

## Primary Cesarean Delivery Rates, by State: Results From the Revised Birth Certificate, 2006–2012

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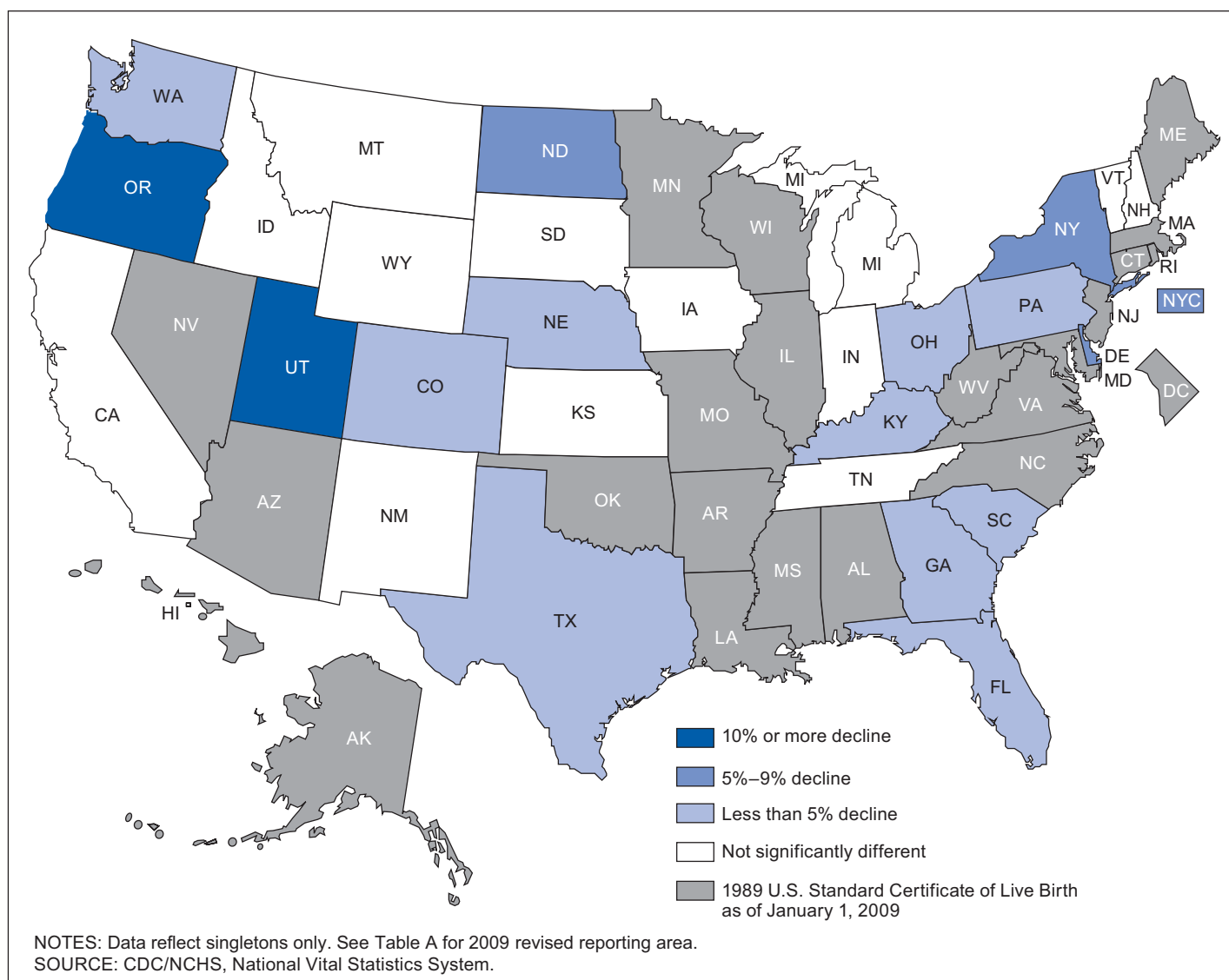


Figure 1. Percent change in primary cesarean delivery rates: 28 states and New York City (2009 revised reporting area), 2009 and 2012

## Abstract

**Objectives**—This report describes state-specific trends in primary cesarean delivery rates from 2006 through 2012 for reporting areas that implemented the 2003 U.S. Standard Certificate of Live Birth by January 1, 2006, and from 2009 through 2012 for reporting areas that implemented the 2003 revision by January 1, 2009. State-specific changes by gestational age are also explored.

**Methods**—Data for 2006–2012 are based on 100% of singleton births to residents of the reporting areas that implemented the 2003 birth certificate revision by January 1 of each year. Results are not generalizable to the entire United States—the reporting areas do not represent a random sample of U.S. births.

**Results**—The primary cesarean delivery rate for the 2006 reporting area (19 states) increased from 21.9% in 2006 to 22.4% in 2009, and then declined to 21.9% in 2012. For the 2009 reporting area (28 states and New York City), the primary cesarean rate declined from 22.1% to 21.5% during 2009–2012. Rates for 16 of 29 areas declined during 2009–2012; the remaining states were unchanged. By gestational age, state-specific primary cesarean delivery rates at 38 weeks declined for 18 of 29 areas from 2009 to 2012; few state-specific changes were observed at other gestational ages. The primary cesarean delivery rate for the 38 states, District of Columbia, and New York City that were using the revised certificate by January 1, 2012, was 21.5%. State-specific rates ranged from 12.5% (Utah) to 26.9% (Florida and Louisiana).

