

Recent Trends and Patterns in Cesarean and Vaginal Birth After Cesarean (VBAC) Deliveries in the United States

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KEYWORDS

- Cesarean delivery • Primary cesarean
- Vaginal birth after cesarean • VBAC • United States
- International comparisons

In 2008, approximately 1.4 million women in the United States had a cesarean delivery, representing 32.3% of all births.¹ Cesarean delivery continues to be the most common major surgical procedure for women in the United States.² In addition, because of increases in primary cesarean delivery, an increasing number of US women approach birth having already had at least 1 previous cesarean delivery.³ This article examines the trends and patterns in total, primary, and repeat cesarean deliveries, in vaginal birth after cesarean (VBAC), and in the percentage of women who have had a prior cesarean.

METHODS

Data on the method of delivery used in this article are as reported on the more than 4 million birth certificates filed each year in the United States and compiled by the National Center for Health Statistics. Data on cesarean delivery became available from birth certificates in 1989, and by 1991, all US states were reporting this information.

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(All states but Oklahoma reported this information in 1990.) Before 1989, data from the National Hospital Discharge Survey were used to track the trends in cesarean delivery.⁴ The 2008 preliminary birth data (summary statistics)¹ and the 2007 final birth data (detailed characteristics)³ were the latest data available at the time of manuscript preparation.

Revision of the US Standard Certificate of Live Birth

Beginning in 2003, some states began adopting the 2003 revision of the US Standard Certificate of Live Birth (revised). Although both revised and unrevised birth certificates contain information on the method of delivery, the format and wording of the method of delivery item is different between revised and unrevised birth certificates. Data on total cesarean delivery is comparable between the 2 revisions and is available for the United States as a whole throughout the period.^{3,5-7} However, data on whether a woman has had a prior cesarean delivery is not comparable between the 2 revisions, which has the potential to affect several cesarean delivery measures.^{3,6,7}

For 2003 and 2004 data, only a few states had revised their birth certificates, and national estimates on VBAC and primary and repeat cesarean deliveries were produced based primarily on unrevised birth certificate data.⁵ However, beginning with 2005 data, it is not possible to produce comparable national estimates for primary and repeat cesarean deliveries, and VBAC rates and thus subnational estimates must be used.^{3,6,7} For example, in 2007, revised data on VBAC and primary and repeat cesarean deliveries are available for 22 states, representing 53% of US births, including California, Colorado, Delaware, Florida, Idaho, Indiana, Iowa, Kansas, Kentucky, Nebraska, New Hampshire, New York State (excluding New York City), North Dakota, Ohio, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Vermont, Washington, and Wyoming.³ Results for this 22-state area are not generalizable to the United States as a whole because they are not a random sample of all births. In particular, Mexican women are overrepresented in these data, whereas non-Hispanic white and non-Hispanic black women are underrepresented.⁸ Therefore the trend data on US VBAC rates presented in **Fig. 1** ends in 2004.

Computation of Measures and Analytic Methods

Cesarean delivery measures are computed as shown in **Table 1**. Briefly, the total cesarean rate is the percentage of cesarean births out of all births in a given year. The primary cesarean rate is the percentage of cesarean births to women who have not had a previous cesarean delivery. The repeat cesarean rate is the percentage of cesarean births to women who have had a previous cesarean delivery. The rate of VBAC is the complement of the repeat cesarean rate and is the percentage of vaginal births to women who have had a previous cesarean delivery. Another important measure is the percentage of women with a prior cesarean delivery, which is the number of births to women with a prior cesarean delivery divided by the total number of live births. This measure represents the population of women who are eligible for either a repeat cesarean delivery or a VBAC. This measure may be computed for the total population or for women with at least 1 prior live birth.

The various cesarean delivery measures were analyzed by maternal age, maternal race/ethnicity, maternal education, birthplace of the mother, live birth order (number of previous live births plus the index birth), plurality, trimester of pregnancy when prenatal care began, and state. VBAC rates were also calculated by the number of prior cesarean deliveries.

For the birth attendant and place of delivery variables, the percentage of VBACs per 100 total births was computed. This measure indicates the prevalence of VBACs

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