NONRESPONSE BIAS IN DEMOGRAPHIC AND SURVEY ESTIMATES FROM THE MENTAL HEALTH SURVEILLANCE STUDY OF THE NATIONAL SURVEY ON DRUG USE AND HEALTH

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

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1. Introduction

1.1 Overview

The Mental Health Surveillance Study (MHSS) was part of an initiative by the Substance Abuse and Mental Health Services Administration (SAMHSA) to develop and implement methods for measuring and estimating serious mental illness (SMI) among adults aged 18 or older at the national and state levels. In December 2006, a technical advisory group meeting of expert consultants was convened on request of Congress by SAMHSA's Center for Mental Health Services and Center for Behavioral Health Statistics and Quality (which was then the Office of Applied Studies) to solicit recommendations for strategies to collect mental health surveillance data among the U.S. population. The technical advisory group recommended that the National Survey on Drug Use and Health (NSDUH) be used to produce a methodology for estimating SMI among adults using NSDUH's mental health measures and a gold-standard clinical diagnostic interview among a subsample of NSDUH respondents.

In response, SAMHSA initiated the MHSS, which was a multicomponent study using several self-administered indicators of mental health, such as assessments of lifetime and past year major depressive episode, past month and past year psychological distress and functional impairment, and past year suicidality from NSDUH; psychiatric diagnostic data collected from a small subsample of adult NSDUH respondents (the clinical follow-up interview); and prediction models developed using data from the clinical interview and applied to the adult NSDUH sample to produce national estimates of mental illness. The primary objective of the MHSS was to develop a statistical model to apply to the full NSDUH sample that would generate accurate, annual national estimates of SMI for all adults and for adult subpopulations. A secondary objective was to produce estimates for other categories of mental illness, defined by level of impairment, such as mild (or low) mental illness, moderate mental illness, and any mental illness. In addition to producing models for the NSDUH data to yield these model-based estimates of categories of mental illness among adults, the 2008-2012 MHSS clinical interview data have also been used to generate nationally representative prevalence estimates of past year mental disorders among the adult civilian, noninstitutionalized population in 2008-2012, across a wide spectrum of diagnostic categories (Center for Behavioral Health Statistics and Quality, 2014c).

An initial prediction model of SMI was estimated using data from the 2008 MHSS clinical follow-up interview and a weight that was adjusted for nonresponse and poststratified to match a limited set of estimated control totals (derived from the 2000 Census) for the civilian, noninstitutionalized population aged 18 or older. The same prediction model was used in subsequent years (2009, 2010, and 2011) to produce model-based estimates of SMI for those years. Once the entire clinical dataset was available (i.e., 2008 to 2012), SAMHSA evaluated whether improvements were needed and whether they could be made to the SMI models and the clinical interview weights.

Nonresponse for the clinical follow-up interview occurred in two stages. The first stage was refusing to participate when asked to do so after completing the main NSDUH interview. The second stage was not completing the clinical interview after having initially agreed to
Differences were examined between respondents and nonrespondents on variables from the NSDUH main interview available for both the respondents and the nonrespondents that were thought to be predictive of nonresponse and related to mental health at these two stages in the clinical interview participation process. Based on these comparisons, variables were chosen for use in the development of nonresponse adjustments tailored to each stage in the participation process. Adjustments for nonresponse and undercoverage were then incorporated into a revised weight that included poststratification to NSDUH population control totals.

This report summarizes the differences between respondents and nonrespondents at the two stages of nonresponse in the clinical follow-up component of NSDUH. Differences between respondents and nonrespondents were examined in addition to nonresponse biases in a variety of demographic and substantive measures related to the key outcome measures at the two stages. The analysis found that nonresponse biases in the key outcome measures were largely driven by nonresponse at the initial request for participation in the follow-up interview, whereas nonresponse biases in demographic estimates were largely due to the inability to complete the follow-up interview.

1.2 Background

Survey practitioners often rely on nonresponse weighting adjustments and population weighting adjustments (such as poststratification and raking) based on auxiliary variables to "correct" for nonresponse bias (Bethlehem, 2002; Little, 1982). Auxiliary variables may include demographic variables and substantive variables that are assumed to be highly associated with the key outcomes of interest and survey participation. For example, self-reports on substance use could be an auxiliary substantive variable for a follow-up survey that collects hair, urine, or saliva samples for estimating substance use (Harrison, Martin, Enev, & Harrington, 2007). Because of the limited availability of substantive auxiliary variables, many studies use only demographic variables in nonresponse weighting adjustments. The assumption is that adjusting the weights of respondents to match the distributions of the demographic variables for both respondents and nonrespondents minimizes nonresponse biases in key outcomes. For this to be true, a "missing at random" mechanism (Little & Rubin, 2002) must be in place so that (conditional on the demographic variables) there is no association between nonresponse and the key outcome variables of interest.