**Keyword:** gestational age

## Introduction

After 13 years of consecutive increases, the total U.S. cesarean delivery rate reached a high of 32.9% of all births in 2009, rising 60% from the most recent low of 20.7% in 1996 (1). The total cesarean delivery rate declined in 2010 to 32.8% and was stable for 2011 and 2012 (1,2). A recent report on the total cesarean delivery rate explored changes by gestational age for singleton births from 2009 through 2011 (3).

Cesarean delivery is abdominal surgery with short- and long-term risks and consequences, such as surgical complications, admission to neonatal intensive care, and higher costs, compared with vaginal delivery (4,5). Clinical guidelines aimed at reducing nonmedically indicated cesarean delivery and induction of labor under 39 completed weeks have recently been released by the American College of Obstetricians and Gynecologists (6,7). Efforts to reduce such births include initiatives at the state level to improve the quality of perinatal care, policy changes at the hospital level to disallow elective delivery prior to 39 weeks, and education of the public (8–14).

About 60% of cesarean deliveries are primary cesareans (a first cesarean delivery regardless of parity) (15). After a primary cesarean, a woman has only about a 10% chance of a vaginal birth for subsequent deliveries (15). Accordingly, efforts to reduce the overall cesarean delivery rate often focus on primary cesareans (16).

This report presents state-specific trends on primary cesarean delivery for states that had implemented the 2003 U.S. Standard

Certificate of Live Birth, with particular focus on changes from 2009 to 2012. State-specific changes in primary cesarean delivery by gestational age are also explored.

## Methods

Information on primary cesarean delivery is reported on both the 2003 U.S. Standard Certificate of Live Birth (revised) and the 1989 U.S. Standard Certificate of Live Birth (unrevised). However, the format and wording of the “method of delivery” item on the revised standard certificate differs from that of the unrevised standard certificate; see [Technical Notes](#). As a result, data on primary cesarean delivery are not directly comparable between revisions. Only data based on the 2003 standard certificate are presented in this report (data on primary cesarean delivery based on the unrevised certificate are no longer available from the National Center for Health Statistics).

Data for 2006 and 2009 are based on 100% of births to residents of the reporting areas that implemented the 2003 U.S. Standard Certificate of Live Birth by January 1, 2006, and for 2009 and 2012 for reporting areas that implemented by January 1, 2009 (data in the background [Table](#) on page 10 are based on 100% of births to residents of the reporting areas that implemented the 2003 revision by January 1 of each year during 2006–2012). Data for 2012 are based on 100% of births to residents of the 38 states, the District of Columbia, and New York City that implemented the 2003 revision as of January 1, 2012. Adoption of the 2003 revision by reporting areas has been staggered, that is, states implemented the 2003 revision in different years. [Table A](#) shows the revised reporting areas for 2006, 2009, and 2012 (New York City and the state of New York are separate reporting areas and shown separately because they implemented the 2003 revision in different years). Counts for revised reporting areas include New York City and the District of Columbia. For more detail on the staggered implementation of the 2003 revision, see [Table C](#) in *User Guide to the 2012 Natality Public Use File* (17).

Because the revised reporting area for each year is not a random sample of births, the results presented in this report are not generalizable to the United States as a whole. Of note, the race and Hispanic origin distributions of births for the revised reporting areas, especially for each year from 2006 through 2011, are substantively different from those for the entire United States. In particular, Hispanic groups are overrepresented in the revised reporting area, whereas non-Hispanic white and non-Hispanic black are underrepresented. Further, the Hispanic population composition in the revised reporting area differs from that of the United States, with relatively more births to Mexican and Cuban women and fewer births to Puerto Rican and Central and South American women; see [Table D](#) in the user guide (17). Differences between the 2012 revised reporting area (38 states and the District of Columbia) and the United States in the distributions of births by maternal age, marital status, and infant characteristics, while generally statistically significant, are smaller.

Trend analysis of data on primary cesarean delivery is compromised by the changing composition of the revised reporting area. Accordingly, trend analysis for this report is accomplished by holding the 2006 and 2009 revised reporting areas constant across years. That is, trends based on the 19-state 2006 revised reporting area are shown

**Table A. Implementation of 2003 revision of U.S. Standard Certificate of Live Birth: Each state, New York City, and District of Columbia, 2006, 2009, and 2012**

Area	Revised reporting area		
	2012	2009	2006
	38 states, New York City, and District of Columbia	28 states and New York City	19 states <sup>1</sup>
Percentage of all U.S. births . . .	86	66	48
California . . . . .	X	X	X
Colorado . . . . .	X	X	...
Delaware . . . . .	X	X	X
District of Columbia . . . . .	X	...	...
Florida . . . . .	X	X	X
Georgia . . . . .	X	X	...
Idaho . . . . .	X	X	X
Illinois . . . . .	X	...	...
Indiana . . . . .	X	X	...
Iowa . . . . .	X	X	...
Kansas . . . . .	X	X	X
Kentucky . . . . .	X	X	X
Louisiana . . . . .	X	...	...
Maryland . . . . .	X	...	...
Massachusetts . . . . .	X	...	...
Michigan . . . . .	X	X	...
Minnesota . . . . .	X	...	...
Missouri . . . . .	X	...	...
Montana . . . . .	X	X	...
Nebraska . . . . .	X	X	X
Nevada . . . . .	X	...	...
New Hampshire . . . . .	X	X	X
New Mexico . . . . .	X	X	...
New York <sup>1</sup> . . . . .	X	X	X
New York City . . . . .	X	X	...
North Carolina . . . . .	X	...	...
North Dakota . . . . .	X	X	X
Ohio . . . . .	X	X	X
Oklahoma . . . . .	X	...	...
Oregon . . . . .	X	X	...
Pennsylvania . . . . .	X	X	X
South Carolina . . . . .	X	X	X
South Dakota . . . . .	X	X	X
Tennessee . . . . .	X	X	X
Texas . . . . .	X	X	X
Utah . . . . .	X	X	...
Vermont . . . . .	X	X	X
Washington . . . . .	X	X	X
Wisconsin . . . . .	X	...	...
Wyoming . . . . .	X	X	X

... Category not applicable.

