

## Trends in the Attendant, Place, and Timing of Births, and in the Use of Obstetric Interventions: United States, 1989–97

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### Abstract

**Objectives**—This report presents recent trends in the circumstances surrounding live births in the United States. Specifically, this report will examine the changes in the attendant and place of birth as well as changes in the day and month of birth. Trends in the use of four obstetric procedures (electronic fetal monitoring, ultrasound, induction of labor, and stimulation of labor) are examined as well as trends in cesarean births, vaginal births after a previous cesarean, and births delivered by forceps and vacuum extraction.

**Methods**—Descriptive tabulations were calculated for each year between 1989 and 1997 using data reported on birth certificates.

**Results**—While the vast majority of births in 1997 were attended by physicians, 92 percent, this has declined steadily as the percent of births attended by midwives has slowly increased to account for 7 percent of all births. About 99 percent of births were in hospitals, basically unchanged from 1989, but the percent of out-of-hospital births that were in residences increased whereas those in freestanding birthing centers declined. While births were more common on weekdays than on weekends in 1989, they have become even more concentrated on weekdays since 1989. The most popular months to give birth continue to be July, August, and September. The percent of mothers receiving electronic fetal monitoring, ultrasound, induction, and stimulation all increased over the period with the most dramatic increase being the doubling of the use of induction. Between 1989 and 1996, the rate of cesarean births dropped by 9 percent whereas the rate of vaginal birth after a previous cesarean (VBAC) increased by 50 percent. However, the trends appear to have changed between 1996 and 1997—the cesarean rate increased slightly while the VBAC rate declined by 3 percent. There is wide variation by State in both of these rates. The percent of births that were delivered by forceps consistently declined during the period whereas the use of vacuum extraction consistently increased.

**Keywords:** birth certificate • midwife • induction of labor • cesarean • VBAC

### Introduction

In the last few decades the attendant, place, and timing of live births have changed in the United States (1). In addition, there have been changes in medical practice with the advent of new obstetric techniques that have altered the way in which pregnancies and labors are managed. This report examines recent changes in various characteristics of live births in the United States from 1989 to 1997. The data in this report are from the National Center for Health Statistics' (NCHS) National Vital Statistics System. The 1989–97 period was chosen because much of the data were not available prior to 1989 and the latest year for which there are final data is 1997. All 50 States and the District of Columbia reported the items that are included in this report for most years. However, during the early years of the period not all States reported all items, and there are differences in the percent of records with complete information among the States that reported (see Data Limitations).

### Births attended by DO's and CNM's increase

More than 9 out of 10 births in the United States in 1997 (92 percent) were attended by physicians but this has dropped from 96 percent in 1989 (table 1). Births attended by physicians include both those attended by medical doctors (MD's) and those attended by doctors of osteopathy (DO's). While the number and percent of births

#### Acknowledgments

This report was prepared under the general direction of Kenneth G. Keppel, Acting Chief of the Reproductive Statistics Branch (RSB). Stephanie J. Ventura, RSB, provided peer review. This report was edited by Demarius V. Miller and typeset by Jacqueline M. Davis of the Publications Branch, Division of Data Services.

attended by MD's dropped every year during the period, births attended by DO's rose every year to almost 150,000 in 1997, and they now attend almost 4 percent of all births. The number and percent of births attended by midwives grew steadily during the period and accounted for 7 percent of births in 1997 compared with 3.7 percent in 1989.

**All of the growth in midwife-attended births has been for CNM's**

All of the growth in the number of midwife-attended births was for certified nurse midwives (CNM's) for whom the number increased by 95 percent. The number of births attended by "other" midwives was 7 percent lower in 1997 than in 1989, although it increased between 1995 and 1997. The "other" midwife category is a heterogeneous group ranging from lay midwives with very little formal education to student nurse midwives who have not yet been certified. As a result of these disparate trends, the percent of midwife-attended births that were attended by CNM's increased from 90 percent in 1989 to 95 percent in 1997.

**States vary in births attended by DO's and midwives**

There was considerable variation among States in the percent of births attended by DO's and midwives, partly reflecting differences in State laws regarding these practitioners. States with more than 10 percent of births attended by DO's were nearly all in the Northeast or Midwest (Iowa, Michigan, Oklahoma, Delaware, Missouri, and Maine (table 2)). There were six States, the majority of which were in the South, with less than 1 percent of DO-attended births (Louisiana, Maryland, Nevada, North Carolina, North Dakota, and Virginia). The District of Columbia and Hawaii had too few DO-attended births (less than 20) to compute a reliable percent. The majority of States had between 1 and 4 percent of births attended by DO's.

The variation by State was even greater for births attended by midwives, ranging from less than 1 percent in Missouri to 20 percent in New Mexico; the Virgin Islands had 55 percent (table 2). Eleven States, five of which were in the Northeast, had more than 10 percent of births

attended by midwives (Alaska, Delaware, Florida, Georgia, Maine, Massachusetts, New Hampshire, New Mexico, Oregon, Rhode Island, and Vermont). Only Missouri had less than 1 percent of births attended by midwives while four other States had between 1 and 2 percent of midwife-attended births (Arkansas, Kansas, Louisiana, and Mississippi). The majority of States had between 2 and 8 percent of births attended by midwives.

**Ninety-nine percent of U.S. births occur in hospitals**

The vast majority of births in the United States occur in hospitals, 99 percent in 1997, which was basically unchanged from 1989 (table 3) and similar to the previous three decades (figure 1). There has been a small shift, however, in the place of birth for out-of-hospital births. The proportion that were in residences increased from 59 percent in 1989 to 64 percent in 1997 whereas the percent in free-standing birthing centers dropped over the period (from 30 to 28 percent). Births in clinics or doctors' offices comprised only 2 percent of out-of-hospital births in both years while births in other locations fell from 9 to 6 percent.