In a meta-analysis of 59 methodological studies on nonresponse bias, Peytcheva and Groves (2009) demonstrated that nonresponse biases in demographic variables are not always informative of biases in key outcome variables. They cautioned against the current practice of looking at demographic subgroup response rates and attempting postsurvey adjustments based solely on demographic data to reduce nonresponse biases in key outcomes. This finding provides support to the assertion that nonresponse adjustments based on demographic characteristics may not be optimal for studies where the likelihood to respond is correlated with the key outcome measures and where demographic variables are inadequate in representing that relationship.

One approach to studying the potential for and nature of nonresponse bias and informing weighting adjustments is to evaluate whether differences between respondents and nonrespondents on estimates for demographic and substantive variables are a function of different components of nonresponse. A few studies have demonstrated the importance of
distinguishing nonresponse due to noncooperation from nonresponse due to noncontact, given that each likely results from different causal mechanisms (Lynn & Clarke, 2002). However, such studies are typically constrained to classifying respondents as "easy" versus "reluctant" or "hard to get" and comparing them on various characteristics. That is, most studies do not have detailed auxiliary substantive information available on nonrespondents and are therefore not able to compare them with respondents. They assume that on substantive characteristics, nonrespondents are similar to respondents who were harder to interview.

The rest of this report presents results of analyses in which differences between respondents and nonrespondents are examined at different stages of nonresponse to the clinical follow-up interview. Such multistage designs introduce the potential for different nonresponse biases at each stage.
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2. Methods and Results

2.1 Data

2.1.1 NSDUH

The National Survey on Drug Use and Health (NSDUH) is the federal government's primary source of annual information on substance use, substance use disorders, and mental health issues in the United States. Conducted since 1971, the survey collects data through an annual, in-person, cross-sectional study of 67,500 people in all 50 states and the District of Columbia. The respondent universe is the civilian, noninstitutionalized population aged 12 or older residing in the United States. Respondents who complete the interview are provided a $30 cash incentive. The survey is administered primarily using audio computer-assisted self-interviewing via a laptop computer. The questionnaire contains questions on tobacco, alcohol, and illicit drug use; substance dependence and abuse; treatment for substance abuse problems; physical health conditions; mental health issues; and mental health services (Center for Behavioral Health Statistics and Quality, 2013a; 2013b). The survey contains demographic items such as race/ethnicity, age, gender, education, marital status, income, health insurance, and employment. The survey is sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA).

2.1.2 Clinical Follow-Up Study to NSDUH

The Mental Health Surveillance Study (MHSS) included a follow-up clinical psychiatric interview to NSDUH that collected data between 2008 and 2012 as part of an initiative by SAMHSA to develop and implement methods to measure and provide estimates of the prevalence of serious mental illness (SMI) among adults aged 18 or older in the U.S. general household population. In each year between 2008 and 2012, a sample of 500 to 1,500 NSDUH respondents was selected from the main NSDUH area probability sample of approximately 45,000 adult respondents. The MHSS target population included NSDUH respondents aged 18 or older who completed NSDUH interviews in English.

At the end of the NSDUH main interview, a probability sample of eligible respondents was drawn such that NSDUH interviewers would, at the conclusion of the interview, recruit sampled respondents by informing them of another interview that was to be conducted by telephone in approximately 2 weeks by a different interviewer. The NSDUH respondents who were sampled for the clinical interview were offered an additional $30 cash incentive, which was provided immediately upon agreeing to participate in the clinical interview. Respondents agreeing to participate were asked to provide contact information and the best times to call. Each case was assigned to a clinical interviewer who made the first attempt to contact a respondent.

---

1 Respondents were sampled based on age and responses to scores for the Kessler-6 (K6) (Kessler et al. 2003) and the World Health Organization Disability Assessment Schedule (WHODAS) scales (Novak, Colpe, Barker, & Gfroerer, 2010; Rehm et al., 1999) in the NSDUH instrument.
within 24 hours of receiving the assigned case. Further details on the MHSS data collection procedures and study design can be found in other documentation (Center for Behavioral Health Statistics and Quality, 2014a; 2014b).

