

## Smoking Prevalence and Cessation Before and During Pregnancy: Data From the Birth Certificate, 2014

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### Abstract

**Objectives**—This report presents findings for 2014 on maternal smoking prevalence and cessation before and during pregnancy as collected on the 2003 U.S. Standard Certificate of Live Birth, for a 46-state and District of Columbia reporting area, representing 95% of all births in the United States.

**Methods**—Cigarette smoking and cessation rates 3 months before and during pregnancy are presented by maternal age; race and ethnicity; marital status; educational attainment; source of payment at delivery (private insurance, Medicaid, and self-pay); receipt of benefits from the Special Supplemental Nutrition Program for Women, Infants, and Children; prenatal care initiation; and jurisdiction.

**Results**—About 1 in 10 women who gave birth in 2014 smoked during the 3 months before pregnancy (10.9%), and about one-quarter of these women (24.2%) did not smoke during pregnancy (i.e., quit before pregnancy). The smoking rate at any time during pregnancy was 8.4%, with 20.6% of women who smoked in the first or second trimesters quitting by the third trimester. Smoking during pregnancy was more prevalent for women aged 20–24 (13.0%) than for other ages, and by race and Hispanic origin, the highest rate was for non-Hispanic American Indian or Alaska Native women (18.0%). Smoking during pregnancy ranged from 1.8% in California to 27.1% in West Virginia. The highest smoking cessation rates before and during pregnancy were for women with the highest educational attainment, private insurance, and non-Hispanic Asian and Hispanic race and ethnicity. On average, women who continued to smoke during pregnancy smoked fewer cigarettes as the pregnancy progressed, from 13 per day before pregnancy to 9 per day by the third trimester.

**Keywords:** prenatal smoking • smoking cessation • tobacco • cigarettes

### Introduction

Maternal smoking during pregnancy is consistently reported as a predictor of adverse birth outcomes such as preterm birth and low birth weight as well as fetal and infant mortality (1,2). Research dating to the 1960s has shown a direct causal link between smoking and suboptimal fetal outcomes due to teratogenic effects in early gestation and abnormal growth and maturation of the fetus in later gestation (3). Although no level of tobacco use during pregnancy is safe, greater smoking intensity, measured by the number of cigarettes smoked per day, has been shown to have more deleterious effects on the fetus than lighter smoking (4). In addition, an indirect association between maternal smoking and adverse fetal and infant outcomes has been documented; women who smoke during pregnancy are also more likely to be exposed to or engage in other high-risk behaviors that can lead to poor birth outcomes (5). Maternal morbidity, placental problems in particular, has also been shown to be elevated in women who smoke during pregnancy (6). Because smoking during pregnancy is considered to be one of the most modifiable risk factors associated with poor birth and maternal outcomes, numerous resources and strategies have been developed to aid in smoking cessation for women of childbearing age in general, and pregnant women in particular (7). A Healthy People 2020 goal is for the prenatal abstinence rate from smoking to improve by 10% by the year 2020, to 98.6% (8).

Information on maternal smoking during pregnancy was first collected on the U.S. Standard Certificate of Live Birth beginning in 1989, but the estimated smoking prevalence based on this source was shown to be underreported (9). Despite this limitation, these data contained information on smoking during pregnancy for the largest reporting area and allowed for assessing differences in smoking prevalence among smaller subgroups. These data also documented a consistent decline in smoking during pregnancy in the 1990s (10). Based on

recommendations to improve the quality of reporting of smoking on the birth certificate (9,11), and to identify the extent to which women change their smoking behavior during pregnancy (12,13), this item was revised with the 2003 revision of the U.S. Standard Certificate of Live Birth. The revised item collects information on smoking during the 3 months before pregnancy as well as in each trimester.

This report presents 2003 revision-based birth certificate data on rates of smoking before and during pregnancy by trimester of pregnancy for a 46-state and District of Columbia (D.C.) reporting area, representing 95% of all 2014 U.S. births. Smoking cessation rates before and during pregnancy are also presented. Variations in smoking prevalence and cessation are examined by maternal age; race and ethnicity; marital status; payment source at delivery (private insurance, Medicaid, and self-pay); receipt of benefits from the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); prenatal care initiation (by trimester in which prenatal care began and no prenatal care); and state. Trends in smoking prevalence by area are compared using the items from the 1989 standard birth certificate and the 2003 revised certificate as states adopted the revision. This analysis was limited to the 31 states that had a full year of data for the last year before revision using the item from the 1989 certificate, allowing data to be compared with the smoking prevalence derived from the first year of using the 2003 item.

## Methods

Data used in this analysis are from the 2014 birth certificate and are based on 46 states and D.C., which comprise most of the 2014 revised reporting area (i.e., vital records jurisdictions, excluding Hawaii, that implemented the revised 2003 U.S. Standard Certificate of Live Birth by January 1, 2014). Three states had not used the revised standard birth certificate—Connecticut, Rhode Island, and New Jersey. Data for Hawaii are excluded from this analysis as recommended by the National Center for Health Statistics (NCHS) because of concerns with data quality. The 46 states and D.C. represent 95% of all 2014 births in the United States but may not be generalizable to the entire United States in 2014. Relevant to this report are the very slight but statistically significant differences between the reporting area and the United States in distributions of maternal age, race and Hispanic origin, and marital status (14).

The 2003 revision of the U.S. Standard Certificate of Live Birth revised the item on tobacco use from the 1989 U.S. Standard Certificate of Live Birth revision. On the 1989 standard certificate, this item was included on the birth certificate under “Other risk factors for this pregnancy” and asked whether the mother used tobacco during pregnancy (yes/no) and the average number of cigarettes smoked per day. The 2003 standard certificate item is separate as “Cigarette smoking before and during pregnancy” and asks for the average number of cigarettes or packs smoked per day during four periods: the 3 months before pregnancy, and in each of the three trimesters of pregnancy. The instructions for this item are to enter the number of cigarettes or packs for each period, with a “0” entry for none. This information

is recommended to be asked of the mother on the mother’s worksheet in the hospital around the time of delivery. The data are edited by the NCHS Division of Vital Statistics to convert the average number of packs to the number of cigarettes (1 pack equals 20 cigarettes), so that an average number of cigarettes for each period can be computed. Information on the use of e-cigarettes and smokeless tobacco products are not collected on the birth certificate.

The information on the average number of cigarettes smoked during each period is used to calculate overall prevalence rates, smoking intensity within each period (average number of cigarettes per day for smokers), and rates of smoking cessation before and during pregnancy:

- Smoking cessation before pregnancy is determined by comparing the entries for the women who reported smoking 3 months before pregnancy to see if they also reported smoking in any trimester of pregnancy. If not, the women were assumed to have quit smoking before pregnancy. The rate is calculated as follows: The number of women who smoked 3 months before pregnancy is the denominator, and the subset of these women who did not report smoking in any trimester is the numerator, multiplied by 100.
- Smoking cessation during pregnancy is similarly determined, by comparing the entries for the women who reported smoking in the first or second trimesters of pregnancy to see if they also reported smoking in the third trimester. The rate is calculated as follows: The number of women who smoked in the first or second trimester is the denominator, and the subset of these women who did not report smoking in the third trimester is the numerator, multiplied by 100.
- A very small percentage of women who did not report smoking 3 months before pregnancy reported smoking at some point during pregnancy (0.2%).

