Trends and Characteristics of Home Vaginal Birth After Cesarean Delivery in the United States and Selected States

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METHODS: Birth certificate data were used to track trends in home and hospital VBACs from 1990–2008. Data on planned home VBAC were analyzed by sociodemographic and medical characteristics for the 25 states reporting this information in 2008 and compared with hospital VBAC data.

RESULTS: In 2008, there were approximately 42,000 hospital VBACs and approximately 1,000 home VBACs in the United States, up from 664 in 2003 and 656 in 1990. The percentage of home births that were VBACs increased from less than 1% in 1996 to 4% in 2008, whereas the percentage of hospital births that were VBACs decreased from 3% in 1996 to 1% in 2008. Planned home VBACs had a lower risk profile than hospital VBACs with fewer births to teenagers, unmarried women, or smokers; fewer preterm or low-birth-weight deliveries; and higher maternal education levels.

CONCLUSION: Recent increases in the proportion of U.S. women with a prior cesarean delivery mean that an increasing number of women are faced with the choice and associated risks of either VBAC or repeat cesarean delivery. Recent restrictions in hospital VBAC availability have coincided with increases in home VBACs; however, home VBAC remains rare, with approximately 1,000 occurrences in 2008.

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LEVEL OF EVIDENCE: II

As the U.S. cesarean delivery rate continues to rise to 32.9% of births in 2009, the percentage of women presenting for delivery after having had a previous cesarean delivery is increasing. The majority of these women are eligible for either a trial of labor for vaginal birth after cesarean delivery (VBAC) or for a repeat cesarean delivery. However, in part due to concerns about safety and liability, approximately half of U.S. physicians and one third of U.S. hospitals have recently stopped offering a trial of labor for VBAC, and the U.S. VBAC rate has declined from 28% in 1996 to approximately 8% currently. Other articles have documented a recent increase in home births and in home VBACs. The purpose of this article is to examine the trends and characteristics of home VBACs in the United States from 1990 to 2008 and compare them with hospital VBACs.

MATERIALS AND METHODS

Data on method of delivery are as reported on the more than four million birth certificates filed each year in the United States and compiled by the National Center for Health Statistics. Method of delivery data became available from birth certificates in 1989, and by 1991, all U.S. states were reporting this information (all states but Oklahoma reported this information in 1990).

Beginning in 2003, some states began adopting the 2003 revision of the U.S. Standard Certificate of
Live Birth (revised). Although both revised and unrevised birth certificates contain information on method of delivery, the format and wording of the method of delivery item is different between revised and unrevised birth certificates, making the data not strictly comparable between the two.\textsuperscript{10,11} The unrevised item asks a direct question on whether the birth was vaginal, VBAC, or a primary or repeat cesarean delivery. In contrast, the revised method of delivery item asks only if the birth was vaginal or cesarean, and information on whether the mother had a prior cesarean delivery is obtained from a different item on “Risk Factors in This Pregnancy.”\textsuperscript{11} These two items are then combined to distinguish VBACs and repeat cesarean deliveries from primary cesareans and vaginal births without a prior cesarean delivery.

In 2003, only two states, Pennsylvania and Washington, revised their birth certificates, and national estimates of VBAC and repeat cesarean delivery were produced based primarily on unrevised birth certificate data.\textsuperscript{12} However, as more states each year revised their birth certificates, it became impracticable to produce national estimates and data were analyzed separately for revised and unrevised states.\textsuperscript{3,11} For example, in 2008, revised VBAC data were available for 27 states representing 65\% of U.S. births; all other states provided unrevised data.\textsuperscript{14} In 2008, data on whether a home birth was planned or unplanned were available from the birth certificates of 25 of the 27 revised states (excluding California and Georgia), and these 25 states were used for the more detailed analysis.\textsuperscript{10,13} Florida and Michigan are excluded from maternal smoking data because these states did not have a comparable smoking question.\textsuperscript{7,13} Results for groups of states may not be representative of the U.S. population as a whole.\textsuperscript{14}

For this analysis, national data are shown through 2003 and compared with 2008 data for revised and, for selected analyses, for unrevised states. Data for 2004–2007 are not shown because the number of states reporting revised and unrevised data changed substantially each year making individual year-by-year comparisons less meaningful.