Nonresponse to the MHSS clinical follow-up interview occurred at two points. First, some respondents who were selected at the end of the NSDUH interview refused to take part when they were asked to participate in the clinical follow-up interview, despite the prospect of receiving an additional $30 cash incentive to be provided upon agreement to participate. Second, nonresponse could occur when a clinical interviewer was not able to contact a respondent who agreed to participate at the end of the NSDUH interview or refused to participate when contacted over the phone.

The average overall weighted response rate (not including the NSDUH main interview response rates) to the MHSS was 60 percent across the 4 years used in this study. On average, 77 percent of the selected eligible NSDUH respondents agreed to take part in the clinical interview, and 77 percent of those who agreed to take part actually completed the interview. Table 1 presents a summary of the overall sample sizes. The analysis included 6,165 NSDUH respondents who were selected to participate in the MHSS clinical interview; 5,271 who agreed to participate at the end of the NSDUH interview; and 4,031 who completed the clinical follow-up interview across the 4 years of data collection from 2008 through 2011.3

Table 1. MHSS Clinical Interview Sample Sizes and Weighted Rates for Agreement to Participate and Completion, by Year

<table>
<thead>
<tr>
<th></th>
<th>2008A¹</th>
<th>2008B¹</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Selected to Participate Count</strong></td>
<td>1,194</td>
<td>1,137</td>
<td>789</td>
<td>768</td>
<td>2,277</td>
<td>6,165</td>
</tr>
<tr>
<td><strong>Agreed to Participate Count</strong></td>
<td>1,024</td>
<td>996</td>
<td>665</td>
<td>644</td>
<td>1,921</td>
<td>5,271</td>
</tr>
<tr>
<td><strong>Completed Clinical Interview Weighted Rate</strong></td>
<td>75.6%</td>
<td>76.4%</td>
<td>75.3%</td>
<td>80.5%</td>
<td>77.6%</td>
<td>77.4%</td>
</tr>
<tr>
<td><strong>Completed Clinical Interview Count</strong></td>
<td>759</td>
<td>741</td>
<td>520</td>
<td>516</td>
<td>1,495</td>
<td>4,031</td>
</tr>
<tr>
<td><strong>Overall Clinical Interview Response Rate Weighted Rate</strong></td>
<td>54.2%</td>
<td>59.7%</td>
<td>53.4%</td>
<td>65.2%</td>
<td>62.5%</td>
<td>59.5%</td>
</tr>
</tbody>
</table>

MHSS = Mental Health Surveillance Study.

¹ In the 2008 NSDUH, half of the adult sample (referred to as the "2008A" sample) was randomly assigned the World Health Organization Disability Assessment Schedule (Novak, Colpe, Barker, & Gfroerer, 2010; Rehm et al., 1999), and the other half (referred to as the "2008B" sample) was assigned the Sheehan Disability Scale (Leon, Olfson, Portera, Farber, & Sheehan, 1997). Because of its better SMI-predicting properties, only the WHODAS was administered in subsequent NSDUHs beginning in 2009, and it is currently used in combination with the Kessler-6 (K6) scale to predict serious mental illness.

² Includes 113 cases throughout the years that were assigned a zero probability of selection and that would have been selected based on their K6 rates (Kessler et al., 2003), but the NSDUH interview was completed toward the very end of the field period and there was insufficient time to carry out the clinical interview.

³ Clinical interviews were expected to be conducted within 2 weeks of completion of the NSDUH interview but allowed for up to 4 weeks.

⁴ Research to inform the development of weighting adjustments for the final clinical interview sample was conducted using data from the first 4 years of data collection (2008 to 2011) in advance of completing all data collection in 2012. For the entire data collection period (2008 to 2012), 8,629 NSDUH respondents were selected to participate in the clinical interview; 7,334 initially agreed to participate; and 5,653 completed the clinical interview.
2.2 Analyses

For this report, differences between respondents and nonrespondents and the magnitude of nonresponse biases at each stage of the request to participate in the clinical follow-up interview were examined for demographic and substantive variables collected in the NSDUH main interview. Bias magnitudes were compared for initial nonrespondents (i.e., immediate refusals to agree to participate in the clinical interview) and for second-stage nonrespondents (i.e., those who initially agreed to take part in the clinical follow-up interview but failed to do so).