**Midwives attending births in hospitals increase**

Nearly all (99 percent or more) births attended by MD's and DO's were in hospitals, and this was essentially the same in 1989 (table 3). Births attended by CNM's, while predominantly in hospitals in 1989 (93 percent), became even more concentrated there, accounting for 96 percent of all births attended by CNM's in 1997 (figure 2). The percent of CNM-attended births occurring in birthing centers and residences dropped over the period. In contrast, "other" midwives were most likely to attend births in residences and this increased to account for 60 percent of births in which they attended in 1997 compared with 53 percent in 1989. The percent of other midwife-attended births that occurred in hospitals also increased during the

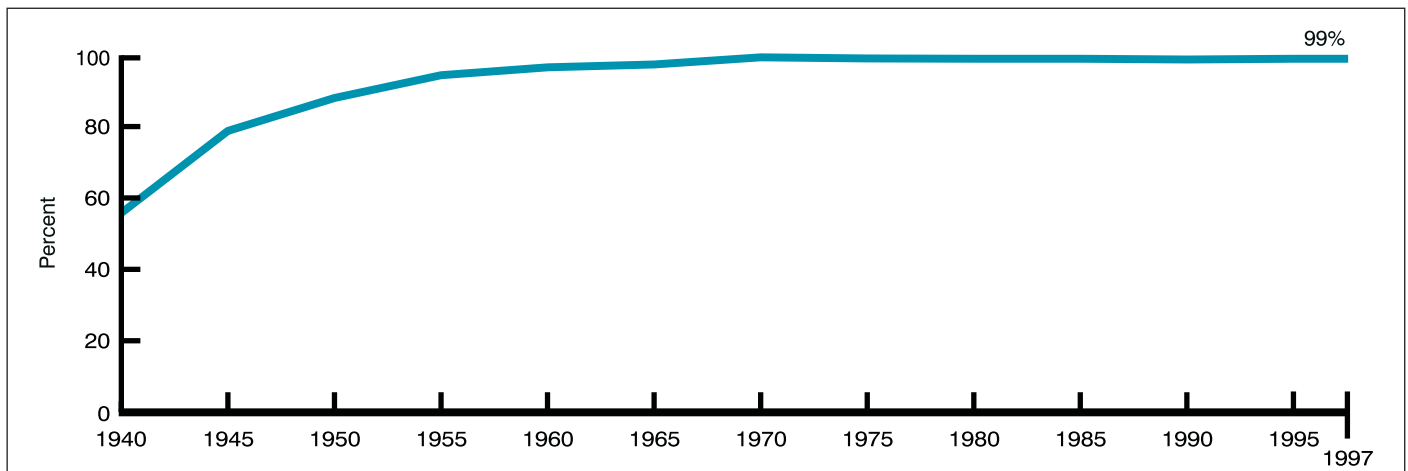
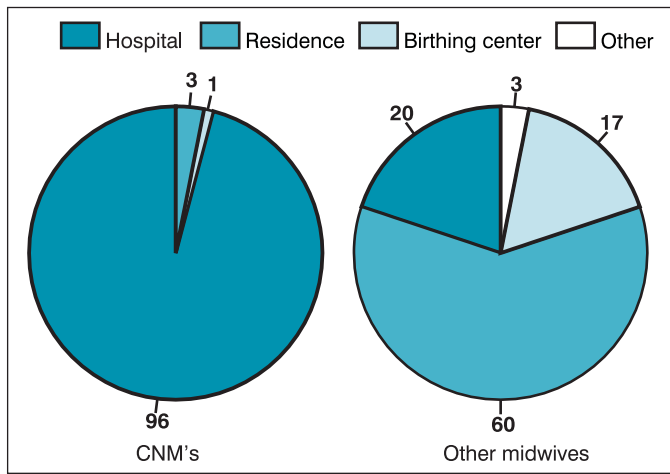


Figure 1. Percent of live births that occur in hospitals: United States, 1940-97



**Figure 2. Births by place of delivery for certified nurse midwives (CNM's) and other midwives: United States, 1997**

period, from 17 to 20 percent. Births attended by "other" midwives that were in birthing centers dropped from 22 to 17 percent.

### Births occurring on weekdays increase; Tuesday most frequent day

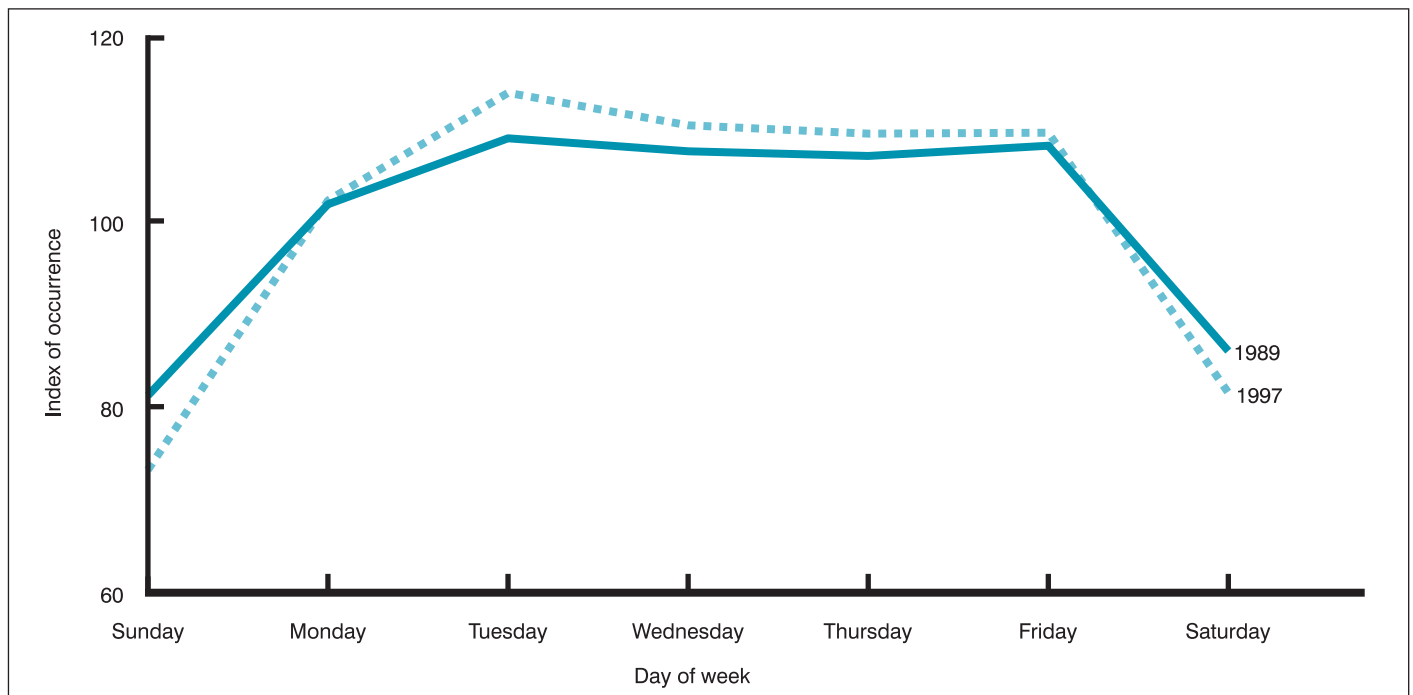
Births by day of the week are examined by computing an index of occurrence as shown in table 4. This index is defined as the ratio of the average number of births for a given day of the week to the average daily number of births multiplied by 100. For example, the

average daily number of births in the United States was 10,633 in 1997 while the average number for Sunday was 7,778. When the average for Sunday was related to the typical daily average, the index of occurrence was computed to be 73.2 for Sunday, which means that births were about 27 percent less likely to occur on Sunday. It is necessary to compute this index because, for example, the number of Sundays in a given year may differ from the number of Mondays. There are also differences in the number of Sundays between years. The index of occurrence controls for these differences and measures the tendency for a birth to occur on a given day of the week.

