2007 NATIONAL SURVEY ON DRUG USE AND HEALTH

SAMPLING ERROR REPORT

Prepared for the 2007 Methodological Resource Book

Contract No. 283-2004-00022
RTI Project No. 0209009.385
Phase III, Deliverable No. 18

Authors:

Harper Gordek
Ralph Folsom

Project Director: Thomas G. Virag

Prepared for:

Substance Abuse and Mental Health Services Administration
Rockville, Maryland 20857

Prepared by:

RTI International
Research Triangle Park, North Carolina 27709

July 2008; revised January 2013

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Acknowledgments

This report was prepared for the Office of Applied Studies, Substance Abuse and Mental Health Services Administration (SAMHSA), under Contract No. 283-2004-00022, by staff at RTI International, a trade name of Research Triangle Institute. In addition to the listed authors, significant contributors included Art Hughes of SAMHSA and Katherine B. Morton, James R. Chromy, and Claudia Clark of RTI.

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1. Introduction

As part of any survey data analysis, a good understanding of the resulting standard errors (SEs) and design effects (DEFFs), corresponding to a key set of outcomes and other variables, is important for a number of reasons: (1) to evaluate how well the sample was designed in light of the target and realized precisions and DEFFs, (2) to obtain confidence intervals (CIs) for cross-sectional estimates (and for change estimates in the case of repeated surveys) and generate significance tests in order to make inferential statements about the target population, and (3) to be able to incorporate realized DEFFs for future redesigns of the survey.

This report compares the estimated (or realized) precisions of a key set of estimates with the targets for the 2007 National Survey on Drug Use and Health (NSDUH), formerly called the National Household Survey on Drug Abuse (NHSDA). The comparison was made with targets specified by the Substance Abuse and Mental Health Services Administration (SAMHSA) and with the predicted precisions that statisticians from RTI International[1] anticipated during the design of the survey. In addition, tables of realized DEFFs are provided.

This report is organized as follows. Chapter 2 summarizes the 2007 sample design. Chapter 3 describes the calculation of relative standard errors (RSEs) and DEFFs. Chapter 4 presents tables that compare the observed precisions with the expected precisions. Chapter 5 compares median and mean DEFFs. Chapter 6 presents median and mean DEFFs for specific analysis domains. Finally, concluding remarks are provided in Chapter 7.

During regular data collection and processing checks for the NSDUH, data errors were identified. These errors affected the data for Pennsylvania (2006 to 2010) and Maryland (2008 and 2009). Investigations showed that while direct estimates for Maryland, Pennsylvania, the mid-Atlantic division, and the Northeast region were affected, the effect of these erroneous cases on nationally representative analyses was minimal. Cases with erroneous data were removed from the data files, and the remaining cases were reweighted to provide representative estimates. The estimates and numbers in this report are based on the revised data. For further information about the erroneous cases, see Section B.3 in Appendix B of the *Results from the 2011 National Survey on Drug Use and Health: Summary of National Findings* (Center for Behavioral Health Statistics and Quality, 2012).

[1] RTI International is a trade name of Research Triangle Institute.

2. Overview of the 2007 Sample Design

2.1. Target Population

The respondent universe for the 2007 National Survey on Drug Use and Health[2] (NSDUH) was the civilian, noninstitutionalized population aged 12 years or older residing in the United States. Consistent with the NSDUH designs since 1991, the 2007 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. Persons excluded from the 2007 universe included those with no fixed household address (e.g., homeless transients 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 NSDUH would be conducted, beginning in 1999 and continuing through subsequent years. The surveys are conducted using computer-assisted interviewing (CAI) methods and provide improved State estimates based on minimum sample sizes per State. The total targeted sample size of 67,500 is equally allocated across three age groups: persons aged 12 to 17, persons aged 18 to 25, and persons aged 26 or older. This large sample size allows SAMHSA to report more precise demographic subgroup estimates at the national level without needing to oversample specially targeted demographics (such as racial/ethnic groups), as required in the past. The achieved sample for the 2007 sample was 67,377 persons.

Beginning with the 2002 NSDUH and continuing through the 2007 NSDUH, survey respondents were given a $30 incentive payment 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.

An additional design change was made in 2002 and continued in 2007. A new pair sampling strategy was implemented that increased the number of pairs selected in dwelling units (DUs) with older persons rostered (Chromy & Penne, 2002). With the increase in the number of pairs came a moderate decrease in the response rate for older persons.

2.2.1 5-Year Design

The 2007 NSDUH is the third survey in a coordinated 5-year sample design. Although there is no planned overlap with the 1999 through 2004 samples, a coordinated design for 2005 through 2009 facilitated 50 percent overlap in second-stage units (area segments) within each

[2] This report presents information from the 2007 National Survey on Drug Use and Health (NSDUH). Prior to 2002, the survey was called the National Household Survey on Drug Abuse (NHSDA).

successive 2-year period from 2005 through 2009. This design was intended to increase the precision of estimates in year-to-year trend analyses, using the expected positive correlation resulting from the overlapping sample between successive NSDUH years.

The 2007 design provided for estimates by State in all 50 States plus the District of Columbia. States may therefore be viewed as the first level of stratification as well as a reporting variable. Eight States, referred to as the "large" States,[3] had samples designed to yield 3,600 respondents per State for the 2007 survey. This sample size was considered adequate to support direct State estimates. The remaining 43 States[4] had samples designed to yield 900 respondents per State in the 2007 survey. In these 43 States, adequate data were available to support reliable State estimates based on small area estimation (SAE) methodology.

State sampling (SS) regions were formed within each State. Based on a composite size measure, States were geographically partitioned into regions of roughly equal size. In other words, regions were formed such that each area yielded, in expectation, roughly the same number of interviews during each data collection period, thus distributing the workload equally among NSDUH interviewers. The smaller States were partitioned into 12 SS regions, whereas the eight large States were divided into 48 SS regions. Therefore, the partitioning of the United States resulted in the formation of a total of 900 SS regions.

Unlike the 1999 through 2001 NHSDAs and the 2002 through 2004 NSDUHs, the first stage of selection for the 2005 through 2009 NSDUHs was census tracts. This stage was included to contain sample segments within a single census tract to the extent possible.[5] In prior years, segments that crossed census tract boundaries made 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 SS regions until each tract[6] had, at a minimum, 150 DUs[7] in urban areas and 100 DUs in rural areas.[8]

Before selecting census tracts, additional implicit stratification was achieved by sorting the first-stage sampling units by a CBSA/SES[9] (core-based statistical area/socioeconomic status)

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[3] The large States are California, Florida, Illinois, Michigan, New York, Ohio, Pennsylvania, and Texas.

