Technical Notes

Data source

Data used to produce this Early Release are derived from the three main components of the National Health Interview Survey (NHIS) from 1997 through June 2017: (a) the Family Core, which collects information on all family members in each household; (b) the Sample Child Core, which collects information on one randomly selected child (the "sample child") in each family with a child; and (c) the Sample Adult Core, which collects information from one randomly selected adult (the "sample adult") aged 18 or over in each family. Data analyses for the January–June 2017 NHIS were based on 39,480 persons in the Family Core, 13,577 adults in the Sample Adult Core, and 4,532 children in the Sample Child Core. Visit the NHIS website at https://www.cdc.gov/nchs/nhis.htm for more information on the design, content, and use of NHIS.

Calibration of weights to independent population estimates

Estimates were calculated using the NHIS sample weights, which were calibrated to 2010 census-based population estimates for sex, age, and race and ethnicity of the U.S. civilian noninstitutionalized population beginning with 2012 NHIS data. NHIS weights were calibrated to 2000 census-based population estimates for NHIS data between 2003 and 2011. In Early Release reports prior to September 2003, the weights for 1997–2002 NHIS data were derived from 1990 census-based population estimates. The impact of the transition from 1990 census-based population estimates to 2000 census-based population estimates was assessed for data from the 2000–2002 NHIS by comparing estimates that used the 1990 census-based weights with those that used the 2000 census-based weights. The results were presented in Tables II and III in the Appendix of the September 2003 Early Release report on key health indicators (13). Although the changes for all selected measures were no more than 1 percentage point, the 2000–2002 estimates for all measures were recalculated beginning with the 2003 Early Release report on key health indicators, up through the present report, using weights derived from the 2000 census. The NHIS data weighting procedure is described in more detail at: https://www.cdc.gov/nchs/data/series/sr_02/sr02_130.pdf (1997–2005 NHIS) and https://www.cdc.gov/nchs/data/series/sr_02/sr02_165.pdf (2006–2015 NHIS).

Implementation of a new sample design

A new sample design was implemented with the 2016 NHIS. Sample areas were reselected to take account of changes in the distribution of the U.S. population since 2006, when the previous sample design was first implemented; commercial address lists were used as the main source of addresses, rather than field listing; and the oversampling procedures for black, Hispanic, and Asian persons that were a feature of the previous sample design were not implemented in 2016. Some of the differences between estimates for 2016 and later and estimates for earlier years may be attributable to the new sample design. Visit the NCHS website at https://www.cdc.gov/nchs/nhis.htm for more information on the design, content, and use of NHIS.

Estimation procedures

NCHS creates weights for each calendar quarter of the NHIS sample. The NHIS data weighting procedures are described in more detail at: https://www.cdc.gov/nchs/data/series/sr_02/sr02_130.pdf (1997–2005 NHIS) and https://www.cdc.gov/nchs/data/series/sr_02/sr02_165.pdf (2006–2015 NHIS). Because the estimates for January–June 2017 are being released prior to final data editing and final weighting, they should be considered preliminary and may differ slightly from estimates that will be made later using the final 2017 data files. Estimates from the 1997–2016 NHIS are based on previous reports and are therefore also based on preliminary data files and not final data files. Differences between estimates calculated using preliminary data files and final data files are typically less than 0.1 percentage point. For 2008, differences may be as high as 1.5 percentage points because a larger-than-usual number of records were removed for insufficient quality in the final data files. As mentioned previously, estimates for 2000–2002 were recalculated in this report using the 2000 census-based weights that were not included in the final files. See "Lack of Health Insurance Coverage and Type of Coverage" (Section 1 in this report) for details on special data editing for health insurance variables. For NHIS announcements and more detailed information, visit the NHIS website at: https://www.cdc.gov/nchs/nhis.htm.

Point estimates, and estimates of their variances, were calculated using the SUDAAN software package (RTI International, Research Triangle Park, NC) to account for the complex sample design of NHIS. The Taylor series linearization method was chosen for variance estimation. The June 2007 Early Release report used final in-house design variables for estimating variance. Early Release reports other than the June 2007 report use Early Release interim design variables to estimate variance.