Weighted estimates were compared on a variety of substantive and demographic variables collected in the main NSDUH interview available for both respondents and nonrespondents for the clinical interview. The auxiliary substantive variables available in the main NSDUH interview, grouped by topic, include (1) measures of mental health, such as the K6 and WHODAS scale scores, and reports of major depressive episode (American Psychiatric Association, 1994), mental health services, and suicidal thoughts; (2) measures of physical health, such as lifetime and past year indicators for asthma, anxiety, bronchitis, heart disease, pneumonia, lung cancer, ulcers, tuberculosis, and other illnesses; (3) substance use, including alcohol, tobacco, and illicit drug use; and (4) substance abuse and dependence, including alcohol, tobacco, and illicit drug abuse and dependence. These variables were assumed to be more directly related to the key outcome measures from the clinical interview (e.g., SMI). The auxiliary demographic variables include age, gender, race/ethnicity, education, marital status, health insurance, work status in the past week and year, region, and county type.

To get an idea of the magnitude of nonresponse bias resulting from differences between respondents and nonrespondents, the relative bias of an estimate was examined, calculated as the nonresponse bias divided by the respondent estimate:

\[
\text{Rel } B(\bar{y}_r) = \frac{B(\bar{y}_r)}{\bar{y}_r},
\]

where \( B(\bar{y}_r) \) denotes the bias for a sample mean of a survey variable, \( y \), which denotes the demographic and substantive measures from the NSDUH interview. This is calculated as the difference between the respondent and nonrespondent means, multiplied by the nonresponse rate:

\[
B(\bar{y}_r) = \left( \frac{n_m}{n} \right)(\bar{y}_r - \bar{y}_m),
\]

where \( r \) is the number of respondents in the sample, \( m \) is the number of nonrespondents in the sample, and \( n \) is the total number of sample individuals, such that \( r + m = n \).

---

4 The weight used for these comparisons is the full base weight for the clinical sample (i.e., the product of the final analysis weight of the NSDUH main study, an adjustment factor to adjust for the Spanish-language interviews in the main study's interviews, and the inverse of an individual's probability of selection to the clinical interview), thus accounting for the undercoverage in the MHSS of those interviewed in Spanish in NSDUH.
Whether these biases differ based on the nonresponse stage was examined. Because of the number of the demographic and substantive auxiliary measures used in this analysis, a summary measure—average absolute relative bias—was examined, calculated as the average magnitude of bias across variables related to the same topic (e.g., mental health, physical health).

2.3 Results

Table 2 presents a summary of the proportion of statistically significant differences between respondents and nonrespondents for different categories of auxiliary variables by initial and second-stage nonresponses.

Table 2. Percentage of NSDUH Variables in Which Significant Differences between Respondents and Nonrespondents Were Detected at the Alpha Level = 0.05 or Below, by Nonresponse Stage

<table>
<thead>
<tr>
<th>NSDUH Variable, by Topic</th>
<th>Total Number of Variables Examined</th>
<th>Significant Differences between Respondents and Initial Nonrespondents</th>
<th>Significant Differences between Respondents and Second-Stage Nonrespondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic</td>
<td>11</td>
<td>45%</td>
<td>73%</td>
</tr>
<tr>
<td>Substantive</td>
<td>143</td>
<td>44%</td>
<td>22%</td>
</tr>
<tr>
<td>Mental Health, K6</td>
<td>15</td>
<td>93%</td>
<td>33%</td>
</tr>
<tr>
<td>Mental Health, WHODAS</td>
<td>10</td>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>Major Depressive Episode, Mental Health Treatment, and Suicidal Thoughts</td>
<td>11</td>
<td>54%</td>
<td>18%</td>
</tr>
<tr>
<td>Physical Health</td>
<td>30</td>
<td>30%</td>
<td>17%</td>
</tr>
<tr>
<td>Substance Use</td>
<td>45</td>
<td>53%</td>
<td>16%</td>
</tr>
<tr>
<td>Substance Abuse and Dependence</td>
<td>32</td>
<td>25%</td>
<td>41%</td>
</tr>
</tbody>
</table>

K6 = Kessler-6; WHODAS = World Health Organization Disability Assessment Schedule.