The terms “mothers” and “births,” and “quitting smoking” and “smoking cessation,” are used interchangeably in this report. Records for states in the reporting area with missing information on smoking before pregnancy numbered 63,200 (of 3,819,133 births), or 1.7%. Similarly, the number of records with missing information on smoking during pregnancy numbered 63,260, also 1.7%. The overlap between the missing records before and during pregnancy was 96%.

Smoking prevalence and cessation rates were examined by the following covariates: maternal age, marital status, race and Hispanic origin, education, source of payment for the delivery (private insurance, Medicaid, and self-pay, which is synonymous with uninsured), receipt of WIC benefits, and trimester in which prenatal care was initiated or no prenatal care.

Race and Hispanic origin are reported independently on the birth certificate. This report presents data for “single-race, non-Hispanic white,” “single-race, non-Hispanic black,” “single-race, non-Hispanic Asian,” “single-race, non-Hispanic American Indian or Alaska Native” and Hispanic births.

Rates (percentages) in this report are computed by subtracting the “not stated” values from the total to obtain the denominators. All rates of smoking prevalence and cessation are per 100 women who gave birth. Estimates are computed only

**Table. Average number of cigarettes smoked per day 3 months before and during each trimester of pregnancy, by quitting status and race and Hispanic origin of mother: Revised reporting area, 2014**

Smoking and quitting status, and trimester of pregnancy	Race and Hispanic origin of mother					
	Non-Hispanic					
	All races <sup>1</sup>	White	Black	Asian	American Indian or Alaska Native	Hispanic
	Average number of cigarettes per day (smokers only)					
Smoked 3 months before pregnancy . . . . .	13	14	10	9	10	10
Quit before pregnancy <sup>2</sup> . . . . .	10	11	9	8	8	8
Did not quit before pregnancy . . . . .	14	15	11	10	11	11
Smoked during first trimester . . . . .	11	11	8	7	9	8
Quit during pregnancy <sup>3</sup> . . . . .	8	9	7	7	7	7
Did not quit during pregnancy . . . . .	11	12	9	8	9	9
Smoked during second trimester . . . . .	9	10	7	6	8	8
Quit during pregnancy <sup>3</sup> . . . . .	6	7	5	5	6	6
Did not quit during pregnancy . . . . .	10	10	8	7	8	8
Smoked during third trimester . . . . .	9	9	7	6	7	7

<sup>1</sup>Include other races not shown and origin not stated.

<sup>2</sup>Includes women who reported smoking in the 3 months before pregnancy and did not report smoking during pregnancy; see Methods.

<sup>3</sup>Includes women who reported smoking in either the first or second trimester and did not report smoking in the third trimester.

NOTE: The revised reporting area excludes Connecticut, Hawaii, New Jersey, and Rhode Island and represents 95% of all U.S. births in 2014.

when the number of women in the numerator is 20 or more. All differences among groups are tested for statistical significance, and only those with significant differences are discussed. See the “User Guide to the 2010 Natality Public Use File” (15) for details on the significance testing and examples of computations.

## Results

### Smoking in the 3 months before pregnancy

- About 1 in 10 women who gave birth in 2014 (10.9%) smoked in the 3 months before pregnancy (Table 1).
- Women in their early 20s (aged 20–24) had the highest smoking rate before pregnancy (16.8%) of all age groups, followed by teenagers (13.5%), while women aged 35 and over had the lowest prepregnancy smoking rate (5.8%) (Table 1).
- Non-Hispanic American Indian or Alaska Native (AIAN) women had the highest smoking rate before pregnancy (22.4%) of the racial and ethnic groups, followed by non-Hispanic white women (15.5%) (Figure 1). Hispanic women (3.1%) and non-Hispanic Asian women (1.2%) had the lowest prepregnancy smoking rates.
- Unmarried women had a prepregnancy smoking rate (18.4%) that was more than three times that of married women (5.8%).
- Women who smoked prior to pregnancy averaged 13 cigarettes per day (Text table). On average, non-Hispanic white women who smoked before pregnancy were the heaviest smokers at 14 cigarettes per day, and non-Hispanic Asian women smoked the fewest at 9 cigarettes per day.

- Women with characteristics associated with lower socioeconomic status were more likely to smoke before pregnancy, including those with less than a high school education (16.0%, compared with 2.0% for women with a bachelor’s degree or higher), those with Medicaid insurance (17.0%, compared with 5.7% for women with private insurance), and those receiving WIC benefits (15.2%, compared with 7.3% of WIC nonrecipients).
- Women who initiated prenatal care in the third trimester (late), or had no prenatal care, had the highest smoking rate 3 months before pregnancy (16.5%), while women who initiated care in the first trimester had the lowest smoking rate (9.7%).
- Prepregnancy smoking rates varied by state—about one-third of women smoked before pregnancy in West Virginia (32.9%), the state with the highest prepregnancy smoking rate, compared with 2.6% in California, which had the lowest rate (Table 2). Other states with high prepregnancy smoking rates were Kentucky (24.2%), Missouri (22.5%), South Dakota (21.7%), and Ohio (21.4%).