To analyze data on home VBACs, the percentage of home VBACs per 100 home births was computed (Fig. 1; Table 1). This measure indicates the prevalence of VBACs among women having a home birth. This alternative measure is used because the standard denominator for VBAC rates (VBACs ÷ repeat cesarean deliveries) is not useful for measurement of home births, because cesarean deliveries do not occur at home. The percentage of hospital VBACs per 100 hospital births (including all methods of delivery) and the percentage of total VBACs per 100 total births (including all places and methods of delivery) were also computed for comparative purposes. Data on planned home VBACs and hospital VBACs were analyzed by selected characteristics, including maternal age, race and ethnicity, education, marital status, live birth order (number of previous live births plus the index birth), birthplace of the mother, maternal smoking status, gestational age, birth weight, plurality, and birth attendant (Table 2). The National Institutes of Health Conference on Cesarean Delivery on Maternal Request advocated using an “intention-to-treat” methodology for the examination of method of delivery issues,\textsuperscript{15} and the use of the planned home birth group most closely represents an “intention to have a home birth” group. The percentage of total VBACs that occurred at home (Fig. 2) and the percentage of U.S. births to women with a prior cesarean delivery (Fig. 3) were also computed. Missing data (less than

![Fig. 1. Percentage of home and hospital births that were vaginal birth after cesarean delivery, United States, 1990–2003 and 2008.](https://www.cdc.gov/nchs/data/nvss/mvsrh/2008/natality.pdf)

2% for all variables) were excluded before percentages were computed. All statements in the text were tested for statistical significance using a two-proportion z test, and differences noted as higher or lower were statistically significant at the $P < 0.05$ level. Because this study analyzes nonidentified data from a publicly available data set, it was deemed exempt from review by the National Center for Health Statistics Ethics Review Board.

RESULTS

The number of home VBACs increased from 656 in 1990 to a high for the decade of 761 in 1994 (Table 1). From 1995 to 2003, the number of home VBACs fluctuated between 629 and 710 per year. In 2008, there were 675 reported home VBACs among the 27 revised states (representing 65% of U.S. births) and 333 among the unrevised states (representing 35% of U.S. births), or approximately 1,000 reported home VBACs nationally. Although data are not comparable between revised and unrevised states, this number is clearly larger than the 629–710 per year from 1995–2003. The number of hospital VBACs increased from 83,425 in 1990 to a high of 115,056 in 1996 and then decreased to 50,702 in 2003. In 2008, there were 28,405 hospital VBACs among the 27 revised states and 13,863 among the unrevised states, or approximately 42,000 nationally.

Figure 1 shows the percentage of home and hospital births that were VBACs for selected years from 1990–2008. The percentage of hospital births that were VBACs increased from 2.1% of all hospital births in 1990 to a high of 3.0% in 1996 and then declined to 1.0–1.1% in 2008 (in both the revised and the unrevised data). In contrast, the percentage of home births that were VBACs increased slightly from 1990–1994 and then remained relatively stable at 2.8–3.0% from 1995–2003. In 2008, 3.6% of home births in the revised states and 3.8% of home births in the unrevised states were VBACs. These levels are higher than for home births in any other year from 1990–2003 and are both more than three times the VBAC levels for hospital births in 2008 (1.0–1.1%).

Figure 2 shows the percentage of all VBACs that occurred at home. As the number of hospital VBACs increased from 1990–1996 (Table 1), the percentage of all VBACs that occurred at home declined from 0.8% to 0.6%. However, beginning in 1998, the percentage of all VBACs that occurred at home declined from 1.0 to 1.1% in 2003. This upward trend for home VBACs coincides with a downward trend in the number of hospital VBACs during that time period (Table 1) leading, in 2008, to 2.3% of all VBACs performed in the United States occurring at home (among both revised and unrevised states), 97.1% of U.S. VBACs occurring in a hospital, and 0.6% occurring in another location such as a birthing center.