In 1997 as in 1989, births were more likely to occur on weekdays with Tuesday being the most frequent day and Sunday the least frequent (figure 3). The index of occurrence for Tuesday was 113.8 in 1997 while the index of occurrence for Sunday was 73.2. The index of occurrence increased for all weekdays between 1989 and 1997 while the indices for Saturday and Sunday both declined. The index of occurrence for Tuesday increased 5 percent between 1989 and 1997, the most of any weekday, while the indices for Saturday and Sunday declined 5 and 10 percent, respectively.

### Repeat cesareans and induced vaginal births are least likely to occur on weekends

Table 5 and figure 4 show that the index of occurrence differs depending on the type of delivery. Cesarean births, particularly repeat cesareans, were much more likely to occur on weekdays, partly because they are more likely to be scheduled than vaginal births. In addition, among vaginal births, those that were induced were much more likely to be on weekdays than noninduced vaginal births. Despite the general decline in the cesarean rate during the period, the weekday/weekend disparity for all births increased. This can be at



**Figure 3. Births by day of week: United States, 1989 and 1997**

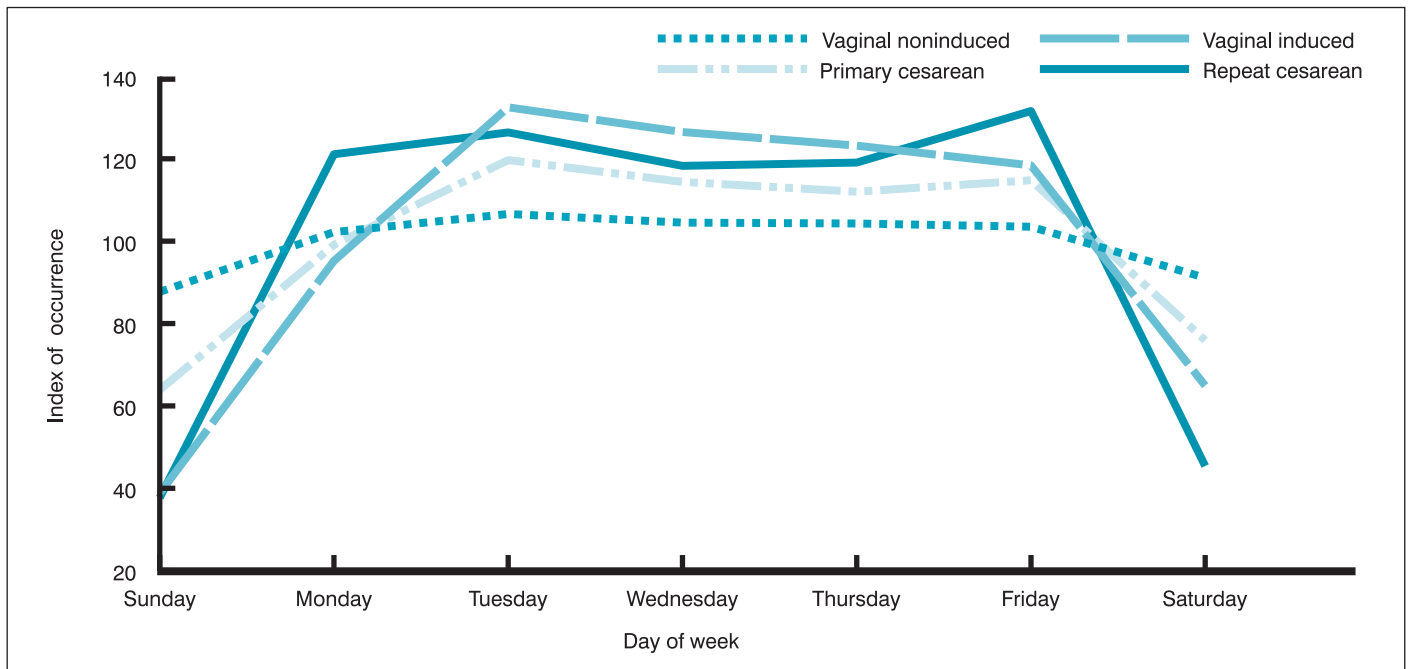


Figure 4. Births by day of week according to method of delivery: United States, 1997

least partly explained by the dramatic increase in the percent of births that are induced (discussed in a later section).

### Summer still the most popular time to give birth

The highest number and rate of births occurred in July 1997 (346,506 births and 15.2 births per 1,000 population, respectively) (table 6). August and September also had among the highest numbers and rates of births. Although the number of births in 1997 was lowest in February (291,541), this was mainly due to February having the fewest days of any month. The birth rate (which is adjusted for the number of days in the month; see Data limitations) was lowest for November (13.9). Births for the preceding 8 years showed a similar pattern with the highest number of births occurring most often in July and August. Birth rates were highest in July, August, and September. January, February, April, and November had among the lowest numbers of births in all years but three of these months (February, April, and November) have fewer than 31 days. Months with the lowest birth rates over the period were usually January, November, or December. Rates for all months were lower in 1997 than in 1990, the most recent high point. Monthly variations in fertility rates (births per 1,000 women aged 15–44 years) are similar to the variations in birth rates (1).

### Use of obstetric procedures increases; induction of labor doubles

About 83 percent of women who gave birth in 1997 had electronic fetal monitoring (EFM), a 22-percent increase over 1989 (table 7 and figure 5). About two-thirds of mothers (64 percent) had at least one ultrasound during pregnancy in 1997, a 35-percent increase

over the 1989 level. Although the rates of induction and stimulation were much lower than the rates of EFM and ultrasound, the percent increases were much greater. Induction was used in 18 percent of births in 1997, twice the 1989 level, 9 percent. Stimulation was used during labor in 11 percent of births in 1989 and increased to 17 percent in 1997. Altogether, one-third of births in 1997 were induced or stimulated (34 percent) including 2 percent of births that were both induced and stimulated.