### Smoking cessation in the 3 months before pregnancy

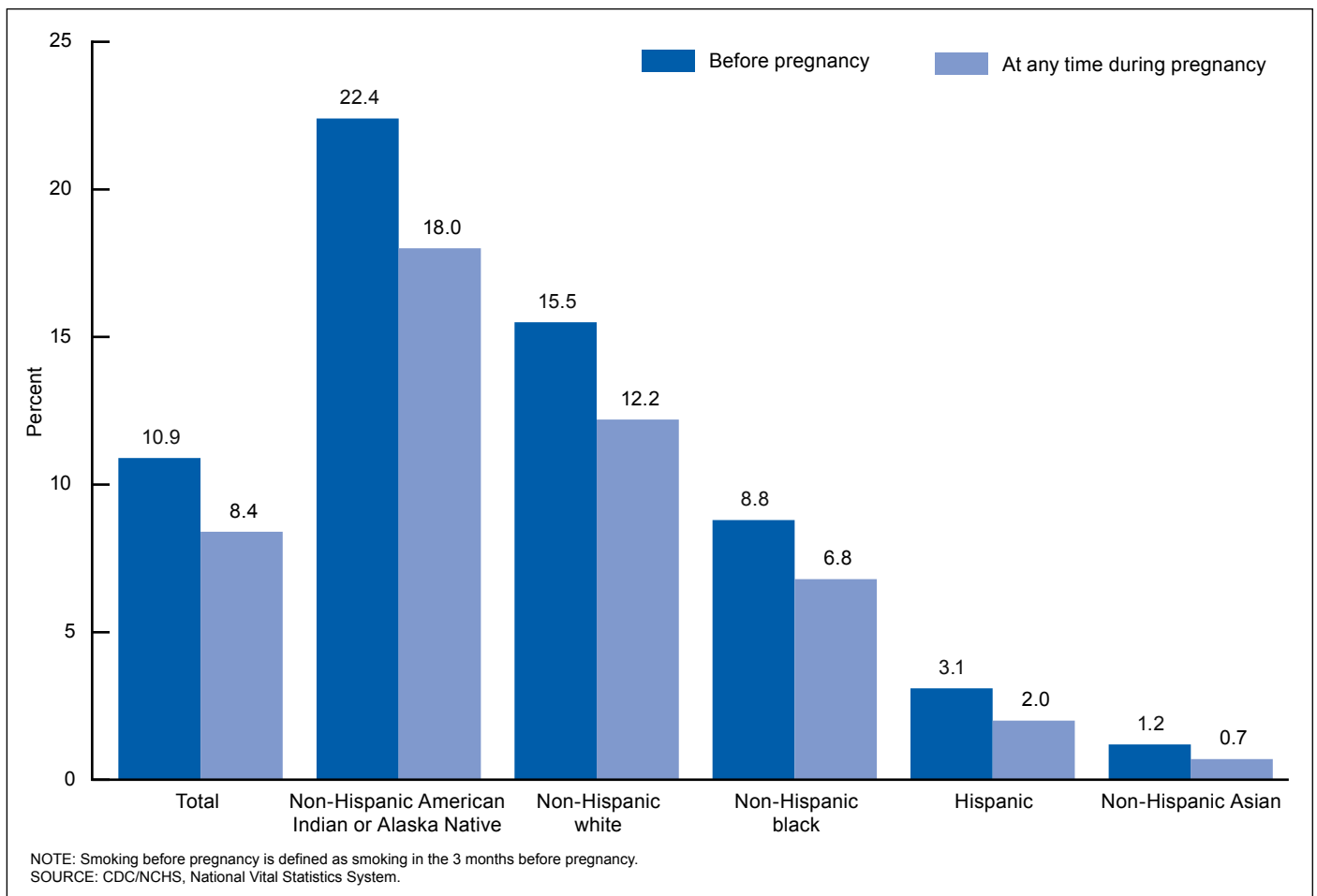
- About one-quarter of women who smoked in the 3 months prior to pregnancy (24.2%) quit before pregnancy (Table 1). Women who quit smoking had smoked fewer cigarettes before pregnancy (10 cigarettes, or one-half pack per day) than women who did not quit (14 cigarettes per day) (Text table).
- In general, smoking cessation rates were higher among groups with lower prepregnancy smoking rates. Groups

with the highest prepregnancy cessation rates were women with a bachelor's degree or higher (53.7%), non-Hispanic Asian women (45.0%), Hispanic women (39.4%), and women with private insurance (38.3%).

- Although teenagers had the second-highest prepregnancy smoking rate (13.5%) by maternal age group after women aged 20–24 (16.8%), they had the highest smoking cessation rate of all age groups at 26.4%.
- Groups with the lowest quitting rates before pregnancy were women with less than a high school education (14.1%) and those who initiated prenatal care in the third trimester or had no prenatal care (13.7%).
- For all race and ethnicity groups, women who quit smoking before pregnancy were lighter smokers initially than women who did not quit (Text table). Non-Hispanic white smokers who quit before pregnancy averaged 4 fewer cigarettes per day (11 cigarettes) than their counterparts who did not quit (15 cigarettes).
- Jurisdictions with the highest smoking cessation rates before pregnancy were: D.C. (39.4%), Maryland (38.0%), New Mexico (37.5%), and Texas (35.8%) (Table 2).

## Smoking during pregnancy

- About 8.4% of mothers smoked at any time during pregnancy (Table 3). The highest smoking rate was in the first trimester at 8.2%, compared with 7.0% in the second trimester and 6.6% in the third trimester.
- Groups with the highest prepregnancy smoking rates also had the highest smoking rates at any time during pregnancy, including women aged 20–24 (13.0%), unmarried women (14.7%), and non-Hispanic AIAN women (18.0%).
- As with prepregnancy smoking, smoking rates were higher for women with less than a high school education (14.1%), with Medicaid insurance (14.0%), and receiving WIC benefits (12.6%) (Figure 2).
- For women who initiated prenatal care in the third trimester or had no care, the smoking rate during pregnancy (14.6%) was twice that of women with early prenatal care (7.1%).
- All groups had higher smoking rates in the first trimester than in the second, and most had further, although smaller, declines between the second and third trimesters.
- On average, women who smoked during the first trimester of pregnancy smoked a little more than one-half pack per



**Figure 1. Prevalence of maternal smoking before and at any time during pregnancy, by race and Hispanic origin of mother: 46 states and District of Columbia, 2014**

day (11 cigarettes), ranging from a high of 11 cigarettes for non-Hispanic white smokers to 7 for non-Hispanic Asian smokers (Text table). Women who smoked during the second and third trimesters of pregnancy smoked an average of 9 cigarettes per day, ranging from 9 or 10 cigarettes for non-Hispanic white women to 6 for non-Hispanic Asian women.