Table 1. Number and Percentage of Vaginal Birth After Cesarean Deliveries by Place of Delivery, United States, 1990–2003 and 2008

<table>
<thead>
<tr>
<th>Year</th>
<th>All Live Births</th>
<th>All Places of Delivery</th>
<th>Home</th>
<th>Hospital</th>
<th>% of Total Births That Were VBACs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>4,158,212</td>
<td>84,335</td>
<td>656</td>
<td>83,425</td>
<td>2.1</td>
</tr>
<tr>
<td>1991</td>
<td>4,110,907</td>
<td>90,690</td>
<td>654</td>
<td>89,731</td>
<td>2.3</td>
</tr>
<tr>
<td>1992</td>
<td>4,065,014</td>
<td>97,549</td>
<td>654</td>
<td>96,580</td>
<td>2.5</td>
</tr>
<tr>
<td>1993</td>
<td>4,000,240</td>
<td>103,581</td>
<td>740</td>
<td>102,521</td>
<td>2.6</td>
</tr>
<tr>
<td>1994</td>
<td>3,952,767</td>
<td>110,341</td>
<td>761</td>
<td>109,287</td>
<td>2.8</td>
</tr>
<tr>
<td>1995</td>
<td>3,899,589</td>
<td>112,439</td>
<td>674</td>
<td>111,475</td>
<td>2.9</td>
</tr>
<tr>
<td>1996</td>
<td>3,891,494</td>
<td>116,048</td>
<td>710</td>
<td>115,056</td>
<td>3.0</td>
</tr>
<tr>
<td>1997</td>
<td>3,880,894</td>
<td>112,145</td>
<td>679</td>
<td>111,172</td>
<td>2.9</td>
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<td>1998</td>
<td>3,941,553</td>
<td>108,903</td>
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<td>1999</td>
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<td>97,680</td>
<td>645</td>
<td>96,739</td>
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<td>2000</td>
<td>4,058,814</td>
<td>89,978</td>
<td>699</td>
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<td>2001</td>
<td>4,025,933</td>
<td>74,048</td>
<td>629</td>
<td>73,151</td>
<td>1.9</td>
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<tr>
<td>2002</td>
<td>4,021,726</td>
<td>59,248</td>
<td>684</td>
<td>58,316</td>
<td>1.5</td>
</tr>
<tr>
<td>2003</td>
<td>4,089,950</td>
<td>51,602</td>
<td>664</td>
<td>50,702</td>
<td>1.3</td>
</tr>
<tr>
<td>2008 revised states</td>
<td>2,748,302</td>
<td>29,287</td>
<td>675</td>
<td>28,405</td>
<td>1.1</td>
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<tr>
<td>2008 unrevised states</td>
<td>1,499,392</td>
<td>14,257</td>
<td>333</td>
<td>1,386</td>
<td>1.0</td>
</tr>
</tbody>
</table>

VBAC, vaginal birth after cesarean delivery.
The number of VBACs is also affected by the population of women who have had a prior cesarean delivery and thus are eligible for either a repeat cesarean delivery or VBAC. Among women with a prior live birth, the percentage of births to women with a prior cesarean delivery fluctuated from 17.7–18.2% during the 1990s and then increased from 18.0% in 2000 to 19.9% in 2003. In 2008, among women with a prior live birth, 21.6% in the revised states and 23.7% in the unrevised states had a previous cesarean delivery and were eligible for either a VBAC or a repeat cesarean delivery.

