIAN, 12+	0.4230	0.0762	0.0820	0.0761	714	1,040	0.4566
ALCMON	Past Month Alcohol Use	Pregnant, 12-44	0.0870	0.1391	0.1352	-0.0280	822	888	0.0803
BINGEDRK	Past Month Binge Alcohol Use	18-25	0.3770	0.0128	0.0150	0.1719	16,877	16,449	-0.0254
BINGEDRK	Past Month Binge Alcohol Use	12+	0.2300	0.0112	0.0113	0.0089	67,507	67,901	0.0058
MRJMON	Past Month Marijuana Use	12+	0.0840	0.0206	0.0191	-0.0728	67,507	67,901	0.0058
MRJMON	Past Month Marijuana Use	12-17	0.0740	0.0372	0.0366	-0.0161	16,877	17,007	0.0077
MRJMON	Past Month Marijuana Use	18-25	0.1960	0.0224	0.0230	0.0268	16,877	16,449	-0.0254
MRJMON	Past Month Marijuana Use	50+	0.0390	0.0816	0.0604	-0.2598	10,126	10,603	0.0471
MRJMON	Past Month Marijuana Use	API, 12+	0.0340	0.1439	0.1109	-0.2293	3,362	3,187	-0.0521
MRJMON	Past Month Marijuana Use	AIAN, 12+	0.1180	0.1370	0.1517	0.1073	714	1,040	0.4566
MRJMON	Past Month Marijuana Use	Pregnant, 12-44	0.0360	0.2061	0.1622	-0.2130	822	888	0.0803
CIGMON	Past Month Cigarette Use	12-17	0.0490	0.0357	0.0426	0.1933	16,877	17,007	0.0077
CIGMON	Past Month Cigarette Use	12+	0.2080	0.0125	0.0127	0.0160	67,507	67,901	0.0058
ANLMON	Past Month Pain Reliever Use	18-25	0.0280	0.0473	0.0584	0.2347	16,877	16,449	-0.0254
ANLMON	Past Month Pain Reliever Use	12+	0.0160	0.0368	0.0403	0.0951	67,507	67,901	0.0058
ABOLALC	Past Year Alcohol Use Disorder	12+	0.0640	0.0200	0.0213	0.0650	67,507	67,901	0.0058
ABODILL	Past Year Illicit Drug Use Disorder	12+	0.0270	0.0279	0.0311	0.1147	67,507	67,901	0.0058
ABODILAL	Past Year Substance Use Disorder	50+	0.0450	0.0653	0.0535	-0.1807	10,126	10,603	0.0471
SPILLALC	Past Year Specialty Substance Use Treatment	12+	0.0100	0.0558	0.0569	0.0197	67,507	67,901	0.0058
SMIYR	Past Year SMI	18+	0.0410	0.0261	0.0292	0.1188	50,630	50,894	0.0052
AMDEYR	Past Year MDE	18+	0.0660	0.0238	0.0222	-0.0672	50,630	50,343	-0.0057

AIAN = American Indian or Alaska Native (NEWRACE2 = 3); API = Asian or Other Pacific Islander (NEWRACE2 = 4 or 5); MDE = major depressive episode; Pregnant 12-44 = (PREG2=1); RSE = relative standard error; SMI = serious mental illness.

NOTE: Projected RSEs were determined using 2014 through 2017 state and age sample allocations in a variance component model.

[1] *Relative Change in RSE* = {[*RSE*(*observed*) – *RSE*(*projected*)]/*RSE*(*projected*)}.

[2] *Relative Change in Sample Size* = {[*2014 Sample Size – Expected Sample Size*]/(*Expected Sample Size*)}.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2014.

7.2.2 Observed versus Expected Precision

In Table 7.1, the expected RSEs and sample sizes are presented for the 25 key outcomes and measures and the RSEs and sample sizes that were observed for the 2014 NSDUH. The observed RSEs differed by up to 25 percent. Although this was quite a large difference in terms of percentages, the point changes from the expected RSEs were generally quite small. Also, the percentage changes followed no particular direction. Out of 25 observed precisions, 12 were less than the expected precisions that were described in the 2014 sample design plan (CBHSQ, 2013).