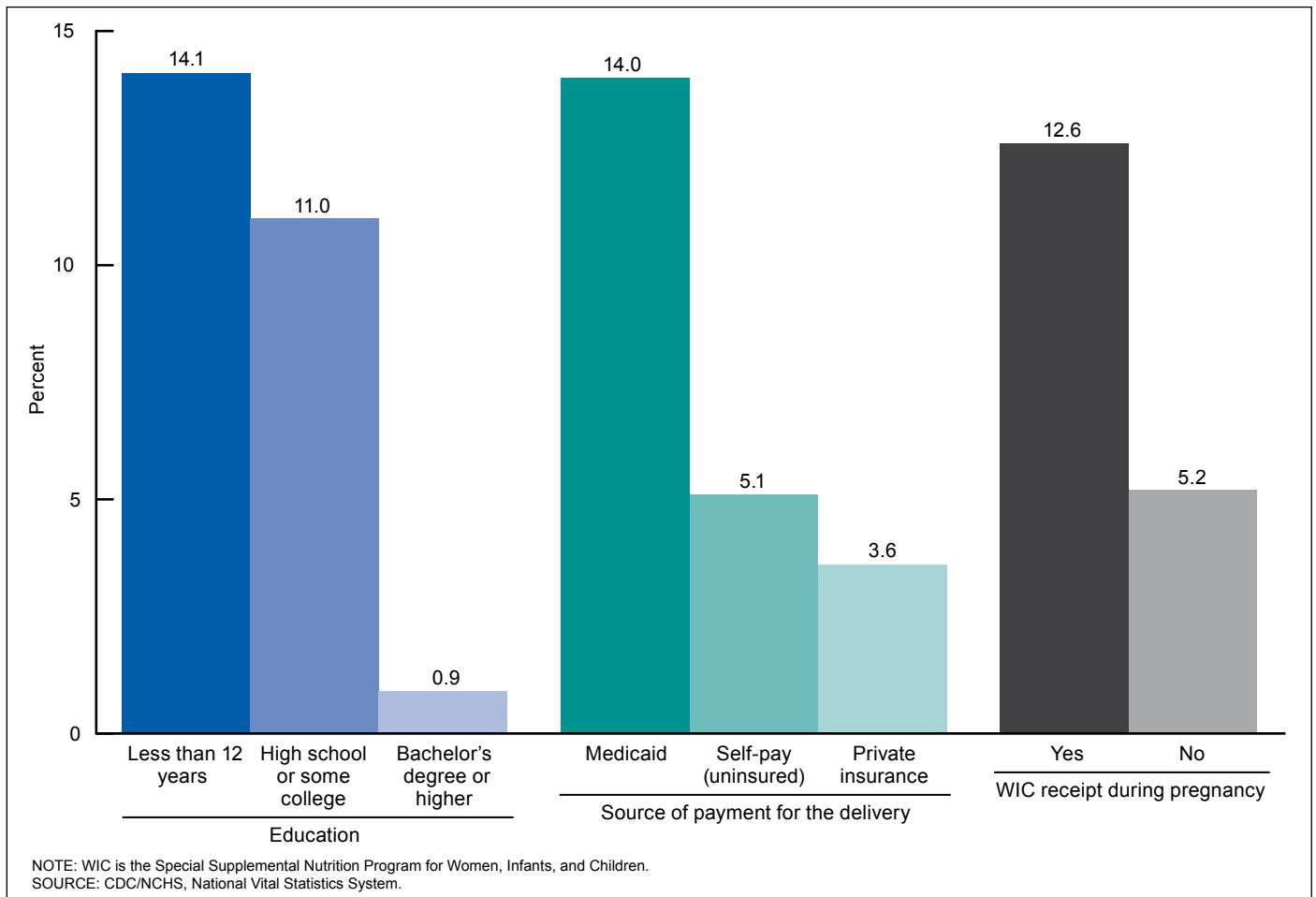
- Geographic variation was seen in smoking during pregnancy (Table 4, Figure 3). States in the Midwest had among the highest rates, with nearly all having rates above 12.0%—about 50% higher than the reporting area average of 8.4%. Western and Southwestern states had among the lowest rates, including California, which had the lowest rate (1.8%). Other areas, such as the Northeast, had marked variation among states within the region. For example, Vermont (16.8%) and Maine (16.5%) had smoking rates about twice the reporting area average, while the nearby states of Massachusetts (6.2%) and New York (5.4%) had rates below the reporting area average.

### Smoking cessation during pregnancy

- About one in five women (20.6%) who smoked in the first or second trimesters had quit by the third trimester (Table 3).

The majority of women who quit smoking during pregnancy (72.0%) did so between the first and second trimesters.

- Groups with the highest pre-pregnancy smoking cessation rates also had the highest rates of quitting during pregnancy. These were non-Hispanic Asian (36.6%) and Hispanic (32.3%) women, women with a bachelor's degree or higher (36.4%), and women with private insurance (28.4%).
- Similar to the findings for smoking cessation before pregnancy, teenagers had the second-highest smoking rate during pregnancy by maternal age group (10.1%) after women aged 20–24 (13.0%), but the highest rate of smoking cessation during pregnancy (27.2%).
- Women who quit smoking during pregnancy smoked fewer cigarettes before quitting than their counterparts who did not quit. Women who smoked in the first trimester but then quit averaged 8 cigarettes per day, 3 fewer than women who did not quit (11 cigarettes). Similarly, women who smoked in the second trimester but then quit smoked fewer cigarettes per day (6 cigarettes) than women who did not quit (10 cigarettes).



**Figure 2. Prevalence of maternal smoking at any time during pregnancy, by educational attainment, source of payment for the delivery, and WIC receipt: 46 states and District of Columbia, 2014**

## Comparing 1989 and 2003 birth certificate items on smoking prevalence

To address how the change in the smoking item may have affected prevalence estimates, [Table 5](#) shows smoking status at any time during pregnancy for 31 states during 2002–2014 with prevalence derived from the item on the 1989 U.S. Standard Certificate of Live Birth and from the revised item on the 2003 standard birth certificate as the states adopted the revision. The states in this table were limited to those that had not only adopted the 2003 standard birth certificate revision but had data from the 1989 standard birth certificate for the full year before revising.

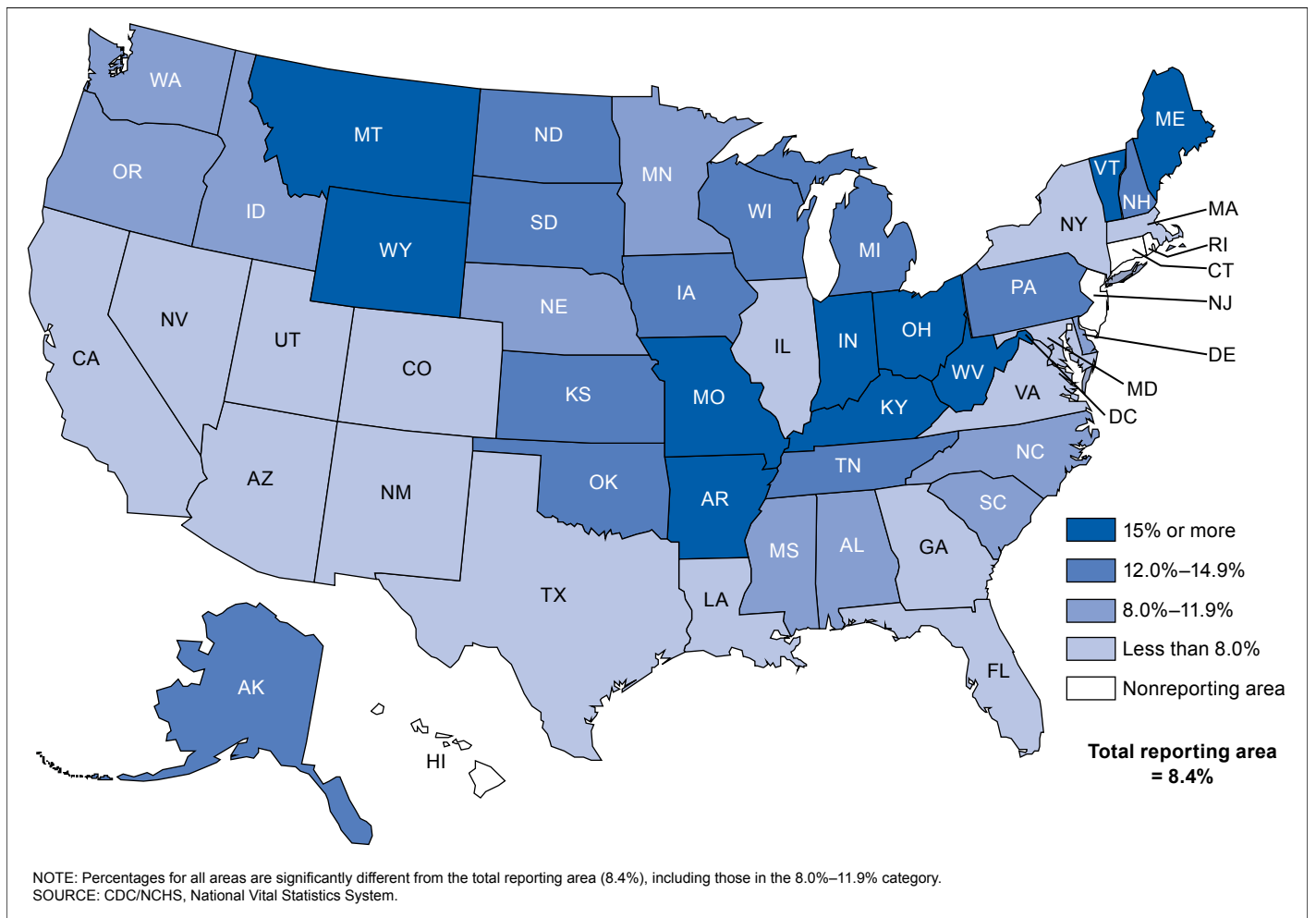
- The majority of the 31 states had significant increases in smoking prevalence during the first year of using the revised item (21 states). In subsequent years, most of these states had declining prevalence.
- A few states had declines the first year after revising the item, in particular Utah and Washington, which suggests continuation of downward trends. Although Delaware had a decline in smoking prevalence the first year after revising, smoking prevalence increased the second year after adopting the 2003 revision.
- Seven states did not have significant differences in their