[4] For reporting and stratification purposes, the District of Columbia is treated the same as a State, and no distinction is made in the discussion.

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

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

[7] DU counts were obtained from the 2000 census data supplemented with revised population counts from Claritas, Inc., a market research firm headquartered in San Diego, California.

[8] 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, and 100 DUs is sufficient to support one field test and two main study samples.

[9] CBSAs include metropolitan and micropolitan statistical areas as defined by the Office of Management and Budget on June 6, 2003.

indicator[10] and by the percentage of the population that is non-Hispanic or Latino and white. From this well-ordered sample frame, 48 census tracts per SS region were selected with probabilities proportionate to a composite size measure and with minimum replacement (Chromy, 1979).

Because census tracts generally exceed the minimum DU requirement, one smaller geographic region was selected within each sampled census tract. For this second stage of sampling, each selected census tract was partitioned into compact clusters[11] of DUs by aggregating adjacent census blocks. 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, segments were formed to contain a minimum of 150 DUs in urban areas and 100 DUs in rural areas. This minimum DU requirement will support the overlapping sample design and any special supplemental samples or field tests that SAMHSA may wish to conduct.

One segment was selected within each sampled census tract with probability proportionate to size. The 48 selected segments then were randomly assigned to a survey year and quarter of data collection as described in Section 2.4.

2.2.2 Sample Selection at Third and Fourth Stages

Once sample segments for the 2007 NSDUH were selected, specially trained field household listers visited the areas and obtained complete and accurate lists of all eligible DUs within the sample segment boundaries. These lists served as the frames for the third stage of sample selection.

The primary objective of the third stage of sample selection (listing units) was to determine 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 we refer to as the "driving" age group. Using 2000 census data adjusted to more recent data from Claritas, Inc.,[12] State- and age-specific sampling rates were computed. These rates then were adjusted by the segment's probability of

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[10] 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, block group-level median rents and property values 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."

[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 and more stable, 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] Claritas, Inc., is a market research firm headquartered in San Diego, California.

selection; the subsegmentation inflation factor,[13] if any; the probability of selecting a person in the age group (equal to the maximum, or 0.99, for the driving age group); and an adjustment for the "maximum of two" rule.[14] In addition to these factors, historical data from the 2004, 2005, 2006, and 2007 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. For example, to ensure adequate samples for supplemental studies, the listing unit sample size could not exceed 100 or half of the actual DU count. Similarly, if five unused DUs remained in the segment, a minimum of five DUs per segment were required for cost efficiency.

Using a random start point and interval-based (systematic) selection, the actual listing units were selected from the segment frame. After DU selections were made, an interviewer visited each selected DU to obtain a roster of all persons residing in the DU. As in previous years, during the data collection period, if an interviewer encountered any new DU in a segment or found a DU that was missed during the original counting and listing activities, the new or missed dwellings were selected into the 2007 NSDUH using the half-open interval selection technique.[15] This selection technique eliminates any frame bias that might be introduced because of errors and/or omissions in the counting and listing activities, and it also eliminates any bias that might be associated with using "old" segment listings.

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 fourth stage of selection based on the State and age group sampling parameters.

One exciting consequence of using an electronic screening instrument in NSDUH is the ability to impose a more complicated person-level selection algorithm on the fourth stage of the NSDUH design. Similar to the 1999 through 2006 designs, one feature that was included in the 2007 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 other family members residing in the same DU (e.g., the relationship of drug use between a parent and his or her child).

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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. The subsegmentation inflation factor accounts for the narrowing down 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.

[15] In summary, this technique states that, if a DU is selected for the 2007 study 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 will be selected.

3. Computation of Relative Standard Errors and Design Effects

As mentioned in Chapter 1, there were several objectives for calculating relative standard errors (RSEs) and design effects (DEFFs) for the 2007 National Survey on Drug Use and Health (NSDUH). One objective was to provide a mechanism for comparing the expected precision of the 2007 design with the precision actually obtained. A second objective was to provide government analysts and other users of NSDUH data with a methodology for determining a quick approximation of the precision of estimates obtained from the 2007 survey. The third objective was to build confidence intervals (CIs) of estimates of level and change. Finally, the magnitudes of the DEFFs are useful for future redesign of the survey.

The RSE of a domain *d* prevalence estimate is the standard error (SE) of the estimate divided by the estimate, that is,

$$RSE(\hat{P}_d) = SE(\hat{P}_d) / \hat{P}_d . \tag{1}$$

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

$$SE(\hat{P}_d) \doteq \left[DEFF(d) \hat{P}_d (1 - \hat{P}_d) / n_d \right]^{1/2}, \tag{2}$$

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

By substituting a prevalence rate of 0.10 into Equations 1 and 2, the RSE becomes

$$RSE(\hat{P}_d = 0.10) = \left[(DEFF(d) * 9 / n_d) \right]^{1/2}. \tag{3}$$

This result shows that, for the specified prevalence rate of 0.10, the RSE is purely a function of the DEFF and sample size. In the tables given in this report, RSEs are expressed as percentages (i.e., the right-hand side of Equation 3 is multiplied by 100).

Mean and median DEFFs were used for many of the calculations in this report. DEFFs were calculated based on drug use variables displayed in the 2007 NSDUH sample design report (Morton, Chromy, Hirsch, & Martin, 2008).

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 generally expected to be greater than 1. 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 the SUrvey DAta ANalysis program (SUDAAN®), which properly accounts for clustering, stratification, and unequal weighting (RTI International, 2007). In the 1999 sampling error report, DEFF was based on the maximum-of-three rule for computing design-based SEs under the premise that the precision loss anticipated due to clustering and unequal probability sampling offsets any gain due to stratification (i.e., the DEFF should be at least 1). The three SEs correspond to the SUDAAN assumption of wr primary sampling units (PSUs), stratified simple random sample, and simple random sample. Note that, for the 2000 survey onward, it was decided to use only the standard SUDAAN wr SE, based on the PSU for the sake of simpler interpretation, as well as for easier computation of the SE of functions of estimates, such as differences and ratios.