7.3 Comparison of Median and Mean Design Effects

The mean DEFF is more sensitive to outliers and is generally larger than the median DEFF. Table 7.2 compares the median and mean of 53 DEFFs for three age groups and over all ages in the 2014 NSDUH design. Comparisons are also provided for the four race/ethnicity categories, although they were not used as stratification variables when selecting individuals within households. Table 7.3 provides the same median and mean DEFFs for the 2012 through 2014 NSDUHs. Compared with the design from previous years, the 2014 design is more efficient overall and within all race/ethnicity groups.

Table 7.2 Comparison of Median and Mean Design Effects of 53 Outcomes: 2014

Outcome	Median Design Effect	Mean Design Effect	Difference (Mean – Median)	Percentage Difference[1]
Total	2.29	2.30	0.02	0.73
Age (Years)				
12 to 17	1.67	1.69	0.02	1.29
18 to 25	1.87	1.85	-0.02	-0.91
26+	1.77	1.81	0.04	2.18
Race/Ethnicity				
White, Not Hispanic or Latino	2.11	2.10	-0.01	-0.65
Black or African American, Not Hispanic or Latino	2.24	2.25	0.01	0.47
Hispanic or Latino	2.37	2.40	0.02	1.05
Other or Multiple, Not Hispanic or Latino	2.57	2.70	0.13	5.21

[1] Computed as 100 * (*Mean* – *Median*) / *Median*.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2014.

Table 7.3 Median and Mean Design Effects of 53 Outcomes: 2012 through 2014

Outcome	Median Design Effect			Mean Design Effect		
	2012	2013	2014	2012	2013	2014
Total	3.16	3.11	2.29	3.09	3.16	2.30
Age (Years)						
12 to 17	1.69	1.70	1.67	1.77	1.68	1.69
18 to 25	2.11	2.07	1.87	2.08	2.05	1.85
26+	1.80	1.85	1.77	1.82	1.83	1.81
Race/Ethnicity						
White, Not Hispanic or Latino	2.80	2.93	2.11	2.79	2.95	2.10
Black or African American, Not Hispanic or Latino	3.39	3.11	2.24	3.78	3.25	2.25
Hispanic or Latino	3.68	3.63	2.37	3.32	3.56	2.40
Other or Multiple, Not Hispanic or Latino	2.86	4.19	2.57	3.28	3.81	2.70

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2012, 2013, and 2014.

The median and mean DEFF estimates were based on estimates from the following four types of substance use and mental health categories: (a) *eight illicit drug use categories:* any illicit drug use, marijuana/hashish, cocaine, crack, inhalants, hallucinogens, nonmedical use of any psychotherapeutics, and nonmedical use of pain relievers; (b) *seven licit drug use categories:* tobacco, cigarettes, smokeless tobacco, cigars, alcohol, heavy drinking, and binge drinking; (c) *six treatment or abuse categories:* abuse of drugs or alcohol, dependence on drugs or alcohol, treatment received for illicit drug use, treatment received for alcohol use, treatment received for either alcohol use or illicit drug use, treatment received for both alcohol use and illicit drug use; and (d) *six mental health categories:* any mental illness (AMI), SMI, treatment or counseling for mental illness, MDE, suicidal thoughts, serious psychological distress (SPD). Estimates used from the illicit and licit categories included one from each of three recency-of-use classes: ever used, used in past year, and used in past month. An exception was made for estimates of heavy drinking and binge drinking, which are past month variables. The treatment or abuse and mental health variables are for past year.

The median and the mean DEFFs were calculated from the above estimates for the total population, by age and by race/ethnicity. As seen from Table 7.2, the mean DEFF turned out to be larger than the median DEFF in six of the eight domains. The differences between the mean and median DEFFs fell below 2.5 percent for seven of the eight comparison groups. However, within the race/ethnicity comparison categories, the percentage differences varied by up to 5.21 percent for the non-Hispanic or Latino other races.

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8. Issues Encountered

In addition to the 2014 National Survey on Drug Use and Health (NSDUH) sample experiences documented in this report, two issues with the sample implementation were encountered. Those problems are documented in this section.

