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Original Research

Smoking prevalence: A comparison of two American surveys

B. Rodu [a,*], P. Cole [b]

[a] Department of Medicine, School of Medicine, University of Louisville, Louisville, KY 40202, USA
[b] Department of Epidemiology, School of Public Health, University of Alabama at Birmingham, Birmingham, AL 35294-0022, USA

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SUMMARY

Objectives: To compare smoking prevalence estimates from two nationally representative surveys in the USA.
Study design: Smoking prevalence estimates derived from the National Health Interview Survey (NHIS) and the National Survey on Drug Use and Health (NSDUH) for the period 1998–2005.
Methods: Comparisons according to age (18–34 or 35+ years) and according to smoking frequency (every day or some days).
Results: In 1998, the prevalence of smoking in both surveys was nearly identical at 24%. From 1999 to 2005, a divergence occurred in smoking prevalence found by the NSDUH and the NHIS. By 2005, NHIS prevalence had declined to 20.9% [95% confidence interval (CI) 20.3–21.5], but the NSDUH estimate was 25.4% (95%CI 24.6–26.2), amounting to 9.1 million more smokers. In 1999, prevalence among 18–34 year olds in the NSDUH was only 18% (95%CI 13–22) higher than that in the NHIS, but that difference had doubled by 2005, when smoking prevalence among 18–34 year olds was 36% (95%CI 30–41) higher in the NSDUH than in the NHIS. NSDUH and NHIS prevalence among 35+ year olds were similar in 1999 and 2001, but the difference was 13% (95%CI 9–18) in 2005. Higher smoking prevalence estimates in the NSDUH were largely due to much higher estimates for some-day smoking in that survey, although every-day smoking prevalence among 18–34 year-olds was also higher in the NSDUH than in the NHIS.
Conclusions: These results raise doubt about the recent decline in smoking prevalence described by the NHIS. Further investigation of the NSDUH/NHIS discrepancy may lead to better surveys and to a clearer picture of smoking trends in the USA.

Introduction

Cigarette smoking has been the leading cause of preventable deaths in the USA for more than 50 years. An accurate enumeration of smokers is an important and useful public health statistic for evaluating anti-smoking campaigns and for measuring progress towards national objectives, such as the Healthy People 2010 goal of reducing smoking prevalence to 12%.[1]

Since the mid 1960s, the Centers for Disease Control and Prevention (CDC) has based its national smoking prevalence estimates on the National Health Interview Survey (NHIS). Smoking prevalence can also be estimated from other federal government surveys. The National Survey on Drug Use and Health (NSDUH), known until 2002 as the National Household Survey on Drug Abuse, is sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA). It is used by the CDC's Office on Smoking and Health to describe trends in youth tobacco use. Concurrent NHIS and NSDUH survey data on adult smoking have been available for many years, but no comparison has been made of the prevalence estimates from the two sources. The Office of Applied Studies at SAMHSA reported smoking prevalence estimates from the NSDUH in 2004 and 2005 that were much higher than those from the NHIS, but no explanation for the discrepancy was offered.[2]

This study compares the smoking prevalence estimates from the NHIS and the NSDUH during the period from 1999 to 2005, and describes how differences in questions and responses between the two survey series may have contributed to differences in their estimates.

Methods

The NHIS is a multipurpose health survey of the non-institutionalized adult (18+ years) population of the USA, and it has been conducted since 1957.[3] The survey uses multistage sampling with state-level stratification. The design oversamples Black and Hispanic populations to allow for more precise estimates in these groups. The survey is administered by field representatives, who

* Corresponding author. Tel.: +1 502 852 7793; fax: +1 502 852 4311.
E-mail address: brad.rodu@louisville.edu (B. Rodu).

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have used computer-assisted interviewing since 1997. Response rates for the 1999, 2001, 2003 and 2005 NHIS were 70%, 74%, 74% and 69%, yielding 30,800, 33,300, 30,900 and 31,400 respondents, respectively.

The NSDUH has been conducted since 1971 to measure the prevalence and correlates of drug use among the non-institutionalized civilian population in the USA who are 12 years of age or older.[4] The survey employs independent multistage area probability sampling for each of the 50 states and the District of Columbia. The design oversamples youths and young adults to allow for more precise estimates in these groups. Field interviewers visit each residence in the NSDUH sample; computer-assisted interviewing has been used since 1999, in which non-sensitive questions (e.g. demographics, occupational status) are administered by an interviewer, and questions about substance abuse are answered directly by respondents in a highly private and confidential manner. Since 2002, respondents have been given an incentive payment of $30, which resulted in increased response rates thereafter. Response rates for the 1999, 2001, 2003 and 2005 NSDUH were 69%, 73%, 77% and 76%, yielding 34,900, 38,100, 37,000 and 37,200 respondents aged 18+ years, respectively.

NHIS adult sample data files and NSDUH data files were obtained from the Inter-University Consortium for Political and Social Research.[3,4] All direct identifiers and variables that might lead to identification had been removed from these public-use data files by the sponsoring agencies. Both surveys employed a complex design involving stratification, clustering and multistage sampling.

The CDC uses two questions in the NHIS to establish the smoking status of participants.[5] The first question is 'Have you smoked at least 100 cigarettes in your entire life?' Subjects answering 'no' are classified as never smokers, and those who answer 'yes' are classified as ever smokers. Ever smokers are asked a second question: 'Do you now smoke cigarettes every day, some days or not at all?' Respondents who answer 'every day' or 'some days' are classified as current smokers, and respondents who answer 'not at all' are classified as former smokers.

