

# Recent Trends in Cesarean Delivery in the United States

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## Key findings

### Data from the Natality Data File, National Vital Statistics System

- The cesarean rate rose by 53% from 1996 to 2007, reaching 32%, the highest rate ever reported in the United States.
- From 1996 to 2007, the cesarean rate increased for mothers in all age and racial and Hispanic origin groups. The pace of the increase accelerated from 2000 to 2007.
- Cesarean rates also increased for infants at all gestational ages; from 1996 to 2006 preterm infants had the highest rates.
- Cesarean rates increased for births to mothers in all U.S. states, and by more than 70% in six states from 1996 to 2007.

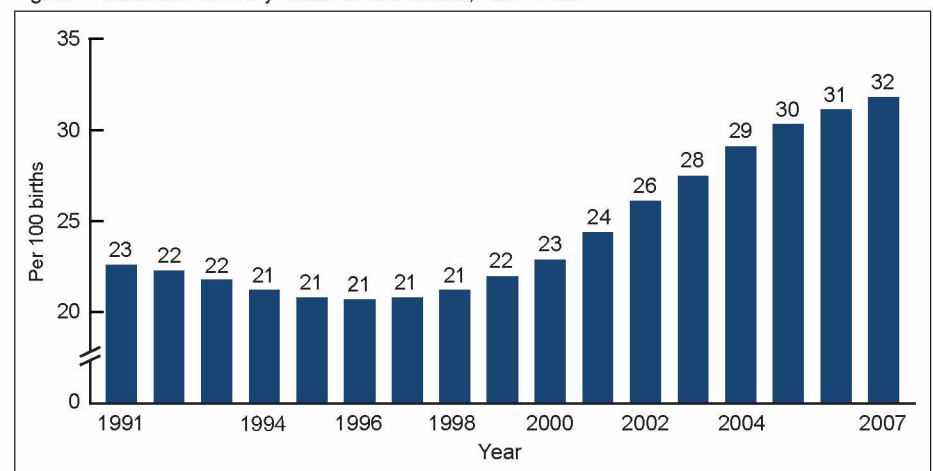
In 2007, nearly one-third (32%) of all births were cesarean deliveries (1). Although there are often clear clinical indications for a cesarean delivery, the short- and long-term benefits and risks for both mother and infant have been the subject of intense debate for over 25 years (2). Cesarean delivery involves major abdominal surgery, and is associated with higher rates of surgical complications and maternal rehospitalization, as well as with complications requiring neonatal intensive care unit admission (3–5). In addition to health and safety risks for mothers and newborns, hospital charges for a cesarean delivery are almost double those for a vaginal delivery, imposing significant costs (6).

This report shows trends in cesarean delivery since 1991, focusing on the period from 1996 to 2007 when cesarean rates began to rise following a decline in the early 1990s. Data for 2007 are preliminary and 2006 data are presented when preliminary 2007 data are not available (1,7).

*Keywords: cesarean delivery • race and Hispanic origin • gestational age • state specific rates*

## In 2007, the cesarean rate was the highest ever reported in the United States.

Figure 1. Cesarean delivery rates: United States, 1991–2007



SOURCE: CDC/NCHS, National Vital Statistics System.



There were 1.4 million cesarean births in 2007, representing approximately one-third of all births in the United States.

Following a decline in the early 1990s, the cesarean rate increased by 53% from 1996 to 2007, from 21% to an all-time high of 32% (Figure 1).