8.1 Duplicate Address Error

Prior to 2014, dwelling units (DUs) that were selected from the overlap segments in the prior year were flagged as "used" and were not eligible for selection in the "current" year (i.e., two separate samples were selected with the complement of the prior year's sample serving as the DU frame in the "current" year). In an effort to further ensure that no household was selected twice for NSDUH, a check was included in the DU sampling process to compare addresses on the "current" year's frame to all addresses on prior years' frames (dating back to 2005). Duplicate addresses were then flagged as "used" and made ineligible for selection in the current year's sample. In theory, no DUs should have been flagged as "used" using this check because area segments are mutually exclusive geographic areas. In 2014, geographic areas were selected anew with no planned overlap with prior NSDUH samples, although some of the same geographic areas were sampled by chance. No controls for overlap with prior selected DUs were intended; however, the duplicate address check remained active, and duplicate addresses from previous surveys were flagged as "used" and were made ineligible for selection in the 2014 NSDUH. Table 8.1 provides a summary of the DUs that were flagged as duplicate addresses on the 2014 sampling frame.

Table 8.1 2014 NSDUH Dwelling Units Flagged as Ineligible, by Quarter, Rural or Urban, and Panel

Domain	Total Segments	Total Segments with One or More DUs Flagged	Percent of Segments with One or More DUs Flagged	Total DUs	Flagged DUs	Maximum DUs Flagged in a Segment	Maximum Percent Flagged DUs in a Segment	Mean Percent Flagged DUs in a Segment
Total	6,000	1,281	21.4%	1,647,838	20,694	158	53.4%	1.3%
Quarter 1	1,500	289	19.3%	414,861	5,276	154	53.4%	1.3%
Quarter 2	1,500	299	19.9%	408,472	4,892	151	47.2%	1.3%
Quarter 3	1,500	371	24.7%	415,346	5,816	92	44.8%	1.6%
Quarter 4	1,500	322	21.5%	409,159	4,710	158	44.3%	1.2%
Rural	1,071	218	20.4%	227,729	2,136	40	26.5%	1.1%
Urban	4,929	1,063	21.6%	1,420,109	18,558	158	53.4%	1.4%
Panel A	3,000	630	21.0%	818,413	9,707	158	53.4%	1.3%
Panel B	3,000	651	21.7%	829,425	10,987	132	40.9%	1.4%

DU = dwelling unit.

Although the duplicate address problem may have introduced a small amount of coverage error in the 2014 sample, it did not affect the sample weights. The sampled addresses were still weighted up to represent the DU population in each segment. Further, the following steps were taken to remediate the problem in future samples:

1. For the 3,000 segments retained in the 2015 NSDUH (panel B), the addresses that were flagged using the duplicate address check will be switched back to "unused" and will be eligible for selection in 2015. Similar to prior years, DUs that were selected in the 2014 NSDUH will be ineligible for selection in the 2015 NSDUH.
2. The duplicate address check was removed from the sampling process because duplicates should theoretically only be identified within segments. Several other procedures are in place to check for duplicates within segments.

8.2 Nebraska Segment Group Quarter Sampling Error

As a result of the NSDUH field verification procedures, it was discovered that a field interviewer (FI) incorrectly screened apartments in three group quarters (GQs) in a quarter 1 2015 Nebraska segment. During the field enumeration (listing) stage, the lister obtained a list of all of the apartments and all of the beds/rooms within each apartment. Each apartment was numbered (e.g., 101, 102), and each apartment had four rooms, labeled A, B, C, and D, with one bed per room. The resulting listing was at the bed level, so each apartment had four listing units, one for each bed. Although it caused confusion for the FI, listing by beds was not an error. The listing could have been done by bed or by apartment.

Because the frame was at the bed level, selected units were at the bed level, such as apartment 101, bed B. The FI, on the other hand, assumed that the entire apartment was selected. If anybody in the apartment cooperated, the FI screened the entire apartment, and all four persons residing in the apartment had a chance of selection.

For 2015, the error will be corrected using weight adjustments. However, the segment was also fielded in quarter 1 of 2014. A small number of sample dwelling units in these GQs were screened and handled the same way in 2014. Because the error was not detected in 2014, apartments were assumed to have the individual bed's probability of selection. In 2014, 16 screeners and 10 interviews were completed in apartments associated with selected beds in these GQs. Because the error affected only a small number of interviews in 2014, the decision was made not to adjust the weights or discard the data. It is almost certain that the poststratification adjustments effectively removed the small biases potentially caused by this error.

To reduce the likelihood of this error reoccurring, field listers will be encouraged to list by beds only if it is the only available option (e.g., in homeless shelters). Their supervisors will also be reminded to carefully review any GQs in advance of the quarter, determine if they are listed by units or beds, then review that information with the FI before data collection begins.

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