smoking prevalence the last year of using the 1989 item compared with the first year of using the 2003 revised item.

## Discussion

### Smoking before and during pregnancy

This report presents data from the revised 2003 standard birth certificate item on maternal smoking 3 months before and during each trimester of pregnancy, as well as quitting rates before and during pregnancy. Similar to smoking prevalence within the general population (16), considerable variation was seen in prepregnancy smoking rates and smoking during pregnancy by maternal characteristics. Women of lower socioeconomic status were more likely to smoke before and during pregnancy, as were women who initiated late prenatal care or had no care. Younger women, particularly those in their early 20s, and unmarried women were more likely to smoke than their older and married counterparts. AIAN women had the highest smoking prevalence before and during pregnancy followed by non-Hispanic white women, while Hispanic and non-Hispanic Asian women were least likely to smoke during pregnancy. Many of these demographic factors are interrelated;



**Figure 3. Prevalence of maternal smoking at any time during pregnancy: 46 states and District of Columbia, 2014**

for example, the majority of women who give birth in their early 20s are unmarried.

Differences in smoking prevalence before and during pregnancy by geographic area are consistent with smoking prevalence for the total U.S. population, as states in the Midwest had among the highest rates and states in the West among the lowest (16). Areas with among the lowest prepregnancy smoking rates also had among the highest quitting rates before and during pregnancy. Because of marked racial and ethnic variations in smoking 3 months before as well as during pregnancy, differences in racial and ethnic distributions may be a contributing factor in state variations. In addition, tobacco control programs in general, and those specifically targeting pregnant women, vary by state (17,18) and may contribute to variations in smoking behavior among areas.

## Smoking cessation and intensity

The 2003 revised smoking item is able to capture changes in women's smoking behavior around the time of pregnancy by asking for the average number of cigarettes smoked per day in the 3 months before pregnancy and in each trimester. The item from the 1989 standard birth certificate was not able to provide this because it collected information only on the number of cigarettes smoked per day at any time during pregnancy. Data from the 2003 revision show that about one-quarter of women who smoked before pregnancy did not report smoking during pregnancy, and for those women who continued to smoke, they smoked fewer cigarettes as the pregnancy progressed. Because no level of tobacco use during pregnancy is safe, the Healthy People 2020 goal is based on total smoking abstinence (8). About one in five women who smoked in early to midpregnancy quit by the third trimester, with most of the cessation happening between the first and second trimester.

## Quality of smoking item on birth certificate

Three recent studies have compared cigarette smoking prevalence as collected on the 2003 standard birth certificate to other data sources. Estimates from the Pregnancy Risk Assessment Monitoring System (PRAMS) of smoking prepregnancy and during pregnancy were compared with birth certificate estimates for an eight-state reporting area (PRAMS states that had implemented the revised 2003 standard birth certificate and had response rates for the smoking item of 65% or more). PRAMS data are from a sample of women who recently gave birth and responded to a self-administered questionnaire. Comparable periods of smoking between PRAMS and the 2003 standard birth certificate are the 3 months before pregnancy and during the third trimester, because PRAMS does not collect information on smoking in the first and second trimesters. In a linked comparison with birth certificate entries, PRAMS data captured more women who smoked during the 3 months before pregnancy and during the third trimester for all sociodemographic subgroups (19). For the eight-state area, the study found a prepregnancy smoking prevalence of 24.4% from PRAMS compared with 17.3% from the revised birth certificate. Similarly, PRAMS identified 14.0% of women who smoked during the third trimester compared

with 11.3% from the revised birth certificate. Women who had private insurance, did not receive WIC benefits, and were light smokers (fewer than five cigarettes per day) were more likely to report information on the PRAMS questionnaire than on the birth certificate. However, both data sources identified similar predictors of smoking before and during pregnancy.

A study in New York City and Vermont compared 2003 revised birth certificate-based smoking data to information from maternal worksheets in hospitals as well as prenatal and medical records (20). This study found almost perfect agreement between the birth certificate entries and the hospitals' maternal worksheets, which are the source of the birth certificate entries. However, maternal smoking before and during pregnancy was about 25% lower on the birth certificate compared with medical records. In addition, this underreporting was differential—more pronounced for women with more education, non-WIC recipients, and for those who had fewer children (lower parity).

Another study in Washington compared entries for the smoking item on the birth certificate to cotinine levels in newborn-screening dried blood spots (21). This study found that for 100 nonsmokers identified on the birth certificate, 2 of the newborns had cotinine levels that were consistent with maternal smoking, for a sensitivity (true positive rate) of 85%. This study also found 89% sensitivity for 100 self-identified smokers on the revised birth certificate who continued to smoke through the third trimester. This study concluded that the birth certificate may be a reliable source for assessing prenatal smoking and cessation (defined as during pregnancy) in epidemiologic studies with enough power to overcome measurement errors.

The comparison in this report of smoking prevalence before and after revising the smoking item for the 31 states in [Table 5](#) shows that about two-thirds of the states had significant increases in the year after adopting the revision. These increases occurred against the backdrop of generally declining rates (22) and suggest that the 2003 item may be capturing more smokers than the 1989 item for some states.

Despite what may be improved ascertainment of smoking levels in 2003 revision-based data, the above-mentioned recent comparisons with PRAMS estimates in eight states and with medical records in New York City and Vermont (20,21) suggest that underreporting may be a continuing issue with birth certificate data, especially for women with more education. These women may perceive more of a stigma to admitting to smoking before and during pregnancy than their less-educated counterparts (23). Efforts are ongoing to improve birth certificate data quality by providing Web-based training to educate hospital staff on the importance of birth certificate data and best practices in collecting high-quality data. Important strengths of birth certificate data are that they provide maternal smoking information for the largest reporting area (soon to be national in scope) and are able to capture more of the changes in women's smoking behavior around pregnancy not possible with other data sources. Thus, improving the quality of these data is essential to accurately monitoring national maternal smoking prevalence and cessation patterns.