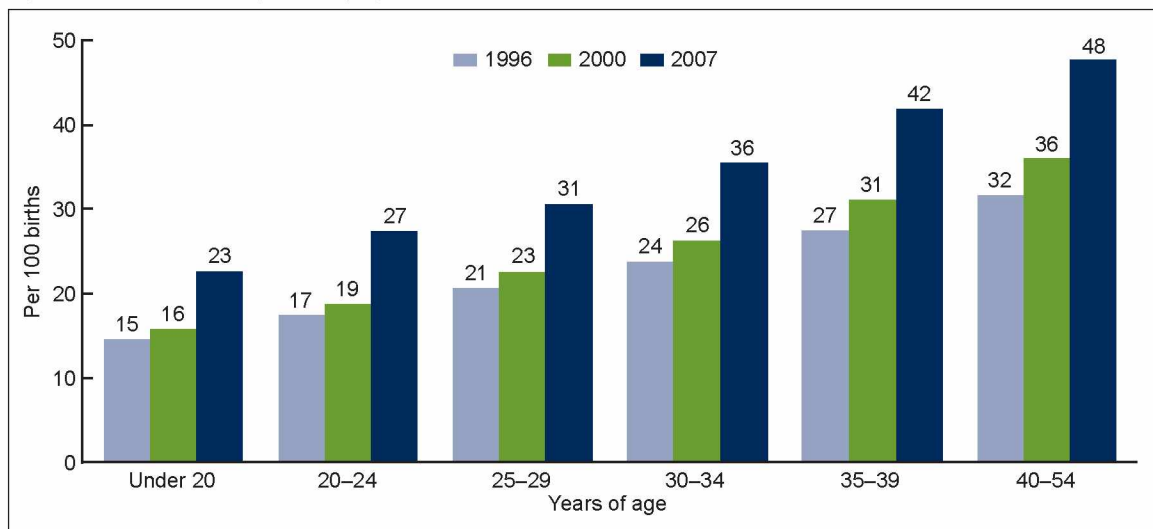
The *number* of cesarean births increased by 71% from 1996 (797,119) to 2007 (1,367,049).

### Cesarean rates rose for women in all age groups in the last decade.

Cesarean rates rose for women in all age groups from 1996 to 2007 (Figure 2). Rates for all age groups increased modestly from 1996 to 2000, then rose more than 33% from 2000 to 2007. Women under age 25 experienced the greatest increases in cesarean deliveries from 2000 to 2007 (57%).

Rates of cesarean delivery typically rise with increasing maternal age. As in 1996 and 2000, the rate for mothers aged 40–54 years in 2007 was more than twice the rate for mothers under age 20 (48% and 23%, respectively).

Figure 2. Cesarean delivery rates, by age of mother: United States, 1996, 2000, and 2007



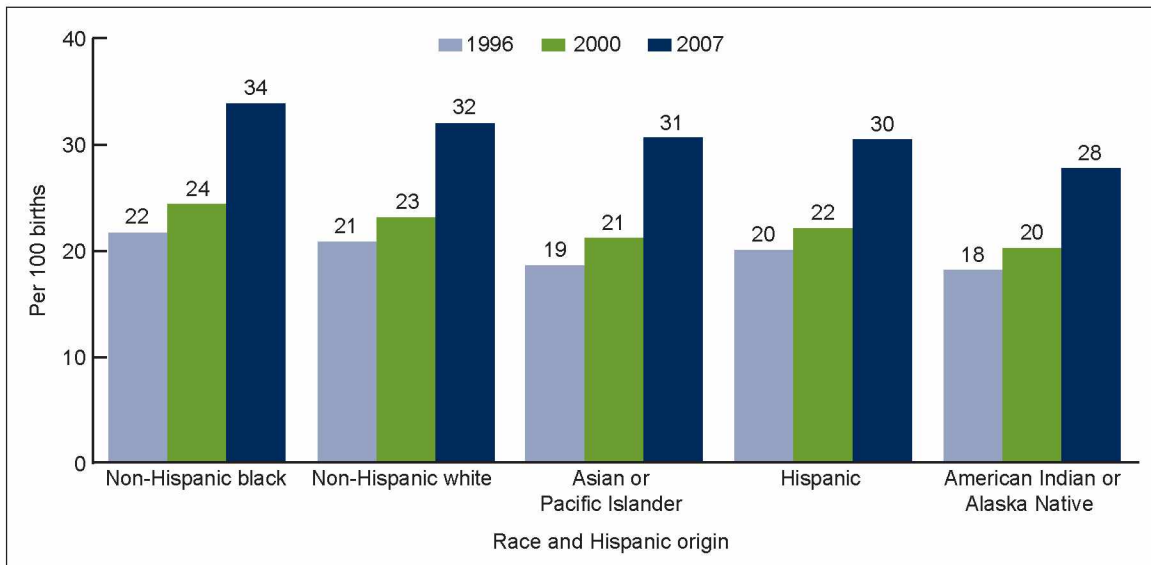
SOURCE: CDC/NCHS, National Vital Statistics System.