Among the demographic variables analyzed, a larger proportion showed statistically significant differences between respondents and second-stage nonrespondents (73 percent) than between respondents and initial nonrespondents (45 percent). Within the set of examined substantive variables, the opposite pattern was found within most categories of variables. In all but one of the categories (substance abuse and dependence), the percentage of variables with statistically significant differences between respondents and initial nonrespondents was higher than the percentage of variables with statistically significant differences between respondents and second-stage nonrespondents. These differences were most pronounced for mental health and substance use variables. For example, statistically significant differences were found between respondents and initial nonrespondents on 14 of the 15 K6 variables (showing psychological distress), but only five K6 variables with statistically significant differences were found between respondents and second-stage nonrespondents. More interestingly, the differences seemed to be in the opposite direction for initial and second-stage nonrespondents. Initial nonrespondents were more likely to provide answers to the K6-related measures indicating lower levels of psychological distress than respondents. In contrast, second-stage nonrespondents were more likely to indicate higher levels of psychological distress on these items than respondents for the individual K6 items where statistically significant differences were detected.
Table 3 presents the magnitude of the differences in the estimates between respondents and nonrespondents, expressed as the average absolute relative bias.

Table 3. Average Absolute Relative Nonresponse Bias, by Nonresponse Stage

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Average Absolute Relative Bias Based on Initial Nonresponse</th>
<th>Average Absolute Relative Bias Based on Second-Stage Nonresponse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic</td>
<td>0.08</td>
<td>0.11</td>
</tr>
<tr>
<td>Substantive</td>
<td>0.08</td>
<td>0.07</td>
</tr>
<tr>
<td>Mental Health, K6</td>
<td>0.04</td>
<td>0.01</td>
</tr>
<tr>
<td>Mental Health, WHODAS</td>
<td>0.03</td>
<td>0.01</td>
</tr>
<tr>
<td>Major Depressive Episode, Mental Health Treatment, and Suicidal Thoughts</td>
<td>0.07</td>
<td>0.11</td>
</tr>
<tr>
<td>Physical Health</td>
<td>0.08</td>
<td>0.06</td>
</tr>
<tr>
<td>Substance Use</td>
<td>0.08</td>
<td>0.04</td>
</tr>
<tr>
<td>Substance Abuse and Dependence</td>
<td>0.09</td>
<td>0.14</td>
</tr>
</tbody>
</table>

K6 = Kessler-6; WHODAS = World Health Organization Disability Assessment Schedule.
NOTE: For categorical variables, absolute relative biases were calculated for each category.

Table 3 suggests that nonresponse biases in substantive variables were largely driven by initial refusals to the clinical interview. For example, in comparison with nonresponse biases due to the second-stage nonrespondents, the average absolute relative biases at the initial nonresponse stage were 4 times larger for the K6 scale, 3 times larger for the WHODAS scale, and 2 times larger for the substance use variables. In contrast, nonresponse biases in the demographic variables seemed to be largely driven by second-stage nonrespondents (about 30 percent larger in magnitude than biases due to initial nonresponse). The cumulative bias effect for demographic and substantive variables due to the two nonresponse stages was examined. For the demographic variables, these biases cancelled each other out for slightly less than two thirds of the demographic estimates, and for the substantive variables, slightly less than half of the bias estimates from the two nonresponse stages cancelled each other out.
3. Discussion

To improve the weight adjustments to minimize the risk of nonresponse bias, whether biases in demographic and substantive variables related to key outcome measures are a function of different nonresponse stages was examined. Significant differences were found between respondents and nonrespondents across both substantive and demographic variables. Furthermore, these differences varied by the point in a two-stage interview process at which nonresponse occurred. Differences between respondents and nonrespondents were more pronounced in the substantive variables at the initial nonresponse stage and among demographic variables at the second nonresponse stage. Correspondingly, biases in the substantive estimates were largely driven by initial nonresponse, whereas those in the demographic variables were driven by second-stage nonresponse.