In addition, the 2007 survey saw the full implementation of a change made to the method of calculation for the standard errors of estimated totals. It had been discovered in previous survey years that the original method, multiplying the weighted sample size by the corresponding standard error of the mean, had produced underestimation of the variance for some estimated totals that had not been controlled for through the weighting process. As a result, from 2000 to 2003, in order to better reflect variance of the estimates within uncontrolled domains, a subset of the detailed tables reported the standard error of the estimated totals directly from the SUDAAN calculation.

However, applying the standard errors directly from SUDAAN to only a subset of tables produced inconsistencies between different sets of tables. Therefore, in 2004 and continuing through 2007, the process was changed so that the decision on which method of calculation for the standard errors of estimated totals would be used would be made at the estimate level (e.g., the cell level) rather than at the marginal table level. 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 standard error reported for these domains would be based on the original method. All other domains would report the standard error directly from the SUDAAN calculation. A more detailed discussion on the change in standard error reporting can be found in Appendix B, Section B.2.1, of the 2007 NSDUH national findings report (Office of Applied Studies, 2008).

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(p) satisfies

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

or

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

A rationale for this rule is that, for a prevalence estimate of 0.10, the minimum required effective sample size (or the sample size under SRS) is around 50 (55.43 to be exact) when the maximum tolerable value of $RSE[-\ln(p)] = 0.175$. This can be derived as follows: under SRS,

$RSE(p)$ is equal to the square root of $p(1 - p)/np^2$, and using a first-order Taylor series, $SE[-\ln(p)]$ is approximately $SE(p)/p$ (i.e., $RSE(p)$). Therefore, under SRS, $RSE[-\ln(p)]$ is approximately $RSE(p)/[-\ln(p)]$. Then, substituting $p = 0.1$ and $RSE[-\ln(p)] = 0.175$ gives $n = 55.43$ under SRS. For complex designs, this can be interpreted as the minimum required effective sample size. In other words, if $DEFF(p) = 2$, the minimum required sample size is the DEFF times the effective sample size (i.e., 111).

It may be remarked that, for a given sample size, the RSE increases as p decreases, and for a given p, it increases as the sample size decreases. The above discussion pertains to $p < 0.5$. For $p > 0.5$, $RSE(p)$ is not symmetric about $p = 0.5$, although $SE(p)$ is. Clearly, precision requirements should be identical for p or $1 - p$. Therefore, it is convenient to use the convention that the suppression rule for $p < 0.5$ also is applied for $p > 0.5$ by replacing p with $1 - p$.

4. Comparison of Observed Precision with Expected Precision

In this chapter, two benchmarks in the 2007 National Survey on Drug Use and Health (NSDUH) are compared with the estimated achieved precision of important outcome measures. One is derived from requirements specified by the Substance Abuse and Mental Health Services Administration (SAMHSA), and the other is the predicted precision that statisticians at RTI International anticipated during the design of the survey.

Predicted precision requirements for the 2007 designs were specified in terms of targeted relative standard errors (RSEs) and in terms of minimum sample sizes. To obtain the targeted RSEs, historical 2001 data were used and RSEs were computed for nine outcome measures of interest. RSEs were then standardized to a prevalence of 10 percent as given by Equation 3 in Chapter 3.

The nine key NSDUH outcomes that the sample design optimization for the 2007 NSDUH was based on included recency-of-use estimates, treatment received for alcohol and illicit drug use, and dependence on alcohol and illicit drug use. Specifically, the following outcomes were used for 2007:

- cigarette use in the past month,
- alcohol use in the past month,
- any illicit drug use in the past month,
- any illicit drug use other than marijuana in the past month,
- cocaine use in the past month,
- dependent on illicit drugs in the past year,
- dependent on alcohol and not illicit drugs in the past year,
- received treatment for illicit drug use in the past year, and
- received treatment for alcohol, but not illicit drugs, in the past year.

Table 4.1 at the end of this chapter shows an overall age group comparison of the projected and observed design effects (DEFFs) and RSEs based on the nine outcomes from the sample design report. Table 4.2 at the end of this chapter shows a comparison of the projected and observed DEFFs and RSEs for the nine outcomes from the sample design report.

4.1. Precision Requirements

Initial requirements for the sample were set as follows:

- minimum sample sizes of 3,600 persons per State in 8 large States and 900 persons in the remaining 43 States; and
- equal allocation of the sample across the three age groups: 12 to 17, 18 to 25, and 26 or older within each State.

In addition, for national estimates, the SAMHSA-specified precision requirements were that the expected RSE on a prevalence of 10 percent not exceed the following:

- 3.0 percent for total population statistics; and
- 5.0 percent for statistics in three age group domains: 12 to 17, 18 to 25, and 26 or older.

The 2007 sample reflected SAMHSA's objective to develop more reliable State-level estimates using small area estimation (SAE) procedures. To achieve this objective, the targeted sample size by State was set to be at least 900 completed interviews. In eight States, the target was set at 3,600 completed interviews. The larger overall sample made it possible to get adequate precision for Hispanic and non-Hispanic black or African-American populations without any targeted oversampling of areas of high concentration of these populations or any oversampling through screening for these target populations.

4.2. Observed versus Expected Precision

The tables at the end of this chapter present observed results compared with projections and targets for sample sizes, DEFFs, and associated RSEs. For Table 4.1, the projected RSEs were averages over the nine outcome variables as given in the beginning of this chapter. Note that, using Equation 3, the RSEs for all the outcome variables were scaled to the generic prevalence of 0.10. The projected DEFF was derived as an average over the DEFFs for the nine variables corresponding to the projected RSEs via Equation 3 for various domains. For the observed RSE, as in previous years' reports, mean DEFFs for the nine outcomes listed above were substituted into Equation 3 to obtain mean RSEs for a prevalence of 0.10. The mean was used here for comparison purposes instead of the median because the mean was used for the purpose of sample allocation. Also, because the DEFF was proportional to the squared RSE or relative variance, it is probably more meaningful to compute projected RSE over all nine outcomes as root mean relative variance rather than mean RSE. However, the difference between the two was only marginal.

All of the nine prevalence estimates contributed to the means in Table 4.1. None were suppressed because of low precision. The observed DEFFs and RSEs were generally close to the values noted in projections. While several were higher, the percentage increases were never greater than 6 percent. In comparison with the target values, the observed RSEs fared even better. In two cases the RSEs were almost half the size of their target values, and in all cases they were lower than their targets by more than 30 percent.