### Births by cesarean decline; VBAC's increase dramatically

Births that were delivered by cesarean fell 9 percent between 1989 and 1996, from 22.8 percent of births to 20.7 percent, but then increased slightly to 20.8 percent in 1997 (table 8 and figure 6). Similarly, the rate of primary cesarean births (first cesareans for

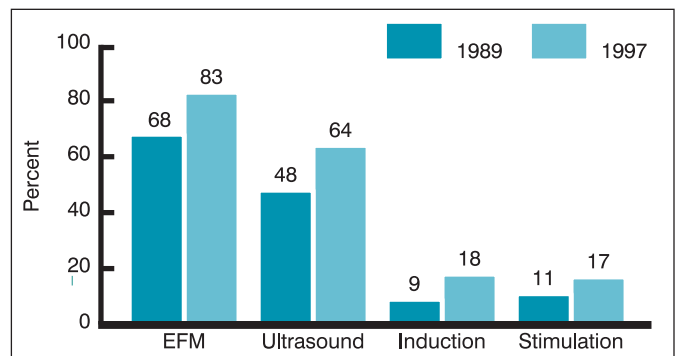


Figure 5. Percent of births that included electronic fetal monitoring (EFM), ultrasound, induction, or stimulation of labor: United States, 1989 and 1997

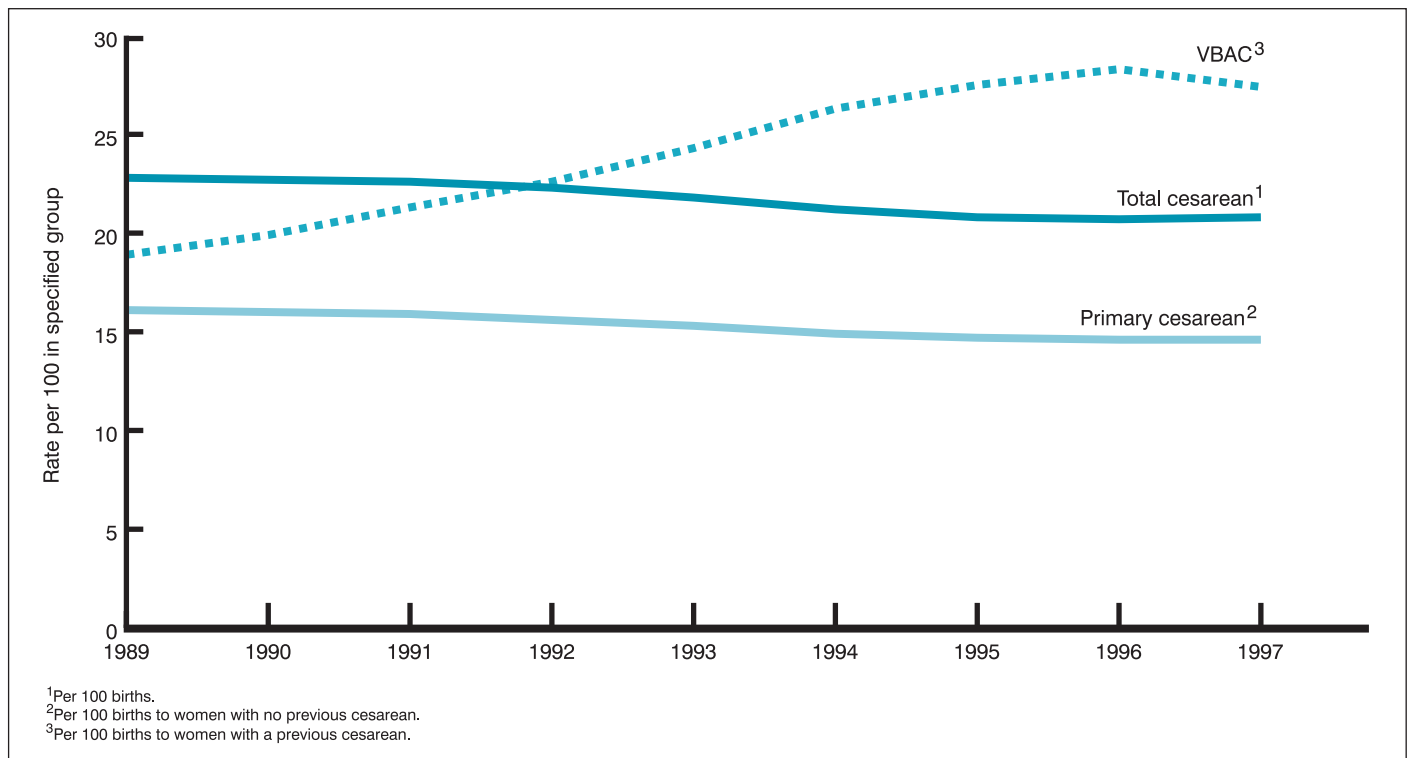


Figure 6. Total and primary cesarean rate and vaginal birth after previous cesarean rate: United States, 1989–97

women with no previous cesarean) also fell 9 percent between 1989 and 1996, from 16.1 to 14.6, and remained at 14.6 in 1997. During the same period, the percent of births that were vaginal births after a previous cesarean (VBAC's) increased by 50 percent, from 18.9 in 1989 to 28.3 in 1996, before declining 3 percent in 1997 (27.4).

There was wide variation in cesarean rates among States ranging from 26.7 in Mississippi to 15.3 in Colorado (table 2). Except for New Jersey, all of the States with cesarean rates above 23.0 were in the South (Alabama, Arkansas, Louisiana, Mississippi, New Jersey, Texas, and West Virginia). Most States with rates below 17 were in the West (Alaska, Arizona, Colorado, Hawaii, Idaho, New Mexico, Oregon, Utah, Vermont, and Wisconsin). Rates for States in the Midwest and Northeast tended to be intermediate. Consistent with these variations in cesarean rates, VBAC rates tended to be lower in the South and higher in the West, ranging from 13.0 in Louisiana to 44.7 in Hawaii.