The percentage of variables with statistically significant differences varied greatly between respondents and nonrespondents by topic. A large percentage of the variables with statistically significant differences did not necessarily correspond to large biases. For example, statistically significant differences were found between respondents and initial nonrespondents in 93 percent of the Kessler-6 items, but the average absolute relative bias for these measures at the initial nonresponse stage was low relative to the biases for the other substantive and demographic variables. The opposite was also true. Statistically significant differences were found between respondents and initial nonrespondents in only a quarter of the substance abuse and dependence variables, but the questions on this topic yielded one of the largest average absolute relative biases. Examining the cumulative bias effect due to the two nonresponse stages, these biases were found to have cancelled each other out for less than two thirds of the demographic variables and less than half of the substantive variables analyzed. An important implication of this finding is that nonresponse bias in estimates from future clinical interviews may be unpredictable when the proportions of initial and second-stage nonresponse change. Another implication is that if nonresponse adjustments are effective only for bias due to initial nonresponse or only for bias due to second-stage nonresponse, then the weighted estimate may be more biased than an estimate without nonresponse adjustment (Brick & Kalton, 1996).

These findings also have implications for the utility of measures of nonresponse bias based on demographic information. Some sampling frames include demographic information that can be used to compute measures such as the coefficient of variation of response rates across subgroups and their model-based counterpart, the R-indicator (Groves et al., 2008; Schouten & Cobben, 2007). Although these measures are based on individual demographic and household characteristics, they may be poor indicators of the potential for nonresponse bias if those demographic variables are not strongly related to the key outcome measures.

The findings from this analysis may not be generalizable to other study designs for several reasons. First, the analysis is conditional on respondents completing the National Survey on Drug Use and Health (NSDUH) interview. It is assumed that NSDUH nonresponse weighting adjustments account for nonresponse to NSDUH itself, and this has no impact on the analysis of differences between respondents and nonrespondents in the clinical follow-up interview. Second, conditions specific to NSDUH were that respondents selected for the clinical follow-up interview were provided cash incentives for agreeing to take part before completing the follow-up.
interview and shortly after completing the NSDUH interview. In addition, the follow-up interview was conducted through computer-assisted telephone interviewing, whereas the initial interview was conducted in person through audio computer-assisted self-interviewing and computer-assisted personal interviewing. Finally, the follow-up interview focused on obtaining more accurate information on mental health measures. The results may not apply to follow-up surveys in which different methods are used to obtain more accurate information on other health behaviors, including behaviors that require using more intrusive methods (e.g., collecting biospecimens for measures of substance use).
References


Appendix A:
Variables Used to Examine Differences between Respondents and Nonrespondents and Bias Estimates

1. Mental health
   a. Kessler-6 (K6)
      i. K6 total score – maximum of past year and past 30 days (range 0-24)
      ii. K6 total score in the past 30 days (range 0-24)
      iii. K6 total score in the worst month of the past year (range 0-24)
      iv. Feel nervous during the past 30 days
      v. Feel hopeless during the past 30 days
      vi. Feel restless or fidgety over the past 30 days
      vii. Feel so sad or depressed that nothing could cheer you up during the past 30 days
      viii. Feel that everything was an effort during the past 30 days
      ix. Feel down on self, no good or worthless during the past 30 days
      x. Feel nervous in the worst month of the past year
      xi. Feel hopeless in the worst month of the past year
      xii. Feel restless or fidgety in the worst month of the past year
      xiii. Feel so sad or depressed that nothing could cheer you up in the worst month of the past year
      xiv. Feel that everything was an effort in the worst month of the past year
      xv. Feel down on self, no good or worthless in the worst month of the past year
   b. World Health Organization Disability Assessment Schedule (WHODAS)
      i. WHODAS total score (range 0-24)
      ii. Alternative WHODAS total score (range 0-8)
      iii. Remembering to do things you needed to do
      iv. Concentrating on doing something important when other things were going on around you
      v. Going out of the house and getting around on your own
      vi. Dealing with people you did not know well
      vii. Participating in social activities, like visiting friends or going to parties
      viii. Taking care of household responsibilities
      ix. Taking care of your daily responsibilities at work or school
      x. Getting your daily work done as quickly as needed
   c. Major depressive episode (MDE), mental health treatment, and suicidal thoughts
      i. Lifetime MDE
      ii. Past year MDE
      iii. Received any mental health treatment in past year
      iv. Received inpatient mental health treatment in the past 12 months
      v. Received outpatient mental health treatment in past 12 months
      vi. Needed mental health treatment, but did not get it in past 12 months
      vii. Seriously think about killing self in past 12 months
      viii. Make plans to kill yourself in past 12 months
      ix. Try to kill yourself in past 12 months
x. Received medical attention because tried to kill self in past 12 months
xi. Stay overnight at hospital because tried to kill self in past 12 months