In Table 4.2, the comparison is between the observed and projected precisions for each of the nine outcomes used in sample design optimization. While the observed mean DEFF values vary quite a bit from the projections, it is important to note that the observed mean RSE values, the values used in the sample design report, are relatively close to the projected values. Out of 36 observed values, only 6 are larger than their projections by greater than 10 percent, and nearly half are below their projections.

Table 4.1 Estimated Precision Compared with Targeted and Projected Precision, by Age Group: 2007

	Sample Size			Mean Design Effect			Mean Relative Standard Error at p = 10 Percent			
Age Group	**Projected**	**Observed**	**% Off**	**Projected**	**Observed**	**% Off**	**Projected**	**Target**	**Observed[1]**	**% Off[2]**
Total	67,500	67,377	-0.18	2.92	3.08	5.59	1.96	3.00	2.02	-32.73
12–17	22,500	22,286	-0.95	1.59	1.64	3.18	2.52	5.00	2.57	-48.67
18–25	22,500	22,006	-2.20	2.08	1.97	-5.47	2.88	5.00	2.83	-43.36
26+	22,500	23,085	2.60	1.83	1.84	0.41	2.70	5.00	2.67	-46.66

[1]Calculated using Equation 2 with the observed sample size and the mean observed design effect.

[2]Percent relative difference from the target relative standard error.

Source: SAMHSA, Office of Applied Studies, National Survey on Drug Use and Health, 2007 (Revised March 2012).

Table 4.2 Estimated Precision Compared with Projected Precision, by Age Group and Variable: 2007

Age Group	Drug	Mean Design Effect			Mean Relative Standard Error at p = 10 Percent		
		Projected	Observed	% Off	Projected	Observed[1]	% Off[2]
Total	CIGMON	3.80	3.91	2.90	2.25	2.28	1.53
	ALCMON	3.43	4.56	32.75	2.14	2.47	15.32
	SUMMON	2.51	2.94	16.95	1.83	1.98	8.24
	IEMMON	2.68	2.85	6.52	1.89	1.95	3.30
	COCMON	3.03	2.92	-3.61	2.01	1.98	-1.73
	DEPNDILL	2.12	2.24	5.85	1.68	1.73	2.98
	DEPNDALC	2.22	2.85	28.45	1.72	1.95	13.44
	DRUGHELP	3.83	2.87	-25.12	2.26	1.96	-13.39
	DRNKHELP	2.65	2.60	-1.93	1.88	1.86	-0.88
12–17	CIGMON	1.59	1.77	11.36	2.52	2.67	6.03
	ALCMON	1.74	1.97	12.78	2.64	2.82	6.71
	SUMMON	1.58	1.88	19.41	2.51	2.76	9.80
	IEMMON	1.38	1.88	35.94	2.35	2.75	17.15
	COCMON	1.95	1.41	-27.67	2.79	2.38	-14.55
	DEPNDILL	1.49	1.43	-4.18	2.44	2.40	-1.64
	DEPNDALC	1.36	1.70	25.14	2.33	2.62	12.40
	DRUGHELP	1.88	1.63	-13.40	2.74	2.56	-6.49
	DRNKHELP	1.37	1.13	-17.40	2.34	2.14	-8.68
18–25	CIGMON	2.09	2.26	8.08	2.89	3.04	5.12
	ALCMON	2.28	2.51	9.96	3.02	3.20	6.03
	SUMMON	2.45	2.09	-14.65	3.13	2.92	-6.58
	IEMMON	2.21	1.84	-16.62	2.97	2.74	-7.67
	COCMON	2.03	1.74	-14.19	2.85	2.67	-6.33
	DEPNDILL	2.48	1.94	-21.87	3.15	2.82	-10.62
	DEPNDALC	1.77	1.92	8.46	2.66	2.80	5.31
	DRUGHELP	1.74	1.72	-1.44	2.64	2.65	0.39
	DRNKHELP	1.70	1.71	0.54	2.61	2.65	1.39
26+	CIGMON	2.03	2.04	0.34	2.85	2.82	-1.10
	ALCMON	1.90	2.51	31.63	2.76	3.13	13.27
	SUMMON	1.74	1.83	4.82	2.64	2.67	1.08
	IEMMON	1.92	1.90	-0.75	2.77	2.72	-1.64
	COCMON	1.93	1.78	-8.06	2.78	2.63	-5.34
	DEPNDILL	1.73	1.55	-10.61	2.63	2.45	-6.66
	DEPNDALC	1.37	1.72	25.76	2.34	2.59	10.71
	DRUGHELP	2.37	1.75	-26.37	3.08	2.61	-15.28
	DRNKHELP	1.45	1.45	-0.01	2.41	2.38	-1.28

[1]Calculated using Equation 2 with the observed sample size and the mean observed design effect.

[2]Percent relative difference from the target relative standard error.

Source: SAMHSA, Office of Applied Studies, National Survey on Drug Use and Health, 2007 (Revised March 2012).

5. Comparison of Median and Mean Design Effects

The mean design effect (DEFF) is more sensitive to outliers and is generally larger than the median. Table 5.1 compares the median and mean of 56 DEFFs for three age groups and over all ages in the 2007 design for the National Survey on Drug Use and Health (NSDUH). Comparisons are also provided for the four race/Hispanicity categories, although they were not used as stratification variables when selecting persons within households.

The median and mean DEFF estimates were based on estimates from the following:

- *15 illicit drug use categories:* any illicit drug use, marijuana/hashish, cocaine, crack, inhalants, hallucinogens, LSD, PCP, heroin, nonmedical use of any psychotherapeutic, nonmedical use of stimulants, nonmedical use of sedatives, nonmedical use of tranquilizers, nonmedical use of pain relievers, any illicit drug except marijuana; and
- *3 licit drug use categories:* cigarettes, alcohol, and smokeless tobacco.

Estimates used from these categories included one from each of three recency-of-use classes: ever used, used in past year, and used in past month.

The estimates of past month heavy drinking and binge drinking also were included in the licit drug use category, bringing the total number of estimates used for the mean versus median comparisons to 56. The median and the mean DEFF were calculated from the above estimates for the total population, by age and by race/ethnicity. As seen from Table 5.1, contrary to expectation, the mean DEFF turned out to be larger than the median DEFF in only four of the eight domains. Regardless of which is greater, the differences between the mean and median DEFFs are small. In only one of the domains (Race/Ethnicity Other) was the difference greater than 4.5 percent.