<sup>1</sup>Excludes New York City.

SOURCE: CDC/NCHS, National Vital Statistics System.

for 2006, 2009, and 2012, and trends based on the 2009 reporting area (28 states and New York City) are shown for 2009 and 2012 (Table B). Primary cesarean rates are also shown for each of the individual reporting areas (and each state) for each year during 2006–2012 in the background Table on page 10.

This report focuses on singleton births, which make up the bulk of all newborns (97% in 2012) (1). Multiple births are excluded because of the much higher likelihood of cesarean delivery (2.5 times higher) compared with singletons.

Results are shown by gestational age (completed weeks), which is primarily determined by the interval between the first day of the mother's last normal menstrual period (LMP) and the date of birth.

Where LMP is missing or inconsistent with birthweight, the clinical or obstetric estimate of gestation is substituted.

All differences noted in the text are statistically significant at the 0.05 level (4), unless otherwise specified.

## Results

### Trends in primary cesarean delivery

In 2006, the total primary cesarean delivery rate for the 19-state revised reporting area was 21.9%. Rates ranged from 14.5% in Idaho to 26.2% in Florida (Table B). The total primary cesarean rate for the 2006 revised reporting area (19 states) increased 2%, to 22.4%, in 2009 (Table B). From 2006 to 2009, rates for 9 of the 19 states increased an average of more than 7% (ranging from a 3% increase in California to a 14% increase in Delaware). Rates for three states (New York, South Dakota, and Tennessee) decreased from 2006 to 2009. The remaining seven states had no significant change in primary cesarean rates during this time. From 2009 to 2012, the primary cesarean delivery rate for the 2006 19-state revised reporting area decreased 2%, returning to the 2006 level of 21.9%. Rates for 11 of the 19 states declined from 2009 to 2012; rates for the 8 remaining states were not significantly different in 2012 than in 2009.

In 2009, the total primary cesarean rate for the 2009 revised reporting area (28 states and New York City) was 22.1%, with state-specific rates ranging from 14.7% (Utah) to 27.5% (Florida). From 2009 to 2012, the rate of primary cesarean delivery for the 2009 revised reporting area declined 3%, from 22.1% to 21.5%. Rates decreased for 16 of the 29 reporting areas (Figure 1); no area reported increases in primary cesareans over this period. Rates for Delaware, New York, New York City, North Dakota, and Oregon decreased by 5%–10% from 2009 to 2012; the rate for Utah decreased by 15%.

Although significant declines were observed for total 2006 and 2009 revised reporting area rates and for many state-specific rates between 2009 and 2012, the pace of the decline has slowed. Among the 19 revised reporting areas in 2009, 13 state rates declined from 2009 to 2010 compared with 2 for 2011 to 2012 (Table C). Further, rates for 16 states remained unchanged from 2009 to 2010 compared with 24 (out of 29) that held steady from 2011 to 2012 (see the background Table on page 10 for state-specific primary cesarean delivery rates and changes for each year during 2006–2012).

### Trends by gestational age

Changes in primary cesarean rates varied by gestational age for 2009–2012. For the 2009 revised reporting area (28 states and New York City), overall primary cesarean delivery rates declined for all gestational ages (each week from 37 through 41 weeks, and 42 or more weeks), except births under 37 weeks (Detailed Table). However, at the state level, the only change supported by a majority of states was for births at 38 weeks of gestation: 18 of the 29 reporting areas reported lower primary cesarean delivery rates among births at 38 weeks in 2012 than in 2009. Primary cesarean delivery rates at 38 weeks declined an average of 10% for these 18 reporting areas, ranging from 5% (Michigan) to 18% (Utah) (Figure 2).

**Table B. Primary cesarean delivery among singleton births, by state: 28 states and New York City, 2006, 2009, and 2012, and percent change, 2006–2009 and 2009–2012**