In 2008, among the 25 states (including 49% of U.S. births) that had adopted the revised birth certificate and included data on the planning status of home births, 90% of all home VBACs were planned compared with 87% of total home births (data not shown). Table 2 shows the percent distribution of births by birthplace and planning status. Overall, 91% of women who had a planned home VBAC were non-Hispanic white compared with 51% of women who had a hospital VBAC. Approximately 35% of women who had a planned home VBAC were 35 years or older compared with 21% for a hospital VBAC. Women with a home VBAC were also more likely than those with a hospital VBAC to be married, have a live birth order of 3 or higher, and to be born in the United States. Approximately 34% of women with a planned home VBAC had a Bachelor's degree or above compared with 24% of women with a hospital VBAC. Nearly all (98%) women with a planned home VBAC had full-term pregnancies (ie, gestational age of 37 weeks or more) compared with 86% for hospital VBACs, and 99% of planned home VBACs had a birth weight of 2,500 g or more compared with 92% for hospital VBACs. All of the 523 women with a planned home VBAC were reported nonsmokers compared with 90% of women with a hospital VBAC.

When analyzed by birth attendant, 27% of planned home VBACs were attended by certified nurse midwives or certified midwives and 51% by other midwives. Other midwives refer to midwives who are not certified nurse midwives or certified midwives and, for example, may include certified professional midwives or direct-entry midwives. An additional 21% of planned home VBACs were attended by “other” attendants, including, for example, a family member or emergency medical technician. For hospital VBACs, 91% were attended by physicians and 8% by certified nurse midwives.

**DISCUSSION**

In 2008, more than half a million U.S. women gave birth after a previous cesarean delivery, representing more than one in eight U.S. births, the highest level ever recorded in the United States. The majority of these women would be eligible for either a trial of
labor for VBAC or a repeat cesarean delivery. However, approximately half of U.S. physicians and one third of U.S. hospitals no longer offer a trial of labor for VBAC, in part due to concerns about safety and liability. Thus, a substantial proportion of women who initially desired a hospital VBAC were unable to access one and were faced with the choice of either a repeat cesarean delivery or a home VBAC. Home VBAC is still a rare event in the United States, but its incidence is increasing.

There were approximately 42,000 hospital and approximately 1,000 home VBACs in the United States in 2008 compared with 664 in 2003 and 656 in 1990. Although a lack of comparability of VBAC data between states using the revised compared with the unrevised birth certificate complicates the analysis of VBAC data for this time period, it is clear that there has been an increase in home VBACs in the past several years. The percentage of home births that were VBACs increased over time to almost 4% in 2008, whereas the percentage of hospital births that were VBACs decreased from 3% in 1996 to 1% in 2008. In general, in time periods when hospital VBAC was more available, home VBAC rates stabilized or decreased, whereas the recent decrease in hospital VBACs coincided with an increase in home VBACs. Currently 0.67% of total births (regardless of method of delivery) are born at home. However, among VBACs, the percentage is more than three times higher: 2.3% of all VBACs in


the United States occurred at home in 2008, up from 0.7% in 1999.

Regardless of place of delivery (home or hospital), obstetric health care providers generally select women with the lowest risk profiles for a possible trial of labor for VBAC. However, even among the very low-risk group of U.S. women having a VBAC, women with a home VBAC had a lower risk profile than those with a hospital VBAC. Women with a home VBAC were more likely than those with a hospital VBAC to be non-Hispanic white, married, older, college-educated, U.S.-born, and nonsmokers with a singleton pregnancy. Women having a home VBAC were less likely than those with a hospital VBAC to have a preterm or low-birth-weight newborn.

Women with home VBACs also had a lower risk profile when compared with data from a prior study of all home births (regardless of pregnancy history) with fewer preterm and low-birth-weight deliveries, no teen births, and fewer births to unmarried women. When compared with all home births, home VBACs were more likely to be attended by a midwife and less likely to be attended by “other” birth attendants (21% compared with 33% in 2008).8

Strengths of the study include the comprehensive population-based nature of the data set, which includes all of the approximately four million births in the United States each year from 1990–2008, together with a large number of sociodemographic and medical variables available for analysis. Because home VBAC is a rare occurrence in the United States, a large population-based data set of this type was needed to obtain sufficient number of cases for analysis. Still, even with national data, there were not enough cases for analysis of neonatal mortality for home VBACs, although this may be possible in the future with additional years of data. Another limitation is the inability of birth certificate data to identify those planned home births that ended in transfers to a hospital.