Table 5.1 Comparison of Median and Mean Design Effects of 56 Outcomes: 2007

Outcome	Median Design Effect	Mean Design Effect	Difference (Mean – Median)	Percentage Difference[1]
Total	2.92	2.99	0.06	2.20
Age (Years)				
12–17	1.78	1.74	-0.03	-1.85
18–25	1.87	1.94	0.07	3.69
26+	1.80	1.82	0.03	1.40
Race/Ethnicity				
White	2.80	2.68	-0.12	-4.16
Black or African American	3.41	3.41	0.00	0.00
Hispanic or Latino	3.27	3.36	0.08	2.54
Other	3.81	3.44	-0.37	-9.68

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

Source: SAMHSA, Office of Applied Studies, National Survey on Drug Use and Health, 2007 (Revised March 2012).

6. Use of Domain-Specific Design Effects for Approximating Standard Error

This chapter presents an approach considered for approximating standard error (SE) when published 2007 National Survey on Drug Use and Health (NSDUH) SE estimates or computer software is unavailable. The approach considered in this chapter is based on domain specific median design effects (DEFFs).

Domains were defined by cross-classifications of age and gender, race/ethnicity, population density, geographic division of residence, adult education, current employment, and State.[16] The 56 types of drug and recency categories provided in Chapter 5 were used for the estimates on which the medians were computed. DEFFs associated with percentage estimates exhibiting low precision as defined in Chapter 3 were not used. The median DEFFs were computed separately for the three classifications: lifetime illicit drug use (Table 6.1), past year and past month illicit drug use (Table 6.2), and licit drug use (Table 6.3). Note that DEFFs for lifetime use were expected to be quite different from those for past year use and past month use; therefore, it was desirable to keep the two separate. However, this separation was not done for licit drugs because of the small number of drug use variables available for computing the median for each domain (a total of only 11). These tables can be used to calculate an approximate variance estimate for a particular domain as follows:

$$var\left(p_d\right)_{appx} = DEFF_{d,MED} * \left[p_d\left(1-p_d\right)/n_d\right], \tag{4}$$

where p_d is the estimated proportion for domain d, n_d is the sample size for domain d, and $DEFF_{d,MED}$ is the median design effect for domain d.

The approximate SE estimate for p_d, $SE(p_d)_{appx}$, is the square root of $var(p_d)_{appx}$. These tables provide the median DEFFs for the 8 large States and the median of the 43 State medians for the remaining States. Results for the smaller States are provided for reference only. Although these DEFFs were of the same order as those for the larger States (because the sample design was the same for all States), the above approximate formula is not recommended for use with smaller States because of the instability of the prevalence estimates. The small area estimation (SAE) methodology was used, as in the case of NSDUH reports since 1999, to improve the precision of the State estimates. To get an idea of the magnitude of the 2007 drug-specific DEFFs used in computing the median DEFF over the drugs, Table 6.4 lists the 56 individual DEFFs for each of the age groups and the national total.

[16] The demographic variables for county type and race underwent minor revisions in 2003 and remained revised for 2007. The Office of Management and Budget, whose definitions are used to determine county type, changed the way "metropolitan" was defined. Counties may have moved between levels of county type specifically because of this change. For race, there is no longer a response in the questionnaire that allows respondents to choose a "main race." Instead "main race" was imputed for multiple race respondents.

Table 6.1 Median Design Effects of Lifetime Illicit Drug Use, by Age Group, Gender, and Demographic Characteristic: 2007

Demographic Characteristic	Age Group			Gender		Total
	12–17	18–25	26+	Male	Female	
Total	1.72	2.04	1.97	3.81	3.17	3.86
Gender						
Male	1.79	1.87	1.91	N/A	N/A	3.81
Female	1.66	1.85	1.77	N/A	N/A	3.17
Age (Years)						
12–17	N/A	N/A	N/A	1.79	1.66	1.72
18–25	N/A	N/A	N/A	1.87	1.85	2.04
26+	N/A	N/A	N/A	1.91	1.77	1.97
Race/Ethnicity						
White	1.62	1.98	1.87	3.47	2.94	3.42
Black or African American	1.72	2.05	1.87	4.05	2.52	3.97
Hispanic or Latino	1.86	2.33	2.14	3.81	3.92	4.38
Other	2.10	2.10	2.54	4.53	3.15	4.57
Population Density						
Large Metropolitan	1.67	1.85	1.85	3.47	3.08	3.61
Small Metropolitan	1.69	2.20	1.86	3.66	3.06	3.71
Nonmetropolitan	1.72	1.87	1.51	2.85	2.17	2.64
Census Division						
New England	2.32	3.03	2.08	4.25	3.36	3.98
Middle Atlantic	1.23	1.81	1.50	3.11	2.50	2.91
East North Central	1.56	1.56	1.56	2.95	2.40	3.03
West North Central	2.00	2.09	2.16	4.33	3.11	3.98
South Atlantic	1.47	1.95	1.91	3.81	2.78	3.51
East South Central	1.44	1.67	1.47	2.70	2.11	2.89
West South Central	1.47	1.58	1.40	2.59	1.97	2.60
Mountain	2.16	2.47	2.33	4.19	3.67	4.49
Pacific	1.69	2.04	1.93	3.28	3.44	3.73
County Type[1]						
Large Metropolitan	1.68	1.87	1.86	3.59	3.10	3.62
Small Metropolitan I	1.61	1.90	1.83	3.52	3.10	3.43
Small Metropolitan II	2.01	2.31	1.98	4.10	2.98	3.86
Nonmetropolitan I	1.39	2.44	1.80	4.04	2.71	3.56
Nonmetropolitan II	1.76	2.27	1.83	3.55	2.38	3.23
Nonmetropolitan III	1.93	2.70	1.88	2.72	1.99	3.16
Adult Education[2]						
Less Than High School	N/A	1.90	1.83	3.12	1.99	2.89
High School Graduate	N/A	1.81	1.70	2.80	2.22	2.66
Some College	N/A	1.90	1.94	3.17	2.54	2.94
College Graduate	N/A	1.86	2.17	2.48	2.57	2.69
Current Employment[3]						
Full-Time	N/A	1.78	2.09	2.66	2.63	2.88
Part-Time	N/A	1.85	1.66	3.11	2.48	3.08
Unemployed	N/A	1.66	1.51	2.92	2.34	2.77
Other[4]	N/A	1.82	1.74	2.66	1.93	2.50

See notes at end of table.