### Use of vacuum extraction increases; forceps decline

The percent of births delivered by either forceps or vacuum extraction increased from 9.0 percent in 1989–91 to a peak of 9.5 percent in 1994 before falling to 9.0 percent in 1997 (table 9). When analyzing vaginal births only, the percent delivered by either forceps or vacuum extraction during 1989–97 ranged from 11.4 to 12.1 percent. The overall trends appear relatively stable, masking dramatic changes in the use of these instruments during the period. The percent of births delivered by forceps consistently declined while the use of vacuum extraction consistently increased until 1996 and then remained steady in 1997. The percent of births delivered by forceps fell from 5.5 percent in 1989 to 2.8 percent in 1997, a

49-percent drop. The use of vacuum extraction increased 77 percent over the period, from 3.5 to 6.2 percent of all births. When analyzing vaginal births only, about 3.6 percent were delivered by forceps in 1997 compared with 7.8 percent delivered by vacuum extraction.

### Data limitations

The data in this report are subject to some important limitations. The item(s) on which some of the information is based may not be included on the birth certificates in every area. Even in those areas that do have the items on their birth certificate, they are sometimes left blank or contain incomplete information. The day, month, attendant, and place of birth were reported by all areas for 1989–97. Data for the very small number of cases in which the day or month of birth was missing were imputed. The percent of birth records that contained missing information for the attendant and place of birth was very small, less than 1 percent for each item every year of the 1989–97 period.

Incomplete data were more of an issue for the obstetric procedures and method of delivery items. In 1989, three States did not report any obstetric procedures (Louisiana, Nebraska, and Oklahoma) and Indiana did not report information on ultrasound. For 1990 and 1991, Oklahoma was the only State that did not report all four obstetric procedures while Indiana did not report ultrasound. Beginning in 1992, all 50 States and the District of Columbia reported information on all four obstetric procedures each year except that Delaware did not report ultrasound in 1996. The completeness of the reporting for those States that did report obstetric procedures improved over the period. The percent of records with missing information dropped from 5.5 percent in 1989 to less than 1 percent in 1994–97.

The method of delivery item was reported by 45 States and the District of Columbia in 1989. Information was not available for Louisiana, Maryland, Nebraska, Nevada, and Oklahoma. In 1990, the reporting area expanded to include all States except Oklahoma. Beginning in 1991 all States and the District of Columbia reported information on method of delivery. For those States that did report, the percent of birth records with missing information declined from 4.7 percent in 1989 to less than 1 percent in 1994–97.

In addition to problems with completeness of the items, there can also be problems with the accuracy of the information. There is some evidence, for example, that midwife-attended births are underreported on the birth certificate. According to the results of the 1994 membership survey of the American College of Nurse Midwives, about 6 percent of midwives reported that they were not identified as the attendant at delivery for some births that they attended (2). Other studies have shown that obstetric procedures are underreported on the birth certificate, especially induction of labor (3,4). In addition, a study that linked successive birth certificates for mothers in Georgia found that VBAC's are underreported on the birth certificate (5).

The birth rates by month shown in table 6 are annualized, which adjusts for the number of days in the month. The number of births for the month is inflated by the proportion of days of the year, which are in specified month (e.g., November = 365/30) and then this number is divided by the U.S. population as of that month.

## Conclusions

Notable changes with regard to the setting and timing of births have occurred in the United States as well as changes in the birth attendant. DO's and midwives are delivering an increasing share of births but nearly all of these increases have been for births occurring in hospitals. The use of EFM, ultrasound, induction, and stimulation of labor all increased over the period with the most dramatic change being the doubling in the percent of births that were induced. Another study using these data found that the increase in the use of induction by midwives was just as great as for physicians (6). More research is needed to examine the factors which have contributed to this trend. Partly as a result of the rise in inductions, more births are occurring on weekdays.

The cesarean rate generally fell during the period although the rate increased slightly between 1996 and 1997. VBAC's increased dramatically from 1989 to 1996 but then fell 3 percent in 1997. The initial decline in the cesarean rate and corresponding rise in VBAC's was in response to national concern over the appropriateness of the dramatic rise in cesareans during the 1970's and early 1980's (7). However, the reversal of the trends in cesarean and VBAC rates between 1996 and 1997 may be the result of recent research that has shown increased chances of major maternal morbidity related to attempting VBAC (8). Although most women who attempt VBAC are successful, there is still a controversy over which route of delivery (VBAC verses elective repeat cesarean) is ultimately the safest (9). During the same period the use of forceps consistently declined whereas the use of vacuum extraction consistently increased. There is some maternal and fetal morbidity associated with use of either instrument but it appears that the medical community considers vacuum extraction the preferred choice in most situations (10).

In general it appears from the data in this report that despite the increase in midwife-attended births, obstetric interventions are

increasing. Although cesareans have generally declined, induced vaginal births have doubled. More research is needed to determine whether these changes are resulting in better maternal and perinatal outcomes.

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**Table 1. Live births by attendant: United States, 1989–97**

Year	All births	Physician			Midwife			Other	Unspecified
		Total	Doctor of medicine	Doctor of osteopathy	Total	Certified nurse midwife	Other midwife		
Number									
1997	3,880,894	3,584,686	3,435,037	149,649	272,201	258,227	13,974	22,207	1,800
1996	3,891,494	3,613,070	3,467,500	145,570	252,782	238,994	13,788	21,708	3,934
1995	3,899,589	3,640,629	3,498,648	141,981	229,947	216,768	13,179	22,173	6,840
1994	3,952,767	3,707,606	3,569,518	138,088	218,466	205,049	13,417	24,173	2,522
1993	4,000,240	3,759,963	3,622,304	137,659	210,054	196,228	13,826	27,729	2,494
1992	4,065,014	3,834,502	3,697,967	136,535	199,195	185,005	14,190	27,161	4,156
1991	4,110,907	3,892,053	3,757,348	134,705	182,457	167,704	14,753	31,123	5,274
1990	4,158,212	3,948,270	3,821,638	126,632	163,049	148,728	14,321	30,709	16,184
1989	4,040,958	3,856,842	3,742,315	114,527	147,293	132,286	15,007	26,737	10,086
Percent									
1997	100.0	92.4	88.6	3.9	7.0	6.7	0.4	0.6	...
1996	100.0	92.9	89.2	3.7	6.5	6.1	0.4	0.6	...
1995	100.0	93.5	89.9	3.6	5.9	5.6	0.3	0.6	...
1994	100.0	93.9	90.4	3.5	5.5	5.2	0.3	0.6	...
1993	100.0	94.1	90.6	3.4	5.3	4.9	0.3	0.7	...
1992	100.0	94.4	91.1	3.4	4.9	4.6	0.3	0.7	...
1991	100.0	94.8	91.5	3.3	4.4	4.1	0.4	0.8	...
1990	100.0	95.3	92.3	3.1	3.9	3.6	0.3	0.7	...
1989	100.0	95.7	92.8	2.8	3.7	3.3	0.4	0.7	...