Area	Percent <sup>1</sup>			Percent change	
	2012	2009	2006	2009–2012	2006–2009
Total:					
2006 reporting area <sup>2</sup> . . . . .	21.9	22.4	21.9	–2	2
2009 reporting area <sup>3</sup> . . . . .	21.5	22.1	---	–3	---
2012 reporting area <sup>4</sup> . . . . .	21.5	---	---	---	---
California . . . . .	19.8	19.9	19.3	*	3
Colorado . . . . .	17.4	17.9	---	–3	---
Delaware . . . . .	20.9	22.4	19.6	–7	14
District of Columbia . . . . .	24.9	---	---	---	---
Florida . . . . .	26.9	27.5	26.2	–2	5
Georgia . . . . .	22.7	23.6	---	–4	---
Idaho . . . . .	14.7	14.9	14.5	*	*
Illinois . . . . .	20.8	---	---	---	---
Indiana . . . . .	20.7	21.0	---	*	---
Iowa . . . . .	19.3	19.3	---	*	---
Kansas . . . . .	19.0	19.4	19.8	*	*
Kentucky . . . . .	24.2	25.1	25.2	–4	*
Louisiana . . . . .	26.9	---	---	---	---
Maryland . . . . .	24.2	---	---	---	---
Massachusetts . . . . .	21.7	---	---	---	---
Michigan . . . . .	22.4	22.6	---	*	---
Minnesota . . . . .	18.0	---	---	---	---
Missouri . . . . .	21.4	---	---	---	---
Montana . . . . .	20.8	21.2	---	*	---
Nebraska . . . . .	19.4	20.2	18.5	–4	9
Nevada . . . . .	23.5	---	---	---	---
New Hampshire . . . . .	21.0	21.2	21.6	*	*
New Mexico . . . . .	17.3	17.0	---	*	---
New York <sup>5</sup> . . . . .	22.0	23.3	25.0	–6	–7
New York City . . . . .	23.2	25.3	---	–8	---
North Carolina . . . . .	21.3	---	---	---	---
North Dakota . . . . .	17.9	19.3	18.5	–7	*
Ohio . . . . .	19.8	20.6	20.6	–4	*
Oklahoma . . . . .	21.2	---	---	---	---
Oregon . . . . .	18.2	20.2	---	–10	---
Pennsylvania . . . . .	21.1	21.7	20.8	–3	4
South Carolina . . . . .	24.3	25.0	23.0	–3	9
South Dakota . . . . .	15.6	16.3	17.9	*	–9
Tennessee . . . . .	23.0	23.3	24.1	*	–3
Texas . . . . .	23.8	24.3	23.3	–2	4
Utah . . . . .	12.5	14.7	---	–15	---
Vermont . . . . .	18.2	19.1	17.4	*	10
Washington . . . . .	19.5	20.2	20.4	–3	*
Wisconsin . . . . .	17.0	---	---	---	---
Wyoming . . . . .	18.5	18.2	16.7	*	9

--- Data not available; data reported using 1989 U.S. Standard Certificate of Live Birth.

\* Percent change not significant at  $p=0.05$ .

<sup>1</sup>Primary cesarean rate is the number of births to women having a cesarean delivery per 100 births to women without a previous cesarean.

<sup>2</sup>19 states.

<sup>3</sup>28 states and New York City.

<sup>4</sup>38 states, District of Columbia, and New York City.

<sup>5</sup>Excludes New York City.

NOTE: Data exclude 12 states (not listed) for which method of delivery data are based on the 1989 revision of the U.S. Standard Certificate of Live Birth as of January 1, 2012; data on primary cesarean delivery are not comparable with data based on the 2003 revision of the U.S. Standard Certificate of Live Birth.

SOURCE: CDC/NCHS, National Vital Statistics System.

**Table C. Changes in primary cesarean delivery rates for singleton births for 2009 revised reporting area: 2010–2012**

Change in rate <sup>1</sup>	Number of reporting areas <sup>2</sup>		
	2012	2011	2010
Total <sup>2</sup> . . . . .	29	29	29
Higher than previous year . . . . .	3	0	0
Lower than previous year. . . . .	2	9	13
No change from previous year . . . . .	24	20	16

<sup>1</sup>Primary cesarean rate is the number of births to women having a cesarean delivery per 100 births to women without a previous cesarean.

<sup>2</sup>The 2009 revised reporting area includes California, Colorado, Delaware, Florida, Georgia, Idaho, Indiana, Iowa, Kansas, Kentucky, Michigan, Montana, Nebraska, New Hampshire, New Mexico, New York, New York City, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Washington, and Wyoming.

NOTE: See background Table on page 10 for state-specific primary cesarean delivery rates and changes for each year from 2006 through 2012.