(continued)

Table 6.1 Median Design Effects of Lifetime Illicit Drug Use, by Age Group, Gender, and Demographic Characteristic: 2007 (continued)

Demographic Characteristic	Age Group			Gender		Total
	12–17	18–25	26+	Male	Female	
State						
California	1.29	1.53	1.52	2.47	2.87	2.84
Florida	1.38	1.52	1.58	2.95	2.56	2.95
Illinois	1.19	1.38	1.37	2.74	2.00	2.48
Michigan	1.21	1.42	1.29	2.32	1.99	2.50
New York	1.29	1.64	1.30	2.74	2.28	2.48
Ohio	1.15	1.42	1.14	2.13	1.67	2.07
Pennsylvania	1.19	1.39	1.13	2.19	2.04	2.28
Texas	1.35	1.41	1.35	2.42	1.89	2.54
Other[5]	1.17	1.44	1.35	2.54	2.13	2.59

N/A = not applicable.

Note: These design effects apply to the following drugs: any illicit drug use, marijuana/hashish, cocaine, crack, inhalants, hallucinogens, LSD, PCP, heroin, nonmedical use of any psychotherapeutics, nonmedical use of sedatives, nonmedical use of tranquilizers, nonmedical use of pain relievers, and any illicit drug except marijuana.

[1]Data on County Type are defined as follows:

Large Metropolitan: counties in metro areas with a population ≥ 1 million.

Small Metropolitan I: counties in metro areas with a population between 250,000 and 1 million.

Small Metropolitan II: counties in metro areas with a population < 250,000.

Nonmetropolitan I: urban populations not part of metro areas ≥ 20,000.

Nonmetropolitan II: urban populations not part of metro areas between 2,500 and 19,999.

Nonmetropolitan III: completely rural.

[2]Data on adult education are not applicable for persons aged 12 to 17.

[3]Data on current employment are not applicable for persons aged 12 to 17.

[4]Retired, disabled, homemaker, student, or "other."

[5]Median of the median design effects for the 43 States.

Source: SAMHSA, Office of Applied Studies, National Survey on Drug Use and Health, 2007 (Revised March 2012).

Table 6.2 Median Design Effects of Past Year and Past Month Illicit Drug Use, by Age Group, Gender, and Demographic Characteristic: 2007

Demographic Characteristic	Age Group			Gender		Total
	12–17	18–25	26+	Male	Female	
Total	1.72	1.83	1.67	2.48	1.95	2.52
Gender						
Male	1.79	1.75	1.56	N/A	N/A	2.48
Female	1.62	1.74	1.42	N/A	N/A	1.95
Age (Years)						
12–17	N/A	N/A	N/A	1.79	1.62	1.72
18–25	N/A	N/A	N/A	1.75	1.74	1.83
26+	N/A	N/A	N/A	1.56	1.42	1.67
Race/Ethnicity						
White	1.55	1.78	1.49	2.25	1.72	2.14
Black or African American	1.52	1.92	1.67	3.15	1.87	2.77
Hispanic or Latino	1.80	2.25	1.65	2.63	2.04	2.60
Other	2.44	1.95	1.60	1.94	2.03	2.19
Population Density						
Large Metropolitan	1.61	1.66	1.51	2.35	1.91	2.39
Small Metropolitan	1.75	2.01	1.73	2.64	1.87	2.56
Nonmetropolitan	1.54	1.83	1.11	1.84	1.36	1.62
Census Division						
New England	1.88	2.68	1.38	2.04	1.13	1.72
Middle Atlantic	1.33	1.44	1.29	2.01	1.42	1.90
East North Central	1.43	1.42	1.46	1.89	1.91	2.23
West North Central	1.76	1.76	1.58	2.09	2.00	2.22
South Atlantic	1.39	1.61	1.56	2.53	1.35	2.38
East South Central	1.21	1.47	1.20	1.83	1.00	1.70
West South Central	1.50	1.42	1.14	1.79	1.23	1.70
Mountain	1.93	2.60	2.67	3.29	1.87	3.24
Pacific	1.71	1.86	1.34	2.08	1.71	2.14
County Type[1]						
Large Metropolitan	1.60	1.70	1.54	2.37	1.92	2.40
Small Metropolitan I	1.53	1.74	1.52	2.15	1.78	2.21
Small Metropolitan II	1.96	1.98	1.98	2.98	1.26	3.02
Nonmetropolitan I	1.50	1.80	1.53	2.46	1.00	1.97
Nonmetropolitan II	1.56	1.96	1.22	1.98	1.57	1.82
Nonmetropolitan III	1.58	2.26	1.00	1.03	1.00	1.00
Adult Education[2]						
Less Than High School	N/A	1.83	1.61	2.18	1.37	2.03
High School Graduate	N/A	1.76	1.44	1.90	1.51	1.95
Some College	N/A	1.78	1.56	1.94	1.77	1.95
College Graduate	N/A	1.55	1.75	1.75	1.73	1.97
Current Employment[3]						
Full-Time	N/A	1.71	1.74	1.92	1.68	2.12
Part-Time	N/A	1.74	1.34	2.56	1.50	2.11
Unemployed	N/A	1.58	1.32	1.88	1.84	1.87
Other[4]	N/A	1.90	1.40	1.60	1.47	1.69

See notes at end of table.

(continued)

Table 6.2 Median Design Effects of Past Year and Past Month Illicit Drug Use, by Age Group, Gender, and Demographic Characteristic: 2007 (continued)

Demographic Characteristic	Age Group			Gender		Total
	12–17	18–25	26+	Male	Female	
State						
California	1.33	1.45	1.03	1.43	1.27	1.63
Florida	1.21	1.64	1.11	1.64	1.35	1.57
Illinois	1.07	1.34	1.08	1.43	1.19	1.40
Michigan	1.19	1.23	1.00	1.11	1.43	1.44
New York	1.34	1.48	1.26	2.28	1.22	1.88
Ohio	1.15	1.35	1.00	1.57	1.20	1.50
Pennsylvania	1.12	1.25	1.00	1.49	1.07	1.41
Texas	1.31	1.35	1.06	1.59	1.07	1.45
Other[5]	1.14	1.31	1.00	1.23	1.00	1.17

N/A = not applicable.

Note: These design effects apply to the following drugs: any illicit drug use, marijuana/hashish, cocaine, crack, inhalants, hallucinogens, LSD, PCP, heroin, nonmedical use of any psychotherapeutics, nonmedical use of sedatives, nonmedical use of tranquilizers, nonmedical use of pain relievers, and any illicit drug except marijuana.