... Category not applicable.

NOTE: Percents computed on the basis of births for which attendant was specified.

**Table 2. Percent of live births attended by doctors of osteopathy or midwives and rates of cesarean births and vaginal birth after previous cesarean delivery: United States and each State, 1997**

State	All births	Percent of births attended by:			
		Doctor of osteopathy	Midwife	Cesarean rate <sup>1</sup>	VBAC rate <sup>2</sup>
United States . . . . .	3,880,894	3.9	7.0	20.8	27.4
Alabama . . . . .	60,914	2.1	2.9	23.9	22.3
Alaska . . . . .	9,947	2.9	16.8	16.8	33.4
Arizona . . . . .	75,699	7.6	9.6	16.8	26.4
Arkansas . . . . .	36,478	2.6	1.8	24.5	19.3
California . . . . .	524,840	1.4	8.2	21.0	20.6
Colorado . . . . .	56,533	3.9	7.7	15.3	35.7
Connecticut . . . . .	43,109	1.1	7.6	19.8	33.2
Delaware . . . . .	10,253	10.5	11.6	21.0	31.0
District of Columbia . . . . .	7,927	*	4.7	21.2	23.4
Florida . . . . .	192,383	2.6	11.8	22.2	24.2
Georgia . . . . .	118,221	1.6	15.2	20.8	23.7
Hawaii . . . . .	17,393	*	4.5	16.7	44.7
Idaho . . . . .	18,582	5.8	4.0	16.4	33.5
Illinois . . . . .	180,803	3.7	3.0	19.1	32.7
Indiana . . . . .	83,436	5.0	2.7	19.7	27.7
Iowa . . . . .	36,659	15.3	2.4	18.9	33.6
Kansas . . . . .	37,289	7.7	1.5	18.5	27.1
Kentucky . . . . .	53,203	1.5	3.2	22.4	24.1
Louisiana . . . . .	66,025	0.6	1.2	25.4	13.0
Maine . . . . .	13,669	11.3	11.1	20.8	29.3
Maryland . . . . .	70,215	0.3	8.8	21.0	31.1
Massachusetts . . . . .	80,364	1.1	13.2	19.7	33.7
Michigan . . . . .	133,714	13.5	6.5	20.1	27.1
Minnesota . . . . .	64,499	2.1	8.3	17.1	34.7
Mississippi . . . . .	41,533	2.1	1.5	26.7	15.6
Missouri . . . . .	74,037	10.9	0.8	20.1	30.8
Montana . . . . .	10,849	1.9	9.5	19.0	32.5
Nebraska . . . . .	23,319	1.7	2.0	20.2	27.6
Nevada . . . . .	26,911	0.7	7.6	20.1	26.6
New Hampshire . . . . .	14,313	1.2	14.4	19.3	36.3
New Jersey . . . . .	113,279	6.3	5.1	24.9	34.1
New Mexico . . . . .	26,871	3.7	20.0	16.6	39.3
New York . . . . .	257,238	2.8	10.9	23.0	31.7
North Carolina . . . . .	107,015	0.7	7.1	21.2	28.2
North Dakota . . . . .	8,353	0.6	5.8	18.4	32.3
Ohio . . . . .	152,033	8.8	4.3	19.0	35.5
Oklahoma . . . . .	48,269	12.0	4.3	22.3	21.6
Oregon . . . . .	43,809	2.7	13.4	16.9	37.6
Pennsylvania . . . . .	144,224	10.0	6.6	19.4	35.0
Rhode Island . . . . .	12,455	1.0	11.9	18.6	31.8
South Carolina . . . . .	52,214	0.6	6.1	22.8	23.3
South Dakota . . . . .	10,173	4.4	3.3	20.0	23.6
Tennessee . . . . .	74,478	1.7	4.1	21.9	25.6
Texas . . . . .	333,974	3.2	4.8	23.1	19.5
Utah . . . . .	43,059	2.2	7.2	15.8	32.9
Vermont . . . . .	6,607	2.8	14.6	15.6	39.3
Virginia . . . . .	91,862	0.8	4.8	21.5	31.6
Washington . . . . .	78,190	2.2	8.8	17.2	34.3
West Virginia . . . . .	20,730	4.3	7.1	24.4	21.2
Wisconsin . . . . .	66,557	2.9	4.9	15.7	33.6
Wyoming . . . . .	6,387	1.7	4.2	18.6	31.6
Puerto Rico . . . . .	64,109	*	*	33.4	8.0
Virgin Islands . . . . .	2,017	*	55.0	22.8	19.8
Guam . . . . .	4,309	*	12.8	15.8	30.8
American Samoa . . . . .	1,634	---	---	---	---

\* Figure does not meet standards of reliability or precision; based on fewer than 20 births in numerator.

--- Data not available.

<sup>1</sup>Percent of all live births by cesarean delivery.<sup>2</sup>Number of vaginal births after previous cesarean per 100 live births to women with a previous cesarean delivery.