**Cesarean rates rose for women in all racial and ethnic groups from 1996 to 2007.**

All racial and ethnic groups experienced large increases in cesarean rates from 1996 to 2007 (Figure 3). The rate increased moderately for all groups from 1996 to 2000 (by about 12%), then accelerated with each group experiencing increases of around 40% from 2000 to 2007.

In 2007, cesarean delivery rates were slightly higher for non-Hispanic black women compared with non-Hispanic white women (34% and 32%, respectively). American Indian or Alaska Native women had the lowest cesarean delivery rate (28%).

Figure 3. Cesarean delivery rates, by race and Hispanic origin of mother: United States, 1996, 2000, and 2007



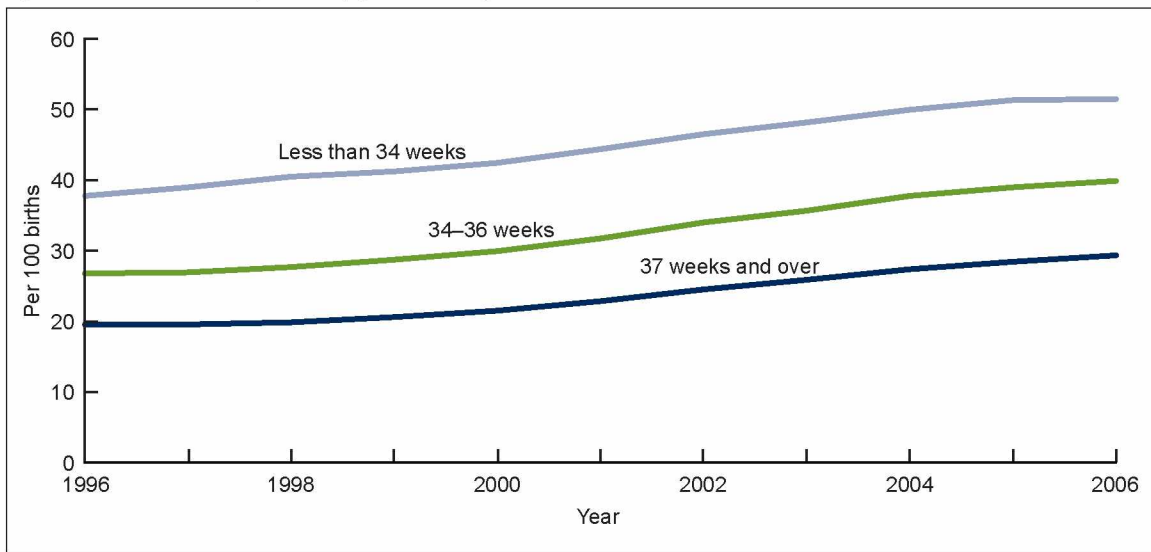
SOURCE: CDC/NCHS, National Vital Statistics System.

**Cesarean rates increased for infants of all gestational ages in the last decade.**

Cesarean rates increased for births at all gestational ages from 1996 to 2006 (Figure 4). During the decade, the cesarean rate for early preterm infants (less than 34 completed weeks of gestation) increased by 36%. Rates for infants born late preterm (34 to 36 completed weeks of gestation) and term and over (37 or more completed weeks of gestation) rose by almost 50%.

From 1996 to 2007, cesarean rates were higher for both early and late preterm infants than for term births.

Figure 4. Cesarean delivery rates, by gestational age, United States, 1996–2006



SOURCE: CDC/NCHS, National Vital Statistics System.

**Cesarean rates varied widely by state.**

Rates varied considerably by state. In 2007, cesarean rates ranged from less than 25% in Alaska, Idaho, New Mexico, and Utah, to over 35% in Florida, Louisiana, Mississippi, New Jersey, and West Virginia.