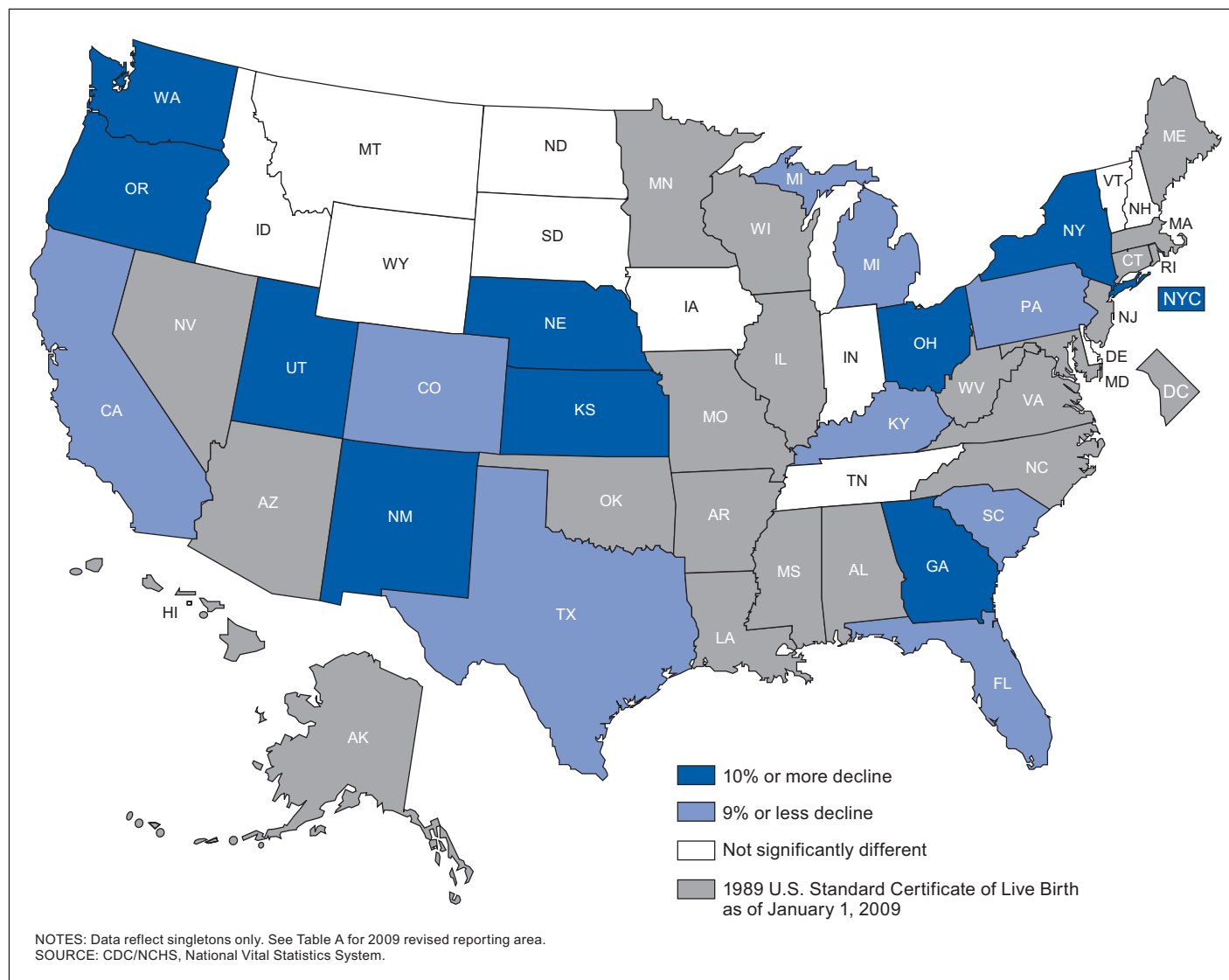
SOURCE: CDC/NCHS, National Vital Statistics System.

**Primary cesarean delivery rates in 2012**

The primary cesarean delivery rate for the 2012 revised reporting area (38 states, District of Columbia, and New York City) was 21.5%. That is, more than one out of five births to women without a previous cesarean delivery were delivered by cesarean. Primary cesarean delivery rates varied by state, ranging from 12.5% in Utah to 26.9% in Florida and Louisiana (Table B and Figure 3).