Beginning with the 2017 NHIS, all estimates shown meet the NCHS standards of reliability as specified in *National Center for Health Statistics Data Presentation Standards for Proportions* (14), unless otherwise noted. Estimates based on the 2016 and earlier NHIS meet the former NCHS standard of having less than or equal to 30% relative standard error, unless otherwise noted. Point estimates in some figures and tables are accompanied by 95% confidence intervals. Beginning with the June 2006 release, confidence intervals are shown to two decimal places to improve the precision of further calculations. Starting with the 2017 NHIS, two-sided 95% confidence intervals are calculated using the Clopper-Pearson method adapted for complex surveys by Korn and Graubard (14). For the 2016 and earlier NHIS, two-sided 95% confidence intervals are calculated using the Wald method.

Significance testing

Trends were assessed by using Joinpoint regression (15), which characterizes trends as joined linear segments. A joinpoint is the year at which two segments with different slopes meet. Joinpoint software uses statistical criteria to determine the fewest number of segments necessary to characterize a trend and the year(s) when segments begin and end. A limitation of using aggregated data and Joinpoint software alone for trend analysis of the National Health Interview Survey is that this approach does not account for year-to-year correlation or use the recommended degrees of freedom for statistical testing. Trends from 1997 through the first 6 months of 2017 were also evaluated using logistic regression analysis.

Differences between percentages or rates for current estimates were evaluated by using two–sided significance tests at the 0.05 level. Terms such as “higher than,” “less than,” “more likely,” and “less likely” indicate a statistically significant difference, unless otherwise noted. Terms such as “similar” and “no difference” indicate that the statistics being compared were not significantly different. Lack of comment regarding the difference between any two statistics does not necessarily mean that the difference was tested and found to be not significant. Because of small sample sizes, estimates based on less than 1 year of data may have large variances, and caution should be used in analyzing these estimates. Patterns for such estimates may change as more data become available.

Adjustment for age and sex

Age-sex-adjusted percentages were calculated for three race and ethnicity groups. For the prevalence of obesity, only age-adjusted sex-specific percentages are presented because the race and ethnicity patterns in obesity prevalence differ by sex. Similarly, only sex-adjusted age-specific prevalences are presented for the asthma measures because the race and ethnicity patterns in asthma episodes and current asthma differ by age. Direct standardization was used for adjustment, using the projected 2000 U.S. population as the standard population (16) and using age groups that varied depending on the impact of age on the specific measure. Rates presented are crude rates unless otherwise stated.

Race and ethnicity categories

The race and ethnicity categories for data years beginning in 2003 are defined using the 1997 *Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity* (17) promulgated by the U.S. Office of Management and Budget (OMB). Subsequent to the Early Releases based on data through 2002, the categories “non-Hispanic white” and “non-Hispanic black” were changed to “not Hispanic white, single race” and “not Hispanic black, single race.” The term “Hispanic” was changed to “Hispanic or Latino,” and “black” was changed to “black or African American.” However, the text and figures in this report use shorter terms, for conciseness. For example, the category “not Hispanic or Latino, white, single race” in the tables is referred to as “non-Hispanic white” in the text. Race and ethnicity-specific estimates for years prior to 2003, released previously, were based on the 1977 OMB standards and therefore are not strictly comparable with estimates for 2003 and later. However, the changes in the OMB standards have little effect on the health estimates reported here. See Tables XI and XII in *Health, United States, 2003* (18) for a comparison of estimates for cigarette smoking and private health insurance coverage using both the 1977 and 1997 OMB standards. In addition, beginning with the 2003 NHIS (first incorporated in the September 2004 Early Release), NHIS editing procedures were changed to maintain consistency with U.S. Census Bureau procedures for collecting and editing data on race and ethnicity. These changes reflect the elimination of “other race” as a separate race response. This response category is treated as missing, and race is imputed if this was the only race response. In cases where “other race” was mentioned along with one or more OMB race groups, the “other race” response is dropped and the OMB race group information is retained. This change is not expected to have a substantial effect on the estimates.

Health insurance

Additional estimates for health insurance can be found in the Early Release Program’s quarterly report, *Health Insurance Coverage: Early Release of Estimates From the National Health Interview Survey, 2016* (1).

Data on health insurance status were edited using a system of logic checks. Information from follow–up questions, such as plan name(s), were used to reassign insurance status and type of coverage to avoid misclassification. The resulting estimates of persons without health insurance coverage are generally 0.1–0.3 percentage point lower than those based on the editing procedures used for the final data files.