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**Table 1. Prevalence of maternal smoking 3 months before pregnancy and of quitting before pregnancy, by maternal characteristics: 46 reporting states and District of Columbia, 2014**

Maternal characteristics	Total number	Smoked 3 months before pregnancy	Quit before pregnancy <sup>1</sup>	Not stated smoked before pregnancy
		Rate (percent)		
Total reporting area <sup>2</sup> .....	3,819,113	10.9	24.2	63,200
Age (years)				
Under 20 .....	245,189	13.5	26.4	3,797
20–24 .....	855,674	16.8	23.8	13,777
25–29 .....	1,101,265	11.6	23.4	17,409
30–34 .....	1,026,153	7.5	25.4	17,474
35 and over .....	590,832	5.8	23.8	10,743
Race and Hispanic origin				
Non-Hispanic:				
White .....	2,031,002	15.5	22.6	29,723
Black .....	544,628	8.8	25.4	13,282
Asian .....	226,450	1.2	45.0	3,087
American Indian or Alaska Native .....	32,513	22.4	21.8	630
Hispanic .....	873,320	3.1	39.4	9,508
Marital status				
Unmarried .....	1,542,943	18.4	21.3	27,260
Married .....	2,276,170	5.8	30.5	35,940
Education				
Less than high school .....	570,315	16.0	14.1	8,393
High school or some college .....	2,063,661	14.5	25.2	30,792
Bachelor's degree or higher .....	1,135,413	2.0	53.7	15,737
WIC <sup>3</sup> receipt during pregnancy				
Yes .....	1,625,888	15.2	20.3	15,238
No .....	2,093,908	7.3	30.8	14,808
Prenatal care initiation				
1st trimester .....	2,810,911	9.7	27.6	26,023
2nd trimester .....	636,897	14.5	18.8	6,994
3rd trimester or no care .....	219,261	16.5	13.7	3,524
Source of payment for the delivery				
Private insurance .....	1,804,801	5.7	38.3	27,558
Medicaid .....	1,658,157	17.0	18.9	24,025
Self-pay (uninsured) .....	154,848	6.0	17.3	2,628

<sup>1</sup>Includes women who reported smoking in the 3 months before pregnancy and did not report smoking during pregnancy; see "Methods."

<sup>2</sup>Excludes Connecticut, Hawaii, New Jersey, and Rhode Island and represents 95% of all U.S. births in 2014.

<sup>3</sup>Special Supplemental Nutrition Program for Women, Infants, and Children.

**Table 2. Prevalence of maternal smoking 3 months before pregnancy and of quitting before pregnancy, by state: 46 reporting states and District of Columbia, 2014**

Area	Total number	Smoked 3 months before pregnancy	Quit before pregnancy <sup>1</sup>	Not stated smoked before pregnancy
		Rate (percent)		
Total reporting area <sup>2</sup>	3,819,113	10.9	24.2	63,200
Alabama	59,422	12.5	15.7	368
Alaska	11,392	16.0	19.2	374
Arkansas	38,511	18.4	20.3	361
Arizona	86,887	7.6	32.1	91
California	502,879	2.6	31.6	2,781
Colorado	65,830	8.3	19.6	361
Delaware	10,972	12.5	17.1	35
District of Columbia	9,509	4.1	39.4	306
Florida	219,991	7.6	16.5	1,951
Georgia	130,946	8.4	21.9	9,232
Idaho	22,876	14.5	27.8	44
Illinois	158,556	8.0	16.9	613
Indiana	84,080	18.5	19.6	49
Iowa	39,687	19.8	27.0	22
Kansas	39,223	14.1	15.8	65
Kentucky	56,170	24.2	15.4	153
Louisiana	64,497	9.1	19.1	1,223
Maine	12,698	18.5	11.4	27
Maryland	73,921	10.9	38.0	659
Massachusetts	71,908	9.5	35.5	918
Michigan	114,375	16.3	18.6	934
Minnesota	69,904	12.1	21.5	724
Mississippi	38,736	12.8	13.9	25
Missouri	75,360	22.5	26.6	567
Montana	12,432	18.8	18.2	135
Nebraska	26,794	15.7	28.4	30
Nevada	35,861	5.8	13.0	307
New Hampshire	12,302	15.4	14.3	242
New Mexico	26,052	10.7	37.5	393
New York	238,773	7.5	28.7	3,166
North Carolina	120,975	13.3	28.5	157
North Dakota	11,359	19.3	27.1	65
Ohio	139,467	21.4	25.2	477
Oklahoma	53,339	15.9	19.0	327
Oregon	45,556	12.3	18.6	195
Pennsylvania	142,268	18.3	26.3	3,304
South Carolina	57,627	15.5	29.2	98
South Dakota	12,283	21.7	32.3	78
Tennessee	81,602	19.5	24.7	504
Texas	399,766	5.9	35.8	129
Utah	51,154	5.0	25.4	164
Vermont	6,130	19.7	16.0	19
Virginia	103,300	10.4	25.9	29,648
Washington	88,585	9.5	16.7	775
West Virginia	20,301	32.9	19.1	454
Wisconsin	67,161	17.2	24.8	454
Wyoming	7,696	22.7	26.7	196

<sup>1</sup>Includes women who reported smoking in the 3 months before pregnancy and did not report smoking during pregnancy; see Methods.<sup>2</sup>Excludes Connecticut, Hawaii, New Jersey, and Rhode Island and represents 95% of all U.S. births in 2014.

**Table 3. Prevalence of maternal smoking at any time during pregnancy and during each trimester of pregnancy, and of quitting during pregnancy, by maternal characteristics: 46 reporting states and District of Columbia, 2014**