Since 1999, the NSDUH has contained a 100-cigarette lifetime question that is identical to the NHIS. However, the NSDUH does not ask ever-smoking subjects about every-day or some-day smoking. Instead, the NSDUH asks the following question of all participants: 'During the past 30 days, have you smoked part or all of a cigarette?' The present authors designated an ever-smoker who had smoked within the past 30 days as a current smoker. This is consistent with the definition employed by the CDC when using the NSDUH,[6] and with a recent report comparing the results from both surveys.[2] In addition, the NSDUH asks smokers on how many of the past 30 days they smoked. The present authors used the responses to this question to create every-day and some-day groups for comparison with the NHIS. Subjects reporting that they had smoked on all 30 days were classified as every-day smokers, and those who had smoked on 1–29 days were classified as some-day smokers.

The NSDUH has limited age groupings for adults, and the most complete grouping is irregular (18–25, 26–34, 35–49, 50–64 and 65+ years). These categories were condensed into two groups, 18–34 and 35+ years, and the same grouping was used for the NHIS.

Statistical Package for the Social Sciences Version 15.0 (SPSS Inc., Chicago, IL, USA) with complex samples was used to provide prevalence estimates and their 95% confidence intervals (CI) based on the non-institutionalized civilian population of the USA, after adjustment for non-response. This procedure was validated by reproducing, from NHIS data, the age- and gender-specific smoking prevalence rates reported by the CDC over the study period. Differences in NSDUH and NHIS prevalence rates were expressed as prevalence ratios with 95%CI.

Results

In 1998, the prevalence of current smoking in both surveys was nearly identical at 24%. In 1999, NSDUH prevalence was 25.9% (95%CI 25.1–26.7) and NHIS prevalence was 23.5% (95%CI 22.9–24.1). In 2001 and 2003, NSDUH prevalence remained at 25.2% (95%CI 24.5–25.9) and 25.6% (95%CI 24.8–26.3), respectively, while NHIS prevalence gradually declined to 22.8% (95%CI 22.2–23.4) and 21.6% (95%CI 21.0–22.2). The difference between the two surveys was largest in 2005, when NSDUH prevalence was 25.4% (95%CI 24.6–26.2) and NHIS prevalence was 20.9% (95%CI 20.3–21.5). In that year, NSDUH prevalence was almost 22% higher than NHIS prevalence (95%CI 18–25), which amounts to a difference of 9.1 million current smokers (NSDUH 54.2 million, NHIS 45.1 million). The prevalence of former smoking in the NSDUH remained above 23% until 2005 when it dropped to 21.9% (95%CI 21.0–22.8), while the NHIS estimate declined gradually from 23.1% (95%CI 22.5–23.7) in 1999 to 21.5% (95%CI 21.0–22.1) in 2005.

To characterize the differences between the NSDUH and the NHIS, the data were analysed according to age and gender in alternating years from 1999 to 2005. The largest differences in smoking prevalence between the two surveys occurred among persons aged 18–34 years (Table 1). In 1999, prevalence among 18–34 year olds in the NSDUH was 18% higher than that in the NHIS (95%CI 13–22), but that difference had doubled by 2005 when smoking prevalence among 18–34 year olds was 36% higher in the NSDUH than in the NHIS (95%CI 30–41%). NSDUH and NHIS prevalence among 35+ year olds was similar in 1999 and 2001, but in 2003, NSDUH prevalence was 9% higher than that in the NHIS (95%CI 4–14), and the difference was 13% (95%CI 9–18) in 2005. These patterns were similar for both genders.

Table 1 shows to what extent the higher NSDUH prevalence estimates were due to every-day or some-day smokers. In the NHIS, every-day smokers were ever smokers who reported smoking 'every day'; in the NSDUH, they were ever smokers who reported smoking on all 30 days in the past month. There was little difference between the NSDUH and the NHIS in the prevalence of every-day smoking among 18–34 year olds in 1999 and 2001. However, in both 2003 and 2005, NSDUH prevalence was 13–14% higher than NHIS prevalence (21% vs 18–19%). In contrast, the prevalence of every-day smoking among 35+ year olds in the NSDUH was significantly lower than that in the NHIS for all years except 2005.

Some-day smokers in the NHIS were ever smokers who reported smoking on 'some days'; in the NSDUH, they were ever smokers who reported smoking on 1–29 days in the past month. NSDUH estimates were much higher than those of the NHIS for both age groups and all years. Among 18–34 year olds, NSDUH estimates were 11–12%, which was almost double the NHIS estimates. Although the prevalence of some-day smoking among 35+ year olds was not as common in either survey, NSDUH rates were significantly higher than those in the NHIS (prevalence ratio 1.65–1.94) for all years.

Discussion

Two nationally representative federal government surveys, the NHIS and the NSDUH, describe an increasingly divergent picture of smoking prevalence in the USA since 1998, when prevalence in both surveys was 24%. By 2005, NHIS prevalence had declined to 21%, but the NSDUH estimate was 25%, suggesting a plateau in smoking prevalence for about a decade. The NSDUH's 4.5 percentage-point higher estimate in 2005 amounted to 9.1 million more smokers than the NHIS estimate.

Higher smoking prevalence estimates in the NSDUH are largely due to much higher estimates for some-day smoking in that survey