[1]Data on County Type are defined as follows:

Large Metropolitan: counties in metro areas with a population ≥ 1 million.

Small Metropolitan I: counties in metro areas with a population between 250,000 and 1 million.

Small Metropolitan II: counties in metro areas with a population < 250,000.

Nonmetropolitan I: urban populations not part of metro areas ≥ 20,000.

Nonmetropolitan II: urban populations not part of metro areas between 2,500 and 19,999.

Nonmetropolitan III: completely rural.

[2]Data on adult education are not applicable for persons aged 12 to 17.

[3]Data on current employment are not applicable for persons aged 12 to 17.

[4]Retired, disabled, homemaker, student, or "other."

[5]Median of the median design effects for the 43 States.

Source: SAMHSA, Office of Applied Studies, National Survey on Drug Use and Health, 2007 (Revised March 2012).

Table 6.3 Median Design Effects of Licit Drug Use Estimates, by Age Group, Gender, and Demographic Characteristic: 2007

Demographic Characteristic	Age Group			Gender		Total
	12–17	18–25	26+	Male	Female	
Total	1.87	2.16	2.04	3.56	3.68	3.75
Gender						
Male	1.89	2.13	1.96	N/A	N/A	3.56
Female	1.78	1.81	2.17	N/A	N/A	3.68
Age (Years)						
12–17	N/A	N/A	N/A	1.89	1.78	1.87
18–25	N/A	N/A	N/A	2.13	1.81	2.16
26+	N/A	N/A	N/A	1.96	2.17	2.04
Race/Ethnicity						
White	1.76	2.06	1.93	3.19	3.11	3.37
Black or African American	1.85	1.72	2.12	3.78	3.73	3.71
Hispanic or Latino	2.05	2.32	2.20	3.93	4.68	4.26
Other	2.67	2.32	2.10	4.37	3.24	3.90
Population Density						
Large Metropolitan	1.64	1.83	1.81	3.13	3.28	3.36
Small Metropolitan	2.09	2.59	2.21	3.65	3.42	3.95
Nonmetropolitan	2.25	2.34	2.23	3.50	3.86	3.85
Census Division						
New England	2.45	3.29	3.00	4.85	4.09	4.79
Middle Atlantic	1.50	2.04	1.63	3.34	2.16	2.97
East North Central	1.48	1.56	1.63	2.86	2.47	2.74
West North Central	2.12	2.11	2.03	3.23	3.03	3.49
South Atlantic	1.99	2.09	2.15	3.60	3.65	3.93
East South Central	1.18	1.86	1.41	2.62	2.27	2.62
West South Central	1.65	1.69	1.60	2.47	3.03	2.90
Mountain	2.32	3.16	2.32	4.11	3.67	4.28
Pacific	1.79	2.13	1.76	2.99	3.87	3.22
County Type[1]						
Large Metropolitan	1.67	1.87	1.86	3.32	3.30	3.47
Small Metropolitan I	1.91	2.37	2.10	3.27	3.44	3.58
Small Metropolitan II	2.05	2.66	2.24	3.83	3.26	4.25
Nonmetropolitan I	1.70	2.04	2.02	3.67	3.62	3.64
Nonmetropolitan II	2.15	2.28	2.09	3.60	3.47	3.67
Nonmetropolitan III	2.62	2.38	2.66	4.60	4.08	4.65
Adult Education[2]						
Less Than High School	N/A	1.97	1.93	3.09	3.16	3.11
High School Graduate	N/A	2.01	1.92	2.76	3.03	2.85
Some College	N/A	1.96	1.83	2.77	2.52	2.80
College Graduate	N/A	1.89	1.92	2.28	1.96	2.32
Current Employment[3]						
Full-Time	N/A	1.92	1.94	2.56	2.38	2.65
Part-Time	N/A	1.82	1.92	3.34	2.68	3.04
Unemployed	N/A	1.74	1.78	3.16	2.60	3.00
Other[4]	N/A	1.99	1.90	2.72	2.69	2.75

See notes at end of table.

(continued)

Table 6.3 Median Design Effects of Licit Drug Use Estimates, by Age Group, Gender, and Demographic Characteristic: 2007 (continued)

Demographic Characteristic	Age Group			Gender		Total
	12–17	18–25	26+	Male	Female	
State						
California	1.45	1.52	1.47	2.22	3.13	2.49
Florida	1.68	1.79	1.55	2.66	2.43	2.97
Illinois	1.12	1.45	1.38	2.38	2.26	2.36
Michigan	1.30	1.75	1.47	2.33	2.34	2.46
New York	1.39	2.03	1.62	3.30	2.35	3.00
Ohio	1.10	1.72	1.39	2.44	1.93	2.47
Pennsylvania	1.28	1.48	1.28	2.23	1.92	2.45
Texas	1.47	1.58	1.44	2.37	2.45	2.69
Other[5]	1.30	1.59	1.43	2.40	2.16	2.66

N/A = not applicable.

Note: These design effects apply to the following drugs: any illicit drug use, marijuana/hashish, cocaine, crack, inhalants, hallucinogens, LSD, PCP, heroin, nonmedical use of any psychotherapeutics, nonmedical use of sedatives, nonmedical use of tranquilizers, nonmedical use of pain relievers, and any illicit drug except marijuana.

[1]Data on County Type are defined as follows:

Large Metropolitan: counties in metro areas with a population ≥ 1 million.

Small Metropolitan I: counties in metro areas with a population between 250,000 and 1 million.

Small Metropolitan II: counties in metro areas with a population < 250,000.

Nonmetropolitan I: urban populations not part of metro areas ≥ 20,000.

Nonmetropolitan II: urban populations not part of metro areas between 2,500 and 19,999.

Nonmetropolitan III: completely rural.

[2]Data on adult education are not applicable for persons aged 12 to 17.

[3]Data on current employment are not applicable for persons aged 12 to 17.

[4]Retired, disabled, homemaker, student, or "other."

[5]Median of the median design effects for the 43 States.

Source: SAMHSA, Office of Applied Studies, National Survey on Drug Use and Health, 2007 (Revised March 2012).