Although the accuracy of some medical information on birth certificates has been questioned, the variables that form the foundation of this analysis (ie, method of delivery, place of birth, sociodemographic variables) have been found to be well reported.21,22 However, a format change in the method of delivery item between revised and unrevised birth certificates created a small discontinuity in data between revised and unrevised states; thus, data were analyzed separately for these two groups. Although it is difficult to quantify the exact degree of discontinuity between the revised and unrevised formats as a result of different states using different formats in different years,3,11 rates of VBAC in the revised data are a bit higher than in the unrevised data and are more in line with hospital discharge data (Martin JA, Ventura SJ. Braving the new world: challenges and rewards of the revised birth data. Presented at the annual meeting of the National Association for Public Health Statistics and Information Systems. June 8, 2006, San Diego, CA.).4,11 Thus, we have emphasized the use of the revised data for the more detailed analysis in Table 2. Also, it should be noted that birth certificates do not contain detailed clinical data on possible risk factors for uterine rupture such as the type and timing of the previous incision and method of suturing.

When compared with other industrialized countries, the U.S. VBAC rate of 9% in 2004 was less than half that of the next industrialized country, and three countries (Finland, Norway, and The Netherlands) had VBAC rates above 50%,2,23 International data on home VBACs are scarce, but the available data suggest widely differing policies and practices among countries. In Canada, home VBAC is permissible for women with one previous cesarean delivery.24,25 In contrast, in The Netherlands where approximately 30% of births occur at home, a previous cesarean delivery is considered to be an absolute contraindication for home birth.26 With a national cesarean delivery rate of 14%,27 The Netherlands has a far smaller proportion of birthing women with a prior cesarean delivery; hence, VBAC is less of an issue there. There is also a suggestion in Australia of a relationship between restrictions on hospital VBACs leading to home VBACs. Australia has a relatively low VBAC rate of 20%,28 and in a study from South Australia, only 0.4% of births occurred at home; however 8.8% of home births were VBACs.29 Some women feel strongly about having a trial of labor for VBAC.18,30 For example, in the Listening to Mothers II survey, 45% of women with a previous cesarean delivery would have liked to have a VBAC; however, for the majority (57%) of these women, that option was unavailable as a result of the unwillingness of either the maternity health care provider (45%) or hospital (23%) to provide VBAC.18 This finding is consistent with information from a large home birth midwifery practice that found that many patients requesting home VBAC services had originally wanted a hospital VBAC but opted for a home VBAC when a hospital VBAC was not available to them (Nelson CA. Unpublished data from The Farm Midwifery Center, Summertown, TN, March 6, 2011).

Like with home birth itself, differences of opinion exist as to the advisability of home VBAC. The American College of Obstetricians and Gynecologists has stated that having had a previous cesarean delivery
is an absolute contraindication for home delivery, \textsuperscript{34} whereas the American College of Nurse Midwives, citing lack of data on outcomes, has not taken an official position on the issue.\textsuperscript{22} Data on birth outcomes for out-of-hospital VBACs are sparse; however, two recent studies, one for home and one for birth center VBACs, although finding low risks of adverse birth outcomes, still recommended that VBACs occur in hospitals as a result of the risk of complications, including uterine rupture, that may require prompt medical intervention.\textsuperscript{33,34} What is agreed on by all maternity care providers is that having had a previous cesarean delivery adds a level of increased risk to the birthing process. Recent increases in the proportion of U.S. women with a prior cesarean delivery mean that an increasing number of women are faced with the choice and associated risks of either a VBAC or a repeat cesarean delivery.\textsuperscript{5,6} Also, recent restrictions in hospital VBAC availability have coincided with increases in home VBACs. Given the strong desire of some women for VBAC,\textsuperscript{18,30,35} additional research on women’s preferences, experiences, and outcomes in relation to home and hospital-based VBACs and repeat cesarean deliveries would help to further inform women and health care providers about childbirth options after previous cesarean delivery.

REFERENCES