To reduce potential errors in reporting Medicare and Medicaid status, two questions were added to the health insurance section of NHIS beginning in the third quarter of 2004. Persons aged 65 and over not reporting Medicare coverage were asked explicitly about Medicare coverage. Persons under age 65 with no reported coverage were asked explicitly about Medicaid coverage. For the present report, estimates that exclude the two additional questions are labeled "Method 1," and estimates that include the additional questions are labeled "Method 2." Estimates for 1997–2003 in this report are generated using Method 1. Estimates for 2004 are presented using Method 2 in figures and both Method 1 and Method 2 in tables. Estimates for 2005 and beyond are calculated using Method 2. Statements about trends or comparisons for 1997–2003 are based on estimates calculated using Method 1. Statements about trends or comparisons for 2004–present are based on estimates calculated using Method 2. Statements about trends over groups of years from before 2004 to 2004 or later take both methodologies into account. Conclusions regarding trends are not made in cases where using one method yields a different result than the same trend analysis using the other method. Note that although both methods may yield the same conclusion, the extent of the increasing or decreasing trend may be larger using one method than with the other method.

Estimates for 2004 were calculated using both methods to assess the effect of adopting Method 2. From July through December 2004 (third and fourth quarters combined), with the use of Method 2, the estimates (weighted) for persons without health insurance coverage decreased, from 10.4% to 9.9% for persons under age 18, from 19.7% to 19.5% for adults aged 18–64, and from 1.7% to 1.2% for persons aged 65 and over. Also, with the use of Method 2, the estimates for public coverage increased, from 28.1% to 29.6% for children under age 18, from 11.3% to 11.4% for adults aged 18–64, and from 89.5% to 93.3% for persons aged 65 and over. The two additional questions had no impact on the estimates for private coverage. Additional information on the impact of these two questions on health insurance estimates can be found in "Impact of Medicare and Medicaid Probe Questions on Health Insurance Estimates from the National Health Interview Survey, 2004" (19).

Influenza vaccination

Starting in 1997, respondents were asked if they received a flu shot during the past 12 months. Beginning in 2003, respondents were also asked if they received a flu vaccine sprayed in their nose during the past 12 months. From August 2010 through 2011, questions were modified to reflect that, for the first time, the seasonal influenza vaccine included protection for the 2009 pandemic H1N1 virus. For children aged 6 months–8 years, who require two doses of vaccine to be fully vaccinated if they have not previously received seasonal influenza vaccination, these questions do not indicate whether the vaccination was a child's first or second dose.

NHIS Early Release influenza vaccination estimates have changed since 1997. Starting in 1997, Early Release influenza vaccination estimates covered receipt of an influenza shot only. Starting in 2005, Early Release influenza vaccination estimates covered the seasonal influenza shot or seasonal intranasal influenza vaccination. Influenza vaccination estimates based on data collected during 2009 and January through July of 2010 included only seasonal and not 2009 H1N1 pandemic influenza vaccination. Estimates based on data collected in quarters three and four of 2010 and quarters one and two of 2011 could be affected, to an unknown extent, by reports of H1N1 immunization without seasonal flu immunization for the period when the two were administered separately (October 2009–May 2010). An error in calculating influenza vaccination rates occurred from the first quarter of 2005 through the first quarter of 2007. The effect of this error on estimates was small. Compared with the original estimates, corrected estimates are slightly higher, usually by no more than 0.3 percentage point. The error has been corrected for all estimates in this Early Release and had no perceptible impact on the graphs.

Prevalence of influenza vaccination during the past 12 months is different from season-specific coverage, and these estimates may differ (20; estimates available from: https://www.cdc.gov/flu/fluvaxview). Responses to the influenza vaccination questions used to calculate the influenza vaccination estimates presented in this report (see Appendix) cannot be used to determine when, during the preceding 12 months, the subject received the influenza vaccination. In addition, estimates are subject to recall error, which will vary depending on when the question is asked, because the receipt of an influenza vaccination is seasonal. Advisory Committee on Immunization Practices (ACIP) recommendations regarding who should receive an influenza vaccination have changed over the years, and changes in coverage estimates may reflect changes in recommendations (4–8). NHIS questions are not always detailed enough to determine whether ACIP recommendations have been met.

An influenza vaccine shortage occurred during the 2004–2005 influenza season (4). Delays in the availability of influenza shots also occurred in fall 2000 and, to a lesser extent, in fall 2001 (4–7).