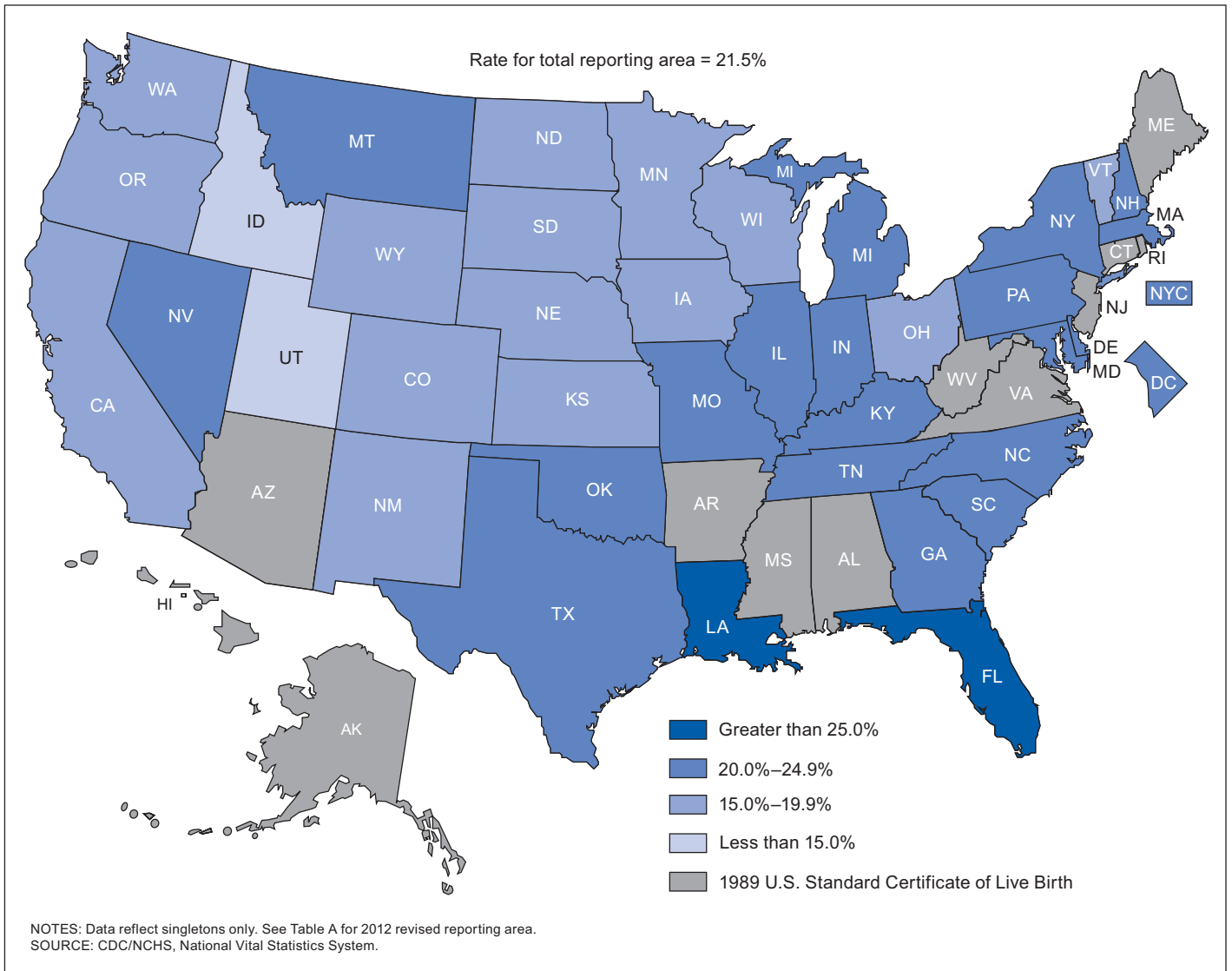
**Summary**

Overall, primary cesarean delivery rates for the 19 states that implemented the revised birth certificate by 2006 increased from 2006 to 2009 and then declined from 2009 to 2012. Rates also declined during 2009–2012 for the total 2009 revised reporting area (28 states and New York City). Rates for 16 of 29 reporting areas were lower in 2012 than in 2009, but were unchanged for the remaining 13 areas. By gestational age, state-specific primary cesarean delivery rates at 38 weeks declined for 18 of 29 reporting



**Figure 2. Percent change in primary cesarean delivery rates at 38 weeks: 28 states and New York City (2009 revised reporting area), 2009 and 2012**





**Figure 3. Primary cesarean delivery rates, by state: 38 states, New York City, and District of Columbia (2012 revised reporting area), 2012**

areas from 2009 to 2012; few state-specific changes in primary cesarean rates were observed among other gestational ages. The primary cesarean delivery rate for the 2012 revised reporting area (38 states, District of Columbia, and New York City) was 21.5%. State-specific 2012 rates ranged from 12.5% in Utah to 26.9% in Florida and Louisiana.

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## List of Detailed Tables

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Table. Primary cesarean delivery among singleton births, by gestational age: 28 states and New York City (2009 revised reporting area), 2009 and 2012

Area	Gestational age													
	Under 37 weeks		37 weeks		38 weeks		39 weeks		40 weeks		41 weeks		42 weeks and over	
	2012	2009	2012	2009	2012	2009	2012	2009	2012	2009	2012	2009	2012	2009
	Percent <sup>1</sup>													
Total for 2009 reporting area . . . . .	†30.5	29.9	†21.7	22.2	†19.3	21.2	†20.9	21.0	†19.4	20.3	†22.7	23.2	†21.5	22.2
California . . . . .	†29.0	27.6	19.0	18.9	†16.9	18.2	†18.9	18.6	†18.4	19.1	22.8	22.5	20.9	21.0
Colorado . . . . .	26.1	26.0	18.1	18.8	†15.1	16.4	17.2	17.5	15.5	15.9	18.2	18.6	17.7	17.2
Delaware . . . . .	†23.6	30.4	19.3	22.9	17.7	19.1	20.7	20.1	20.3	21.1	23.3	26.0	23.3	25.2
Florida . . . . .	34.6	34.1	26.6	27.1	†25.2	27.6	26.6	26.8	†24.4	25.7	26.5	26.4	26.2	26.6
Georgia . . . . .	†31.0	29.5	22.4	22.2	†20.0	22.1	†22.4	23.2	†20.8	22.0	24.2	25.5	†22.4	24.6
Idaho . . . . .	24.7	25.3	15.7	16.4	12.5	13.3	†12.2	13.6	13.7	12.7	†19.9	16.3	14.2	15.8
Indiana . . . . .	†32.0	29.7	†20.7	22.3	20.0	20.3	19.9	19.8	17.9	18.7	20.4	21.3	20.2	20.7
Iowa . . . . .	28.5	27.3	20.0	19.5	16.6	17.1	18.4	18.1	17.4	17.9	21.3	21.3	19.9	21.1
Kansas . . . . .	28.2	27.9	19.8	19.4	†16.9	18.8	18.5	18.2	†16.5	17.7	20.6	21.3	18.5	19.0
Kentucky . . . . .	32.5	32.4	23.9	25.3	†22.1	23.8	24.1	24.1	†21.4	23.2	24.5	25.1	23.8	25.1
Michigan . . . . .	29.8	29.8	22.2	22.9	†20.1	21.2	22.2	21.8	20.2	20.2	24.0	23.8	22.2	23.1
Montana . . . . .	33.1	33.1	22.3	20.7	18.9	20.4	19.0	20.7	19.1	17.6	21.8	22.4	19.1	20.6
Nebraska . . . . .	30.1	28.5	21.3	20.9	†17.0	19.3	18.6	18.9	17.5	18.6	†18.0	21.0	20.5	20.9
New Hampshire . . . . .	29.0	29.5	22.0	21.9	19.0	20.9	22.1	21.4	16.7	18.1	23.3	21.0	21.9	23.2
New Mexico . . . . .	26.4	26.8	19.4	18.2	†15.2	17.1	16.8	15.7	15.2	14.3	16.7	15.5	15.0	14.7
New York <sup>2</sup> . . . . .	†30.3	31.8	22.2	23.4	†19.4	21.9	21.8	22.0	†19.6	21.3	24.3	25.1	†21.8	24.3
New York City . . . . .	32.1	32.4	†23.9	25.5	†20.3	23.6	†22.5	24.5	†21.3	23.9	†25.1	26.2	23.8	23.7
North Dakota . . . . .	†25.0	31.0	20.1	16.4	16.0	18.0	17.6	18.1	15.9	17.5	20.1	22.9	16.4	19.0
Ohio . . . . .	28.6	28.2	20.0	20.7	†16.8	18.9	19.2	19.5	†18.3	19.2	21.9	22.6	†19.2	20.7
Oregon . . . . .	28.5	30.2	19.6	21.4	†17.1	19.3	†17.0	19.2	†15.5	17.4	19.5	21.0	19.7	20.6
Pennsylvania . . . . .	†30.6	29.4	21.3	21.3	†18.6	20.2	21.0	21.3	18.8	19.2	†22.2	23.9	†20.9	22.4
South Carolina . . . . .	31.3	30.6	23.0	24.2	†21.4	23.4	24.2	24.4	22.9	23.9	24.9	25.3	23.8	25.4
South Dakota . . . . .	24.2	26.3	14.3	15.9	14.8	16.1	14.2	13.3	14.4	15.1	16.8	17.3	16.4	18.9
Tennessee . . . . .	30.5	29.6	21.8	22.4	21.6	22.1	22.2	22.2	22.1	22.5	23.5	24.9	22.9	22.7
Texas . . . . .	†32.6	31.8	†24.3	25.0	†22.3	24.2	†23.2	22.7	†21.5	22.2	†23.1	24.1	23.0	22.7
Utah . . . . .	23.9	22.1	†13.2	15.8	†10.8	13.1	†10.6	13.3	†11.2	13.1	15.7	16.7	†12.4	16.5
Vermont . . . . .	24.4	27.1	20.1	17.4	16.6	16.9	19.3	19.6	15.6	15.0	18.9	21.1	18.5	23.5
Washington . . . . .	27.7	28.0	21.2	19.8	†17.1	19.4	19.5	19.7	†16.3	17.5	21.4	22.1	20.2	20.4
Wyoming . . . . .	24.9	26.8	20.1	18.6	16.1	17.8	16.4	16.7	17.7	17.0	†22.7	15.9	21.6	20.0