2. Physical health
   a. Lifetime
      i. Anxiety disorders
      ii. Asthma
      iii. Bronchitis
      iv. Cirrhosis of the liver
      v. Depression
      vi. Heart disease
      vii. High blood pressure
      viii. Lung cancer
      ix. Pancreatitis
      x. Pneumonia
      xi. Sexually transmitted disease
      xii. Sinusitis
      xiii. Sleep apnea
      xiv. Stroke
      xv. Tinnitus
      xvi. Tuberculosis
   b. Past year
      i. Anxiety disorders
      ii. Asthma
      iii. Cirrhosis of the liver
      iv. Depression
      v. Heart disease
      vi. Hepatitis
      vii. High blood pressure
      viii. Pancreatitis
      ix. Sexually transmitted disease
      x. Sinusitis
      xi. Sleep apnea
      xii. Stroke
      xiii. Tinnitus
      xiv. Ulcer(s)

3. Substance use
   a. Alcohol
      i. Total number of days used alcohol in past 12 months
      ii. Number of days had 5+ drinks in past 30 days
      iii. Age first drank alcoholic beverage
      iv. Lifetime alcohol use
      v. Past year alcohol use
   b. Illicit drugs
      i. Age first used illicit drug
      ii. Total number of days used marijuana in past 12 months
      iii. Lifetime illicit drug use
      iv. Lifetime marijuana and hashish
      v. Lifetime cocaine
      vi. Lifetime crack
      vii. Lifetime heroin
      viii. Lifetime hallucinogens
      ix. Lifetime lysergic acid diethylamide (LSD)
      x. Lifetime phencyclidine (PCP)
      xi. Lifetime Ecstasy (MDMA, 3,4-methylenedioxymethamphetamine)
      xii. Lifetime inhalants
      xiii. Lifetime nonmedical use of psychotherapeutics
      xiv. Lifetime pain relievers
      xv. Lifetime OxyContin®
      xvi. Lifetime tranquilizers
      xvii. Lifetime stimulants
      xviii. Lifetime methamphetamine
      xix. Lifetime sedatives
      xx. Lifetime illicit drugs other than marijuana
      xxi. Past year illicit drug use
      xxii. Past year marijuana and hashish
      xxi. Past year cocaine
      xxiv. Past year crack
      xxv. Past year heroin
      xxvi. Past year hallucinogens
      xxvii. Past year LSD
      xxviii. Past year Ecstasy
      xxix. Past year inhalants
      xxx. Past year nonmedical use of psychotherapeutics
      xxxi. Past year pain relievers
      xxxii. Past year OxyContin®
      xxxiii. Past year tranquilizers
      xxxiv. Past year stimulants
      xxxv. Past year methamphetamine
      xxxvi. Past year sedatives
      xxxvii. Past year illicit drugs other than marijuana
   c. Tobacco
      i. Lifetime tobacco use
      ii. Past year tobacco use
      iii. Past year cigarette use
4. Substance abuse and dependence
   a. Dependence or abuse
      i. Illicit drugs
      ii. Marijuana and hashish
      iii. Cocaine
      iv. Heroin
      v. Nonmedical use of psychotherapeutics
      vi. Pain relievers
      vii. Tranquilizers
   viii. Stimulants
      ix. Sedatives
      x. Alcohol
      xi. Both illicit drugs and alcohol
      xii. Illicit drugs or alcohol
   b. Dependence
      i. Illicit drugs
      ii. Marijuana and hashish
      iii. Cocaine
      iv. Nonmedical use of psychotherapeutics
      v. Pain relievers
      vi. Tranquilizers
      vii. Stimulants
      viii. Sedatives
      ix. Alcohol
      x. Both illicit drugs and alcohol
      xi. Illicit drugs or alcohol
   c. Abuse
      i. Illicit drugs
      ii. Marijuana and hashish
      iii. Cocaine
      iv. Nonmedical use of psychotherapeutics
      v. Pain relievers
      vi. Tranquilizers
      vii. Alcohol
      viii. Both illicit drugs and alcohol
      ix. Illicit drugs or alcohol

5. Demographics
   a. Gender
   b. Age
   c. County type (large metro, small, metro, nonmetro)
   d. Race/ethnicity
   e. Education
   f. Marital status
   g. Income
   h. Region
   i. Health insurance
   j. Work situation in past week
   k. Worked in the past 12 months
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