Cesarean rates rose significantly in each state from 1996 to 2007 (see table). The magnitude of the increases varied. Six states (Colorado, Connecticut, Florida, Nevada, Rhode Island, and Washington) had increases of over 70%. In 34 states, cesarean delivery rates increased by 50% or more.

Table. Cesarean delivery rates, by state: United States, 1996 and 2007 and percent change, 1996–2007

	1996	2007	Percent change 1996–2007
United States	20.7	31.8	54
Alabama	23.3	33.8	45
Alaska	16.7	22.6	35
Arizona	16.1	26.2	63
Arkansas	25.3	34.8	38
California	20.6	32.1	56
Colorado	15.1	25.8	71
Connecticut	19.8	34.6	75
Delaware	21.0	32.1	53
District of Columbia	21.3	32.6	53
Florida	21.6	37.2	72
Georgia	20.9	32.0	53
Hawaii	17.5	26.4	51
Idaho	16.0	24.0	50
Illinois	19.3	30.3	57
Indiana	20.3	29.4	45
Iowa	18.6	29.4	58
Kansas	19.2	29.8	55
Kentucky	21.3	34.6	62
Louisiana	26.4	35.9	36
Maine	20.8	30.0	44
Maryland	21.6	33.1	53
Massachusetts	19.8	33.5	69
Michigan	20.2	30.4	50
Minnesota	16.9	26.2	55
Mississippi	26.6	36.2	36
Missouri	20.4	30.3	49
Montana	19.1	29.4	54
Nebraska	19.8	30.9	56
Nevada	19.3	33.1	72
New Hampshire	20.3	30.8	52
New Jersey	24.0	38.3	60
New Mexico	17.2	23.3	35
New York	22.9	33.7	47
North Carolina	21.1	30.7	45
North Dakota	18.9	28.4	50
Ohio	19.0	29.8	57
Oklahoma	22.5	33.6	49
Oregon	16.9	28.2	67
Pennsylvania	19.4	30.1	55
Rhode Island	17.7	32.2	82
South Carolina	22.6	33.4	48
South Dakota	20.8	26.6	28
Tennessee	21.7	33.3	53
Texas	23.1	33.7	46
Utah	15.9	22.2	40
Vermont	16.5	26.8	62
Virginia	21.1	33.5	59
Washington	16.8	29.0	73
West Virginia	22.8	35.2	54
Wisconsin	15.6	25.0	60
Wyoming	18.3	26.9	47

NOTE: The cesarean rate is the percentage of all live births by cesarean delivery.

## Summary

In 2007, approximately 1.4 million women had a cesarean birth, representing 32% of all births, the highest rate ever recorded in the United States and higher than rates in most other industrialized countries (8).

From 1996 to 2007, cesarean rates increased for all women, regardless of age, race and Hispanic origin, or state of residence. In 2006, cesarean delivery was the most frequently performed surgical procedure in U.S. hospitals (9). Cesarean rates also increased for infants of all gestational ages and may be partly related to the increased rate of multiple births (7), because infants in multiple births are much more likely than singletons to be cesarean births (10). However, cesarean delivery rates for singletons increased substantially more than cesarean rates for infants in multiple deliveries (data not shown).

In addition to clinical reasons, nonmedical factors suggested for the widespread and continuing rise of the cesarean rate may include maternal demographic characteristics (e.g., older maternal age), physician practice patterns, maternal choice, more conservative practice guidelines, and legal pressures (11–13).

## Definitions

Cesarean delivery: Extraction of the infant, placenta, and membranes through an incision in the maternal abdominal and uterine walls.

Cesarean rate: Number of cesarean births per 100 live births.

Race and Hispanic origin: These items are reported separately on birth certificates. Persons of Hispanic origin may be of any race. Persons of non-Hispanic ancestry are further classified by race because there are substantial differences in fertility and maternal characteristics between Hispanic and non-Hispanic persons. Persons of American Indian or Alaska Native and Asian or Pacific Islander ancestry are not classified separately by Hispanic origin because the majority of these persons are non-Hispanic. Multiple race data reported since 2003 were bridged to single-race categories for trend analysis (7).

Preterm birth rate: The number of births delivered at less than 37 completed weeks of gestation per 100 total births.