† Difference from 2009 significant at  $p = 0.05$ .

<sup>1</sup>Primary cesarean rate is the number of births to women having a cesarean delivery per 100 births to women without a previous cesarean.

<sup>2</sup>Excludes New York City.

NOTES: Data exclude 22 states (not listed) for which method of delivery data in 2009 are based on the 1989 revision of the U.S. Standard Certificate of Live Birth; primary cesarean data are not comparable with data based on the 2003 revision of the U.S. Standard Certificate of Live Birth. Gestational age is based on completed weeks of gestation.

SOURCE: CDC/NCHS, National Vital Statistics System.



## Technical Notes

### Sources of data

Data for 2006 and 2009 are based on 100% of births to residents of the reporting areas that implemented the 2003 U.S. Standard Certificate of Live Birth by January 1, 2006, and for 2009 and 2012 on reporting areas that implemented the 2003 revision by January 1, 2009 (data in the background [Table](#) on page 10 are based on 100% of births to residents of the reporting areas that implemented the 2003 revision by January 1 of each year during 2006–2012). Data for 2012 are based on 100% of 2012 births. [Table A](#) shows the revised reporting area for each year. New York City and the state of New York are separate reporting areas and shown separately because they implemented the 2003 revision in different years.

### Generalizability of data

Because births in the revised reporting area are not a random sample of all births, the findings are not generalizable to the entire United States. Of note, the race and Hispanic origin distributions of births for the 36-state and District of Columbia reporting area are substantively different from those for the entire United States. In particular, Hispanic groups are overrepresented in these data, whereas non-Hispanic white and non-Hispanic black are underrepresented. Further, the composition of the Hispanic population in the reporting area differs from that of the United States, with relatively more births to Mexican and Cuban women and fewer births to Puerto Rican and Central and South American women; see [Table D](#) in *User Guide to the 2012 Natality Public Use File* (17).

### Primary cesarean delivery

Information on the method of delivery is reported on both the 2003 U.S. Standard Certificate of Live Birth and the 1989 U.S. Standard Certificate of Live Birth. However, the format and wording of the “method of delivery” item on the 2003 revised standard certificate differs from that of the unrevised standard certificate. The unrevised item asks a direct question on whether the birth was vaginal, vaginal birth after cesarean delivery (VBAC), or a primary or repeat cesarean delivery. In contrast, the revised “method of delivery” item asks if the final route of delivery was a vaginal (with or without forceps or vacuum assistance) or a cesarean delivery. Information on the type of vaginal (vaginal or VBAC) or cesarean (repeat or primary) delivery is calculated from the response to a question under a different item, “Risk factors in this pregnancy,” which asks if the mother had a previous cesarean delivery. As a result of these changes, although the data on total cesarean deliveries appear to be comparable between revisions, information on type of vaginal or cesarean delivery is not. In brief, rates based on data from the revised certificates are substantially higher for VBACs and primary cesareans, and lower for repeat cesareans, than rates based on data from unrevised certificates (18). Accordingly, data on VBAC, primary, and repeat cesarean deliveries are not directly comparable between revisions, and since 2005, they have been presented separately for revised and unrevised reporting areas.