Maternal characteristics	Total number	Smoking prevalence					Quit during pregnancy <sup>1</sup>	Not stated smoked during pregnancy
		At any time during pregnancy	First trimester	Second trimester	Third trimester			
		Rate (percent)						
Total reporting area <sup>2</sup> . . . . .	3,819,113	8.4	8.2	7.0	6.6	20.6	63,260	
Age (years)								
Under 20 . . . . .	245,189	10.1	9.8	7.9	7.4	27.2	3,751	
20–24 . . . . .	855,674	13.0	12.7	10.7	10.1	21.9	13,726	
25–29 . . . . .	1,101,265	9.0	8.8	7.6	7.3	19.3	17,433	
30–34 . . . . .	1,026,153	5.7	5.6	4.8	4.6	18.8	17,581	
35 and over . . . . .	590,832	4.5	4.4	3.8	3.6	18.6	10,769	
Marital status								
Unmarried . . . . .	1,542,943	14.7	14.4	12.3	11.7	20.5	27,201	
Married . . . . .	2,276,170	4.1	4.0	3.4	3.2	21.1	36,059	
Race and Hispanic origin								
Non-Hispanic: . . . . .								
White . . . . .	2,031,002	12.2	11.9	10.3	9.8	18.9	29,743	
Black . . . . .	544,628	6.8	6.5	5.4	5.1	24.6	13,417	
Asian . . . . .	226,450	0.7	0.7	0.5	0.4	36.6	3,094	
American Indian or Alaska Native . . . . .	32,513	18.0	17.5	14.7	14.0	22.2	592	
Hispanic . . . . .	873,320	2.0	1.9	1.4	1.3	32.3	9,462	
Education								
Less than high school . . . . .	570,315	14.1	13.7	12.4	12.0	14.7	8,332	
High school or some college . . . . .	2,063,661	11.0	10.7	9.1	8.6	22.1	30,780	
Bachelor's degree or higher . . . . .	1,135,413	0.9	0.9	0.6	0.6	36.4	15,844	
WIC <sup>3</sup> receipt during pregnancy								
Yes . . . . .	1,625,888	12.6	12.3	10.6	10.1	19.3	15,154	
No . . . . .	2,093,908	5.2	5.1	4.2	4.0	23.4	14,918	
Prenatal care initiation								
1st trimester . . . . .	2,810,911	7.1	6.9	5.8	5.5	21.9	25,987	
2nd trimester . . . . .	636,897	12.0	11.7	10.1	9.6	19.7	6,898	
3rd trimester or no care . . . . .	219,261	14.6	14.2	12.9	12.3	15.5	3,514	
Source of payment for the delivery								
Private insurance . . . . .	1,804,801	3.6	3.5	2.7	2.6	28.4	27,769	
Medicaid . . . . .	1,658,157	14.0	13.7	12.0	11.4	18.4	23,887	
Self-pay (uninsured) . . . . .	154,848	5.1	4.9	4.4	4.2	16.9	2,625	

<sup>1</sup>Includes women who reported smoking in either the first or second trimester and did not report smoking in the third trimester; see Methods.

<sup>2</sup>Excludes Connecticut, Hawaii, New Jersey, and Rhode Island and represents 95% of all U.S. births in 2014.

<sup>3</sup>Special Supplemental Nutrition Program for Women, Infants, and Children.

**Table 4. Prevalence of maternal smoking at any time during pregnancy and during each trimester of pregnancy, and of quitting during pregnancy, by state: 46 reporting states and District of Columbia, 2014**

Area	Total number	Smoking prevalence					Quit during pregnancy <sup>1</sup>	Not stated smoked during pregnancy
		Anytime during pregnancy	First trimester	Second trimester	Third trimester	Rate (percent)		
Total reporting area <sup>2</sup>	3,819,113	8.4	8.2	7.0	6.6	20.6	63,260	
Alabama	59,422	10.8	10.5	9.3	9.0	16.4	268	
Alaska	11,392	13.3	12.8	10.9	10.4	21.5	358	
Arkansas	38,511	15.0	14.6	12.7	12.1	19.4	350	
Arizona	86,887	5.4	5.2	4.3	4.1	23.3	89	
California	502,879	1.8	1.8	1.4	1.3	31.2	2,782	
Colorado	65,830	6.7	6.6	5.7	5.5	18.1	215	
Delaware	10,972	10.8	10.2	8.6	8.2	24.0	35	
District of Columbia	9,509	2.6	2.5	1.7	1.5	41.5	304	
Florida	219,991	6.4	6.4	5.6	5.4	16.2	1,880	
Georgia	130,946	6.5	6.3	5.6	5.4	14.3	9,675	
Idaho	22,876	10.7	10.4	8.6	8.2	22.7	44	
Illinois	158,556	6.8	6.6	5.9	5.7	15.1	587	
Indiana	84,080	15.1	14.8	13.0	12.5	17.1	37	
Iowa	39,687	14.6	14.2	12.1	11.5	21.6	24	
Kansas	39,223	12.0	11.7	10.3	9.9	17.2	60	
Kentucky	56,170	20.7	20.4	18.8	18.4	11.4	151	
Louisiana	64,497	7.4	7.3	6.6	6.3	14.8	1,220	
Maine	12,698	16.5	16.3	15.0	14.5	11.6	27	
Maryland	73,921	7.0	6.7	5.3	4.9	29.3	672	
Massachusetts	71,908	6.2	6.1	4.9	4.6	26.0	920	
Michigan	114,375	13.3	13.2	10.9	10.3	22.5	911	
Minnesota	69,904	9.8	9.5	8.1	7.8	20.2	620	
Mississippi	38,736	11.2	11.0	10.0	9.7	13.3	24	
Missouri	75,360	16.7	16.2	13.7	13.1	21.7	568	
Montana	12,432	15.9	15.3	13.4	12.8	19.4	117	
Nebraska	26,794	11.4	11.1	9.0	8.4	26.1	25	
Nevada	35,861	5.1	5.0	4.3	3.9	24.2	303	
New Hampshire	12,302	13.7	13.2	11.1	10.7	21.5	242	
New Mexico	26,052	6.8	6.7	5.1	4.8	30.2	371	
New York	238,773	5.4	5.3	4.4	4.2	22.5	3,166	
North Carolina	120,975	9.8	9.5	8.0	7.5	24.1	159	
North Dakota	11,359	14.5	14.0	11.3	10.7	26.1	62	
Ohio	139,467	16.3	15.9	13.6	13.0	19.9	454	
Oklahoma	53,339	13.1	12.8	11.3	10.9	16.8	333	
Oregon	45,556	10.3	10.1	8.7	8.2	20.9	170	
Pennsylvania	142,268	13.7	13.3	11.2	10.8	20.6	3,535	
South Carolina	57,627	11.2	10.8	8.8	8.4	25.3	102	
South Dakota	12,283	14.8	14.4	11.1	10.2	31.3	79	
Tennessee	81,602	14.9	14.5	12.6	11.8	21.2	453	
Texas	399,766	3.9	3.8	3.2	2.9	26.7	126	
Utah	51,154	3.9	3.7	3.1	3.0	22.8	174	
Vermont	6,130	16.8	16.5	14.6	13.8	17.7	19	
Virginia	103,300	7.8	7.6	6.4	6.0	22.0	29,820	
Washington	88,585	8.0	7.8	6.7	6.4	20.4	730	
West Virginia	20,301	27.1	26.3	23.5	22.8	14.1	357	
Wisconsin	67,161	13.1	12.8	10.7	10.0	23.9	438	
Wyoming	7,696	16.9	16.2	13.6	12.8	23.9	204	

<sup>1</sup>Includes women who reported smoking in either the first or second trimester and did not report smoking in the third trimester; see Methods.<sup>2</sup>Excludes Connecticut, Hawaii, New Jersey, and Rhode Island and represents 95% of all U.S. births in 2014.