Table 6.4 Design Effects, by Age Group, for the Outcomes Used in the Medians in Tables 6.1, 6.2, and 6.3: 2007

Outcome	Age Group			Total
	12–17	18–25	26+	
Illicit Drugs, Lifetime Recency				
Any Illicit Drug	1.90	2.20	2.25	4.18
Marijuana	1.98	2.27	2.23	4.23
Cocaine	1.69	2.19	2.04	3.86
Crack	1.38	1.68	1.91	3.77
Inhalants	1.86	1.87	1.93	3.36
Hallucinogens	1.72	2.24	1.98	3.77
LSD	1.47	1.85	1.97	3.98
PCP	1.54	1.58	1.96	4.00
Heroin	1.68	1.63	2.12	4.18
Nonmedical Use of Psychotherapeutics	1.88	2.09	1.74	3.27
Nonmedical Use of Stimulants	1.44	2.08	1.68	3.17
Nonmedical Use of Sedatives	1.73	1.83	2.12	4.35
Nonmedical Use of Tranquilizers	1.63	2.01	1.77	3.22
Nonmedical Use of Pain Relievers	1.91	2.04	1.70	3.00
Any Illicit Drug except Marijuana	1.97	2.17	2.11	3.86
Illicit Drugs, Past Year Recency				
Any Illicit Drug	1.79	2.25	1.89	3.15
Marijuana	1.81	2.32	1.76	2.93
Cocaine	1.68	2.11	1.87	2.83
Crack	1.69	1.53	1.55	2.85
Inhalants	1.68	1.85	1.69	1.49
Hallucinogens	1.69	2.08	1.25	1.45
LSD	1.62	1.69	1.79	1.33
PCP	1.39	1.49	1.00	1.00
Heroin	1.43	1.88	1.49	2.14
Nonmedical Use of Psychotherapeutics	1.89	1.97	1.62	2.56
Nonmedical Use of Stimulants	1.63	2.23	1.38	1.99
Nonmedical Use of Sedatives	1.71	1.68	1.63	2.77
Nonmedical Use of Tranquilizers	1.69	1.99	1.73	2.57
Nonmedical Use of Pain Relievers	1.93	1.81	1.54	2.28
Any Illicit Drug except Marijuana	1.84	2.06	1.81	2.83

See notes at end of table.

(continued)

Table 6.4 Design Effects, by Age Group, for the Outcomes Used in the Medians in Tables 6.1, 6.2, and 6.3: 2007 (continued)

Outcome	Age Group			Total
	12–17	18–25	26+	
Illicit Drugs, Past Month Recency				
Any Illicit Drug	1.88	2.09	1.83	2.94
Marijuana	1.76	2.16	1.63	2.57
Cocaine	1.41	1.74	1.78	2.92
Crack	1.32	1.39	1.39	2.85
Inhalants	1.99	1.83	2.18	2.00
Hallucinogens	1.56	1.75	1.38	1.53
LSD	1.85	1.41	2.36	2.05
PCP	2.00	1.50	1.00	1.14
Heroin	1.00	1.70	1.51	2.49
Nonmedical Use of Psychotherapeutics	1.78	1.75	1.69	2.55
Nonmedical Use of Stimulants	1.37	1.87	1.59	2.25
Nonmedical Use of Sedatives	2.09	1.65	2.25	3.67
Nonmedical Use of Tranquilizers	1.72	1.85	1.73	2.47
Nonmedical Use of Pain Relievers	1.73	1.70	1.64	2.45
Any Illicit Drug except Marijuana	1.88	1.84	1.90	2.85
Licit Drugs, Lifetime Recency				
Alcohol	1.84	2.55	2.70	3.91
Cigarettes	2.01	2.06	2.18	3.75
Smokeless Tobacco	1.87	1.83	1.87	3.68
Licit Drugs, Past Year Recency				
Alcohol	1.83	2.57	2.57	4.46
Cigarettes	1.98	2.16	2.07	3.88
Smokeless Tobacco	2.00	1.83	1.49	2.52
Licit Drugs, Past Month Recency				
Alcohol	1.97	2.51	2.51	4.56
Cigarettes	1.77	2.26	2.04	3.91
Smokeless Tobacco	1.85	1.63	1.57	2.79
Binge Drinking	1.87	2.42	1.91	3.63
Heavy Drinking	2.06	2.14	1.81	3.15

Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Use and Health, 2007 (Revised March 2012).

7. Conclusions

As stated in Chapter 1, it is important to have a good understanding of the resulting standard errors (SEs) and design effects (DEFFs) corresponding to a set of key outcome variables and other variables as part of any survey data analysis. One reason for this is to evaluate how well the sample was designed in light of the target and realized precisions as well as the DEFFs. The 2007 National Survey on Drug Use and Health (NSDUH) met its precision goals for all four target domains defined by three age groups (12 to 17, 18 to 25, 26 or older, and total [i.e., 12 or older]).

Another important reason for the examination of SEs and DEFFs is to obtain quick estimates of SEs for any user-specified outcome variable through some form of modeling. Although SEs of several prevalence estimates are available from published analysis reports on the survey, SEs of other estimates of interest by a user may not be available in the published tables. If the user has access to the primary data source, the SE can be computed using commercially available software, such as SUDAAN®. However, a user often has access to only a secondary data source. For this case, it would be useful to have a provision for computing quick and approximate SEs. If the secondary data source contains information about median DEFFs (over a set of drug use variables) for selected demographic domains, such as age and race/ethnicity, a rough approximate SE can be obtained easily using the formula (Equation 4) for variance as a function of DEFF, domain sample size, and the prevalence estimate. The formula is

$$var\left(p_d\right)_{appx} = DEFF_{d,MED} * \left[p_d\left(1-p_d\right)/n_d\right].$$

Note that the use of a known median DEFF in place of a variable-specific unknown DEFF provides a simple type of modeling. One also could use mean DEFF instead of median DEFF. This report contains tables showing median and mean DEFFs for a number of domains. The differences are generally small. The above way of modeling SEs, via median DEFF, is not applicable if the available median DEFF does not correspond to the domain of interest.

In summary, the user may obtain SE estimates for the 2007 NSDUH for drug recency outcomes from the following sources in recommended order:

1. commercially available variance estimation software packages, such as SUDAAN;
2. published SEs from reports using data from the 2007 NSDUH (to be available at http://oas.samhsa.gov/WebOnly.htm#NHSDAtabs or upon request from the Office of Applied Studies at the Substance Abuse and Mental Health Services Administration);
3. median domain DEFFs appearing in Tables 6.1, 6.2, and 6.3 and application of Equation 4 for drug recency of use; and
4. online data analysis system in the Substance Abuse and Mental Health Data Archive (SAMHDA), available at http://www.icpsr.umich.edu/SAMHDA/, provided that the stratum and primary sampling unit variables are specified.

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