Alcohol consumption

From 1997–2013, the alcohol consumption estimates presented are for the percentage of adults aged 18 and over who had five or more drinks in 1 day at least once in the past year, regardless of sex. However, in 2014 the survey questions were changed; male and female respondents were asked about a different quantity of drinks consumed in a day in the past year. As a result, the estimates presented for 2014 and later are for men aged 18 and over who had five or more drinks in 1 day at least once in the past year and women aged 18 and over who had four or more drinks in 1 day at least once in the past year. Differences observed in estimates for women based on the 2014 and later NHIS and 2013 and earlier NHIS may be partially or fully attributable to these changes in the survey questions on alcohol consumption.

Human immunodeficiency virus (HIV) testing

From 1997 to 2010, the question on HIV testing was located in the AIDS Knowledge and Attitudes (ADS) section of the NHIS questionnaire. The question was preceded by questions that asked respondents whether they had donated blood to a blood bank since March 1985 and, if they had, whether they had donated blood during the past 12 months. The wording of the HIV testing question depended on the respondent's answers to the blood donation questions. Respondents who had donated blood were instructed to exclude tests they may have had as part of blood donations before they were asked if they had ever been tested for HIV. Respondents who had not donated blood were only asked if they had ever been tested for HIV. The ADS section was the last section fielded in the Sample Adult Core questionnaire and was preceded by the Adult Access to Health Care and Utilization (AAU) section.

In 2011, the ADS section was dropped from NHIS, with only the HIV testing question retained. The question was added to the AAU section and is preceded by questions on health insurance. Because no questions were asked about blood donations prior to the HIV testing question, the wording of the question was the same for all respondents. They were instructed to exclude tests they may have had as part of blood donations before they were asked if they had ever been tested for HIV. The AAU section is the last section fielded in the Sample Adult Core questionnaire, and the HIV testing question is the last question in the AAU section. Differences observed in estimates based on the 2010 and earlier NHIS and the 2011 and later NHIS may be partially or fully attributable to this change in placement of the HIV testing question on the NHIS questionnaire.

In 2013, the HIV testing question was removed from the AAU section and was added to the Adult Selected Items (ASI) section, where it is preceded by questions on sexual orientation, worries related to financial matters, sleep, and psychological distress. Because no questions were asked about blood donations prior to the HIV testing question, the wording of the question was the same for all respondents. They were instructed to exclude tests they may have had as part of blood donations before they were asked if they had ever been tested for HIV. Beginning in 2013, the ASI section is the last section fielded in the Sample Adult Core questionnaire, and the HIV testing question is the second–to–last question in the ASI section (followed by a question asking adults who had not been tested why they had not been tested). Differences observed in estimates based on the 2012 and earlier NHIS and the 2013 and later NHIS may be partially or fully attributable to this change in placement of the HIV testing question on the NHIS questionnaire.

Serious psychological distress

From 1997 to 2012, the six questions on psychological distress were located in the Adult Conditions (ACN) section of the Sample Adult Core questionnaire. The ACN section was preceded by the Adult Socio–Demographic (ASD) section. In 2013, the six psychological distress questions were moved from the ACN section and added to the Adult Selected Items (ASI) section, where they were preceded by questions on sexual orientation, worries related to financial matters, and sleep. Beginning in 2013, the ASI section is the last section fielded in the Sample Adult Core questionnaire. Due to the higher than usual amount of missing data in the ASI section, adults with missing data for any of the six psychological distress questions are excluded from the calculation of the serious psychological distress indicator for 2013 and later. Differences observed in estimates based on the 2012 and earlier NHIS and the 2013 and later NHIS may be partially or fully attributable to this change in placement of the six psychological distress questions on the NHIS questionnaire.

Early Release of NHIS Estimates

The NCHS Early Release Program updates and releases timely estimates by means of three Early Release reports. This Early Release of Selected Estimates (21) and a separate health insurance report (1) are released approximately 5 to 6 months after National Health Interview Survey (NHIS) data collection has been completed for each quarter. A third report on wireless substitution (2) is released mid–year and again at the end of the year. New measures may be

added as work continues and in response to changing data needs. Feedback on the Early Release mechanism and on the estimates is welcome (e–mail).

Announcements about Early Releases, other new data releases, publications, or corrections related to NHIS will be sent to members of the National Health Interview Survey (NHIS) researchers electronic mailing list. To join, visit: https://www.cdc.gov/subscribe.html.

A list of previous Early Release Program reports is available from: https://www.cdc.gov/nchs/nhis/releases.htm.

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