Primary cesarean delivery rates are computed by using the information on vaginal and cesarean deliveries from the “method of delivery” item as well as information on whether the mother had a previous cesarean from the “risk factors in this pregnancy” item. The primary cesarean rate relates the number of women having a first cesarean delivery to all women giving birth who have never had a cesarean delivery. The denominator for the primary cesarean rate includes the sum of primary cesareans and vaginal births without previous cesarean.

### Gestational age

Gestational age is primarily determined by the interval between the first day of the mother’s last normal menstrual period (LMP) and the date of birth. The clinical or obstetric estimate of gestation is substituted where the LMP is missing or inconsistent with birth-weight; see the user guide (17) for more details.

### Random variation and significance testing for natality data

For information and discussion on random variation and significance testing for natality data, see *User Guide to the 2010 Natality Public Use File* (19).

**Table. Primary cesarean delivery among singleton births: 38 states, New York City, and District of Columbia, 2006–2012**

[By place of residence]

Area	2012	2011	2010	2009	2008	2007	2006
	Percent <sup>1</sup>						
California . . . . .	19.8	19.8	19.9	19.9	†19.8	†19.6	19.3
Colorado . . . . .	17.4	17.1	†17.4	17.9	17.9	18.2	---
Delaware . . . . .	20.9	20.4	†20.8	†22.4	20.4	20.0	19.6
District of Columbia . . . . .	24.9	†25.6	24.2	---	---	---	---
Florida . . . . .	26.9	27.1	†27.2	27.5	†27.3	†27.0	†26.2
Georgia . . . . .	22.7	†22.8	23.4	23.6	23.5	---	---
Idaho . . . . .	14.7	14.4	14.9	14.9	15.1	14.8	14.5
Illinois . . . . .	20.8	†20.8	21.2	---	---	---	---
Indiana . . . . .	20.7	20.7	20.6	21.0	20.9	20.9	---
Iowa . . . . .	19.3	19.1	19.1	†19.3	†18.2	19.7	---
Kansas . . . . .	19.0	19.4	19.6	19.4	19.8	19.8	19.8
Kentucky . . . . .	24.2	24.5	†24.4	25.1	24.7	24.9	†25.2
Louisiana . . . . .	†26.9	27.6	---	---	---	---	---
Maryland . . . . .	24.2	24.6	24.9	---	---	---	---
Massachusetts . . . . .	21.7	---	---	---	---	---	---
Michigan . . . . .	22.4	22.6	22.9	†22.6	22.1	---	---
Minnesota . . . . .	18.0	---	---	---	---	---	---
Missouri . . . . .	21.4	†21.2	21.8	---	---	---	---
Montana . . . . .	†20.8	†19.4	21.1	21.2	21.5	---	---
Nebraska . . . . .	19.4	19.4	19.8	20.2	20.1	†19.5	18.5
Nevada . . . . .	†23.5	†22.4	23.7	---	---	---	---
New Hampshire . . . . .	21.0	20.9	20.6	21.2	22.2	22.3	†21.6
New Mexico . . . . .	†17.3	16.5	†16.2	17.0	17.3	---	---
New York <sup>2</sup> . . . . .	†22.0	†22.4	23.0	23.3	23.0	†22.8	†25.0
New York City . . . . .	23.2	†23.4	†24.5	†25.3	26.2	---	---
North Carolina . . . . .	21.3	21.1	---	---	---	---	---
North Dakota . . . . .	17.9	17.7	†17.5	†19.3	18.0	18.2	18.5
Ohio . . . . .	†19.8	20.2	†20.2	20.6	20.6	20.4	20.6
Oklahoma . . . . .	†21.2	†22.1	22.7	---	---	---	---
Oregon . . . . .	18.2	†18.4	†19.4	20.2	20.5	---	---
Pennsylvania . . . . .	21.1	20.9	†21.2	†21.7	21.1	20.8	†20.8
South Carolina . . . . .	†24.3	23.8	†24.2	†25.0	24.0	†23.6	23.0
South Dakota . . . . .	15.6	†14.9	16.1	16.3	16.5	†16.8	17.9
Tennessee . . . . .	23.0	†22.8	23.7	†23.3	23.8	24.0	†24.1
Texas . . . . .	23.8	23.8	†23.8	†24.3	†23.9	23.5	23.3
Utah . . . . .	12.5	†12.6	†13.2	14.7	---	---	---
Vermont . . . . .	18.2	18.3	18.3	19.1	18.3	18.0	17.4
Washington . . . . .	19.5	†19.3	20.1	†20.2	20.8	20.7	20.4
Wisconsin . . . . .	17.0	16.9	---	---	---	---	---
Wyoming . . . . .	18.5	17.4	18.6	†18.2	16.7	16.9	16.7

--- Data not available; data reported using 1989 U.S. Standard Certificate of Live Birth.

† Difference from previous year significant at  $p = 0.05$ .<sup>1</sup>Primary cesarean rate is the number of births to women having a cesarean delivery per 100 births to women without a previous cesarean.<sup>2</sup>Excludes New York City.

NOTE: Data exclude 12 states (not listed) for which method of delivery data are based on the 1989 revision of the U.S. Standard Certificate of Live Birth; primary cesarean data are not comparable with those based on the 2003 revision of the U.S. Standard Certificate of Live Birth.

SOURCE: CDC/NCHS, National Vital Statistics System.

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