**Table 3. Live births by attendant by place of delivery: United States, 1989 and 1997**

Place of delivery	All births	Physician			Midwife			Other	Unspecified
		Total	Doctor of medicine	Doctor of osteopathy	Total	Certified nurse midwife	Other midwife		
1997					Number				
Total . . . . .	3,880,894	3,584,686	3,435,037	149,649	272,201	258,227	13,974	22,207	1,800
In hospital . . . . .	3,843,506	3,579,057	3,430,553	148,504	251,758	248,802	2,956	12,052	639
Not in hospital . . . . .	36,521	5,419	4,372	1,047	20,164	9,179	10,985	9,911	1,027
Freestanding birthing center . . . . .	10,264	1,484	880	604	8,596	6,239	2,357	177	7
Clinic or doctor's office . . . . .	705	385	308	77	168	89	79	130	22
Residence . . . . .	23,236	2,792	2,473	319	11,082	2,664	8,418	8,545	817
Other . . . . .	2,316	758	711	47	318	187	131	1,059	181
Not specified . . . . .	867	210	112	98	279	246	33	244	134
Percent					Percent				
Total . . . . .	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
In hospital . . . . .	99.1	99.8	99.9	99.3	92.6	96.4	21.2	54.9	38.4
Not in hospital . . . . .	0.9	0.2	0.1	0.7	7.4	3.6	78.8	45.1	61.6
Freestanding birthing center . . . . .	0.3	0.0	0.0	0.4	3.2	2.4	16.9	0.8	0.4
Clinic or doctor's office . . . . .	0.0	0.0	0.0	0.1	0.1	0.0	0.6	0.6	1.3
Residence . . . . .	0.6	0.1	0.1	0.2	4.1	1.0	60.4	38.9	49.0
Other . . . . .	0.1	0.0	0.0	0.0	0.1	0.1	0.9	4.8	10.9
Not specified . . . . .	...	...	...	...	...	...	...	...	...
1989					Number				
Total . . . . .	4,040,958	3,856,842	3,742,315	114,527	147,293	132,286	15,007	26,737	10,086
In hospital . . . . .	3,991,448	3,842,313	3,729,345	112,968	125,451	122,892	2,559	14,983	8,701
Not in hospital . . . . .	47,214	12,970	11,450	1,520	21,766	9,366	12,400	11,707	771
Freestanding birthing center . . . . .	14,273	5,016	4,388	628	8,990	5,678	3,312	235	32
Clinic or doctor's office . . . . .	1,111	769	553	216	173	107	66	168	1
Residence . . . . .	27,748	5,790	5,170	620	11,383	3,412	7,971	9,919	656
Other . . . . .	4,082	1,395	1,339	56	1,220	169	1,051	1,385	82
Not specified . . . . .	2,296	1,559	1,520	39	76	28	48	47	614
Percent					Percent				
Total . . . . .	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
In hospital . . . . .	98.8	99.7	99.7	98.7	85.2	92.9	17.1	56.1	91.9
Not in hospital . . . . .	1.2	0.3	0.3	1.3	14.8	7.1	82.9	43.9	8.1
Freestanding birthing center . . . . .	0.4	0.1	0.1	0.5	6.1	4.3	22.1	0.9	0.3
Clinic or doctor's office . . . . .	0.0	0.0	0.0	0.2	0.1	0.1	0.4	0.6	0.0
Residence . . . . .	0.7	0.2	0.1	0.5	7.7	2.6	53.3	37.2	6.9
Other . . . . .	0.1	0.0	0.0	0.0	0.8	0.1	7.0	5.2	0.9
Not specified . . . . .	...	...	...	...	...	...	...	...	...

0.0 Quantity more than zero but less than 0.05.

... Category not applicable.

**Table 4. Average number of live births and index of occurrence, by day of the week: United States, 1989-97**

Year	1997	1996	1995	1994	1993	1992	1991	1990	1989
Average number of births									
Total . . . . .	10,633	10,632	10,684	10,829	10,960	11,107	11,263	11,392	11,071
Sunday . . . . .	7,778	7,949	8,034	8,245	8,469	8,754	8,975	9,153	8,984
Monday . . . . .	10,861	10,742	10,719	10,936	11,201	11,398	11,562	11,582	11,272
Tuesday . . . . .	12,104	11,903	11,888	12,131	12,210	12,333	12,301	12,382	12,052
Wednesday . . . . .	11,723	11,712	11,801	11,908	11,997	11,957	12,053	12,221	11,899
Thursday . . . . .	11,631	11,631	11,800	11,845	11,889	11,895	12,090	12,230	11,844
Friday . . . . .	11,640	11,690	11,758	11,820	11,796	11,957	12,227	12,375	11,964
Saturday . . . . .	8,670	8,774	8,838	8,957	9,140	9,420	9,612	9,799	9,522
Index of occurrence <sup>1</sup>									
Total . . . . .	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sunday . . . . .	73.2	74.8	75.2	76.1	77.3	78.8	79.7	80.3	81.2
Monday . . . . .	102.2	101.0	100.3	101.0	102.2	102.6	102.7	101.7	101.8
Tuesday . . . . .	113.8	111.9	111.3	112.0	111.4	111.0	109.2	108.7	108.9
Wednesday . . . . .	110.3	110.2	110.5	110.0	109.5	107.7	107.0	107.3	107.5
Thursday . . . . .	109.4	109.4	110.4	109.4	108.5	107.1	107.3	107.4	107.0
Friday . . . . .	109.5	109.9	110.1	109.1	107.6	107.7	108.6	108.6	108.1
Saturday . . . . .	81.5	82.5	82.7	82.7	83.4	84.8	85.3	86.0	86.0

<sup>1</sup>Index is the ratio of the average number of births on a given day of the week to the average daily number of births for the year, multiplied by 100. For example, the ratio for Sunday is computed as 7,778 divided by 10,633 multiplied by 100 which equals 73.2.

**Table 5. Live births by day of week and index of occurrence by method of delivery, induced and noninduced births, by day of week: United States, 1997**

Day of week	Average number of births	Index of occurrence <sup>1</sup>						
		Total	Method of delivery			Total	Primary	Repeat
			Total	Induced	Noninduced			
Total . . . . .	10,633	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sunday . . . . .	7,778	73.2	78.2	38.8	87.7	54.1	63.9	37.7
Monday . . . . .	10,861	102.2	100.8	95.2	102.2	107.3	99.1	121.1
Tuesday . . . . .	12,104	113.8	111.6	132.5	106.6	122.2	119.7	126.4
Wednesday . . . . .	11,723	110.3	108.8	126.5	104.5	115.8	114.4	118.3
Thursday . . . . .	11,631	109.4	107.9	123.2	104.3	114.6	112.0	119.1
Friday . . . . .	11,640	109.5	106.4	118.4	103.5	121.0	114.8	131.6
Saturday . . . . .	8,670	81.5	86.1	64.9	91.1	64.6	75.9	45.4

<sup>1</sup>Index is the ratio of the average number of births on a given day of the week to the average daily number of births for the year, multiplied by 100. For example, the ratio for Sunday is computed as 7,778 divided by 10,633 multiplied by 100 which equals 73.2.