Early preterm birth rate: The number of births delivered at less than 34 completed weeks of gestation per 100 total births.

Late preterm birth rate: The number of births delivered at 34 to 36 completed weeks of gestation per 100 total births.

Rate of term and later births: The number of births delivered at 37 completed weeks of gestation and over per 100 total births.

## Data source and methods

This report contains data from the Natality Data File from the National Vital Statistics System (NVSS). The NVSS includes information for all live births reported in the United States. The Natality Data File is the primary data file for analyzing birth trends and patterns in the United States. Data may be accessed from NCHS at [http://www.cdc.gov/nchs/data\\_access/VitalStatsOnline.htm](http://www.cdc.gov/nchs/data_access/VitalStatsOnline.htm) and <http://www.cdc.gov/nchs/VitalStats.htm>.

Terms such as “higher than” and “less than” indicate statistically significant differences.

Computations exclude records with missing data.

## About the authors

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## References

1. Hamilton BE, Martin JA, Ventura SJ. Births: Preliminary data for 2007. National vital statistics reports; vol 57 no 12. Hyattsville, MD. National Center for Health Statistics, Released March 18, 2009. Available from: [http://www.cdc.gov/nchs/data/nvsr/nvsr57/nvsr57\\_12.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr57/nvsr57_12.pdf).
2. U.S. Department of Health and Human Services. Cesarean childbirth. Report of a consensus development conference sponsored by the National Institute of Child Health and Human Development in conjunction with the National Center for Health Care Technology. September 22–24, 1980. NIH Publication No.82–2067. 1981.
3. Yang Q, Wen SW, Oppenheimer L, et al. Association of cesarean delivery for first birth with placenta previa and placental abruption in second pregnancy. *BJOG* 114(5): 609–13. 2007.
4. Kuklina EV, Meikle SF, Jamieson DJ, et al. Severe obstetric morbidity in the United States: 1998–2005. *Obstet Gynecol.* 113(2 Part 1):293–9. 2009.
5. Liston FA, Allen VM, O’Connell CM, Jangaard KA. Neonatal outcomes with cesarean delivery at term. *Arch Dis Child Fetal Neonatal Ed.* 93(3): F176–82. 2008.
6. U.S. Agency for Healthcare Research and Quality. HCUPnet. Healthcare Cost and Utilization Project: Rockville, MD. AHRQ 2005 [DRGs 370–3].
7. Martin JA, Hamilton BE, Sutton PD, Ventura SJ, et al. Births: Final data for 2006. National vital statistics reports; vol 57 no 7. Hyattsville, MD. National Center for Health Statistics. 2009.
8. Organization for Economic Co-operation and Development. OECD health data 2009: statistics and indicators for 30 countries. Paris, France: Organization for Economic Cooperation and Development; 2009. Available from: <http://www.ecosante.org/index2.php?base=OCDE&lang=h=ENG&langs=ENG&sessionid>.
9. Russo CA (Thompson Reuters), Wier L (Thompson Reuters), Steiner C. (AHRQ). Hospitalizations related to childbirth, 2006. HCUP, Statistical Brief # 71. U.S. Agency for Healthcare Research and Quality, Rockville, MD. April 2009.

10. CDC. QuickStats: Percentage of live births by cesarean delivery, by plurality—United States, 1996, 2000, and 2006. *MMWR* 58(19):542. 2009.
11. Williams HO. The ethical debate of maternal choice and autonomy in cesarean delivery. *Clin Perinatol* 35:455–62. 2008.
12. Murthy K, Grobman WA, Lee TA, Hall J L. Association between rising professional liability insurance premiums and primary cesarean delivery rates. *Obstet Gynecol* 110(6):1264–9. 2007.
13. Guise J-M, McDonagh M, Hashima J, et al. Vaginal births after cesarean (VBAC). Evidence report/technology assessment No. 71 (Prepared by the Oregon Health & Science university Evidence-based Practice Center under Contract No. 209–977–0018). AHRQ Publication No. 03–Eoi8,; Agency for Healthcare Research and Quality. Rockville, MD. March 2003.

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