**Table 5. Prevalence of maternal smoking at any time during pregnancy using the item on smoking from the 1989 and 2003 U.S. Standard Certificates of Live Birth: 31 states, 2002–2014**

State	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Percent change: 1989 compared with 2003 revision <sup>1</sup>
Alabama	12.1	11.1	11.2	11.9	12.0	12.1	12.0	11.2	11.3	10.5	10.7	<sup>2</sup> 10.8	<sup>3</sup> 10.8	0.0
Alaska	17.9	17.1	15.9	16.1	15.4	15.5	15.6	15.6	14.9	14.6	<sup>2</sup> 13.9	<sup>3</sup> 13.5	13.3	-2.9
Arizona	6.3	5.9	5.9	5.4	5.2	4.7	4.9	4.9	4.7	4.3	4.2	<sup>2</sup> 4.4	<sup>3</sup> 5.4	*22.7
Arkansas	18.0	16.8	16.7	16.2	15.9	15.7	15.2	14.8	13.8	13.9	13.7	<sup>2</sup> 13.0	<sup>3</sup> 15.0	*15.4
Colorado	8.5	8.3	8.3	7.8	<sup>2</sup> 7.3	<sup>3</sup> 8.8	8.6	8.4	8.1	7.4	7.4	7.1	6.7	*20.5
Delaware	12.9	11.6	11.9	<sup>2</sup> 11.5	<sup>3</sup> 9.5	13.0	12.5	13.5	12.5	11.8	12.6	11.4	10.8	*-17.4
Idaho	10.5	<sup>2</sup> 11.2	<sup>3</sup> 13.3	13.3	12.7	12.2	11.8	12.0	11.6	10.6	10.5	10.4	10.7	*18.8
Illinois	10.1	9.6	9.3	8.7	8.6	8.3	7.9	<sup>2</sup> 7.8	<sup>3</sup> 7.9	7.5	7.1	7.0	6.8	1.3
Indiana	19.1	18.5	18.0	18.0	<sup>2</sup> 17.3	<sup>3</sup> 18.8	18.6	18.3	17.2	16.6	16.6	15.7	15.1	*8.7
Iowa	16.5	15.8	16.2	16.2	<sup>2</sup> 15.9	<sup>3</sup> 18.9	18.2	17.0	16.4	15.7	15.2	15.3	14.6	*18.9
Kansas	12.6	12.5	<sup>2</sup> 12.9	<sup>3</sup> 16.9	16.7	16.3	16.3	15.3	14.9	14.5	13.7	12.5	12.0	*31.0
Kentucky	24.4	<sup>2</sup> 23.9	<sup>3</sup> 26.2	26.1	26.4	25.4	25.1	23.8	22.6	22.5	22.3	21.6	20.7	*9.6
Maryland	8.1	7.7	7.4	7.0	6.8	6.5	6.6	<sup>2</sup> 6.4	<sup>3</sup> 8.2	7.6	7.4	7.5	7.0	*28.1
Mississippi	12.1	11.5	12.0	12.2	12.7	12.5	12.5	12.3	11.9	11.2	<sup>2</sup> 10.6	<sup>3</sup> 11.2	11.2	*5.7
Missouri	18.2	18.1	18.2	18.6	18.7	18.1	17.9	<sup>2</sup> 17.2	<sup>3</sup> 18.9	18.3	18.1	17.7	16.7	*9.9
Montana	19.1	19.0	18.8	18.0	18.4	<sup>2</sup> 17.4	<sup>3</sup> 17.8	16.0	16.3	16.6	16.2	16.5	15.9	2.3
Nebraska	14.1	13.9	<sup>2</sup> 12.8	<sup>3</sup> 15.5	16.0	15.2	15.3	14.1	13.3	12.4	12.1	11.7	11.4	*21.1
New Mexico	10.1	9.7	8.3	8.3	7.6	<sup>2</sup> 7.2	<sup>3</sup> 7.2	7.6	6.9	6.3	7.0	7.2	6.8	0.0
North Dakota	17.4	16.0	16.0	<sup>2</sup> 17.1	<sup>3</sup> 19.4	19.1	19.2	17.8	17.5	16.7	16.6	15.5	14.5	*13.5
Ohio	17.9	17.3	17.5	<sup>2</sup> 17.4	<sup>3</sup> 19.1	19.6	19.4	19.2	18.2	17.7	17.3	16.9	16.3	*9.8
Oregon	12.4	12.0	12.5	12.3	12.0	<sup>2</sup> 11.4	<sup>3</sup> 11.7	11.2	11.3	10.6	10.5	10.1	10.3	2.6
Pennsylvania	<sup>2</sup> 15.6	<sup>3</sup> 17.5	17.9	17.9	17.4	17.4	16.9	16.5	15.9	15.3	14.8	14.2	13.7	*12.2
South Carolina	13.0	<sup>2</sup> 12.7	<sup>3</sup> 14.3	14.3	13.6	12.2	12.7	12.8	12.4	11.4	11.0	11.0	11.2	*12.6
South Dakota	19.3	18.8	18.6	<sup>2</sup> 17.8	<sup>3</sup> 19.3	19.5	18.5	18.5	17.2	16.9	16.5	15.1	14.8	*8.4
Tennessee	17.1	<sup>2</sup> 16.4	<sup>3</sup> 19.3	19.4	19.1	19.4	18.8	18.4	17.6	17.1	16.4	16.0	14.9	*17.7
Texas	6.3	5.9	<sup>2</sup> 5.6	<sup>3</sup> 6.1	6.0	5.6	5.4	5.1	4.9	4.6	4.4	4.3	3.9	*8.9
Utah	7.0	6.4	6.2	5.9	5.8	5.7	<sup>2</sup> 5.3	<sup>3</sup> 4.7	4.3	4.4	4.3	4.2	3.9	*-11.3
Washington	<sup>2</sup> 12.0	<sup>3</sup> 11.1	10.2	10.2	10.3	10.1	10.3	9.8	9.2	9.0	8.8	8.5	8.0	*-7.5
West Virginia	26.2	26.5	27.1	26.5	27.3	26.9	27.1	27.3	26.1	26.1	26.8	<sup>2</sup> 26.4	<sup>3</sup> 27.1	2.7
Wisconsin	14.9	14.0	14.0	13.5	14.9	15.8	14.2	14.2	<sup>2</sup> 13.3	<sup>3</sup> 14.4	13.9	13.6	13.1	*8.3
Wyoming	20.7	19.3	19.6	<sup>2</sup> 19.1	<sup>3</sup> 21.8	21.5	20.2	19.3	19.1	17.7	17.6	17.0	16.9	*14.1

\*  $p < 0.05$ .

<sup>1</sup>Smoking prevalence from the last year of using the item on smoking from the 1989 U.S. Standard Certificate of Live Birth compared with smoking prevalence from the first year of using the item from the 2003 U.S. Standard Certificate of Live Birth.

<sup>2</sup>Smoking prevalence collected from the last year of using the item from the 1989 standard birth certificate.

<sup>3</sup>Smoking prevalence collected from the first year of using the item from the 2003 standard birth certificate.

NOTE: States included in this table are those that revised to the 2003 standard birth certificate and had data on smoking from the 1989 standard certificate for the full year before revision.

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