**Table 6. Live births and birth rates, by month: United States, 1989–97**

Year	1997	1996	1995	1994	1993	1992	1991	1990	1989
Number of births									
Total . . . . .	3,880,894	3,891,494	3,899,589	3,952,767	4,000,240	4,065,014	4,110,907	4,158,212	4,040,958
January . . . . .	317,211	314,283	316,013	320,705	323,073	334,045	335,172	335,274	320,422
February . . . . .	291,541	301,763	295,094	301,327	304,656	315,448	309,130	312,611	300,391
March . . . . .	321,212	322,581	328,503	339,736	342,187	339,518	344,079	350,614	339,912
April . . . . .	314,230	312,595	309,119	317,392	327,042	333,373	335,626	336,382	318,779
May . . . . .	330,331	325,708	334,543	330,295	335,989	344,137	353,131	354,114	336,320
June . . . . .	321,867	318,525	329,805	329,737	335,349	339,664	334,265	347,355	338,973
July . . . . .	346,506	345,162	340,873	345,862	352,554	359,112	362,913	367,670	356,716
August . . . . .	339,122	346,317	350,737	352,173	350,898	348,949	366,786	372,516	366,579
September . . . . .	333,600	336,348	339,103	339,223	348,013	347,547	356,016	358,682	357,344
October . . . . .	328,657	336,346	330,012	330,172	332,937	343,546	348,934	353,166	344,161
November . . . . .	307,282	309,397	310,817	319,397	316,379	321,943	323,635	333,146	325,543
December . . . . .	329,335	322,469	314,970	326,748	331,163	337,732	341,220	336,682	335,818
Birth rate <sup>1</sup>									
Total . . . . .	14.5	14.7	14.8	15.2	15.5	15.9	16.3	16.7	16.3
January . . . . .	14.0	14.0	14.2	14.6	14.8	15.5	15.7	15.9	15.3
February . . . . .	14.3	14.9	14.7	15.1	15.5	15.7	16.1	16.4	15.8
March . . . . .	14.2	14.4	14.8	15.4	15.7	15.8	16.1	16.6	16.2
April . . . . .	14.3	14.4	14.3	14.9	15.5	16.0	16.3	16.5	15.7
May . . . . .	14.6	14.5	15.0	15.0	15.4	16.0	16.5	16.8	16.0
June . . . . .	14.6	14.6	15.3	15.4	15.8	16.3	16.1	17.0	16.6
July . . . . .	15.2	15.3	15.3	15.6	16.1	16.6	16.9	17.4	16.9
August . . . . .	14.9	15.4	15.7	15.9	16.0	16.1	17.1	17.6	17.4
September . . . . .	15.1	15.4	15.7	15.8	16.4	16.6	17.1	17.5	17.5
October . . . . .	14.4	14.9	14.7	14.9	15.2	15.8	16.2	16.6	16.3
November . . . . .	13.9	14.1	14.3	14.9	14.9	15.3	15.5	16.2	15.9
December . . . . .	14.4	14.3	14.1	14.7	15.1	15.6	15.9	15.8	15.9

<sup>1</sup>Rates on an annual basis per 1,000 population for specified month; see Data limitations.

**Table 7. Percent of live births to mothers with selected obstetric procedures: United States, 1989–97**

Year	Total number of births	Electronic fetal monitoring	Ultrasound	Induction of labor	Stimulation of labor
1997 . . . . .	3,880,894	83.3	64.4	18.4	17.4
1996 <sup>1</sup> . . . . .	3,891,494	82.5	63.9	16.9	16.9
1995 . . . . .	3,899,589	81.3	61.2	16.0	16.1
1994 . . . . .	3,952,767	80.3	61.2	14.7	15.2
1993 . . . . .	4,000,240	79.0	60.1	13.4	13.8
1992 . . . . .	4,065,014	77.3	57.9	11.4	12.9
1991 <sup>2</sup> . . . . .	4,110,907	75.5	56.1	10.5	12.1
1990 <sup>2,3</sup> . . . . .	4,158,212	73.2	52.5	9.5	11.4
1989 <sup>2,4</sup> . . . . .	4,040,958	68.4	47.7	9.0	10.9

<sup>1</sup>Delaware did not report ultrasound.

<sup>2</sup>Illinois did not report ultrasound.

<sup>3</sup>Excludes data for Oklahoma, which did not require reporting of obstetric procedures.

<sup>4</sup>Excludes data for Louisiana, Nebraska, and Oklahoma, which did not require reporting of obstetric procedures.

**Table 8. Total and primary cesarean rates and vaginal birth after previous cesarean delivery rates: United States, 1989–97**

Year	Cesarean rate		VBAC rate <sup>3</sup>
	Total <sup>1</sup>	Primary <sup>2</sup>	
1997	20.8	14.6	27.4
1996	20.7	14.6	28.3
1995	20.8	14.7	27.5
1994	21.2	14.9	26.3
1993	21.8	15.3	24.3
1992	22.3	15.6	22.6
1991	22.6	15.9	21.3
1990 <sup>4</sup>	22.7	16.0	19.9
1989 <sup>5</sup>	22.8	16.1	18.9

<sup>1</sup>Percent of all live births by cesarean delivery.

<sup>2</sup>Number of primary cesareans per 100 live births to women who have not had a previous cesarean.

<sup>3</sup>Number of vaginal births after previous cesarean per 100 live births to women with a previous cesarean delivery.

<sup>4</sup>Excludes data for Oklahoma, which did not require reporting of method of delivery.

<sup>5</sup>Excludes data for Louisiana, Maryland, Nebraska, Nevada, and Oklahoma, which did not require reporting of method of delivery.

**Table 9. Percent of live births delivered by forceps or vacuum extraction, 1989–97**

Year	Forceps or vacuum extraction		Forceps		Vacuum extraction	
	Percent of all births	Percent of vaginal births	Percent of all births	Percent of vaginal births	Percent of all births	Percent of vaginal births
1997	9.0	11.4	2.8	3.6	6.2	7.8
1996	9.4	11.8	3.2	4.0	6.2	7.8
1995	9.4	11.9	3.5	4.4	5.9	7.5
1994	9.5	12.1	3.8	4.9	5.7	7.2
1993	9.4	12.0	4.1	5.3	5.3	6.7
1992	9.1	11.7	4.3	5.5	4.8	6.2
1991	9.0	11.6	4.6	5.9	4.4	5.7
1990 <sup>1</sup>	9.0	11.7	5.1	6.6	3.9	5.0
1989 <sup>2</sup>	9.0	11.6	5.5	7.1	3.5	4.5

<sup>1</sup>Excludes data for Oklahoma, which did not require reporting of method of delivery.

<sup>2</sup>Excludes data for Louisiana, Maryland, Nebraska, Nevada, and Oklahoma, which did not require reporting of method delivery.

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### Suggested citation

Curtin SC, Park MM. Trends in the attendant, place, and timing of births, and in the use of obstetric interventions: United States, 1989-97. National vital statistics reports; vol 47 no. 27. Hyattsville, Maryland: National Center for Health Statistics. 1999.

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Centers for Disease Control and Prevention  
National Center for Health Statistics  
6525 Belcrest Road  
Hyattsville, Maryland 20782-2003

DHHS Publication No. (PHS) 2000-1120  
9-0741 (11/99)

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