

Expanded Health Data from the New Birth Certificate, 2004

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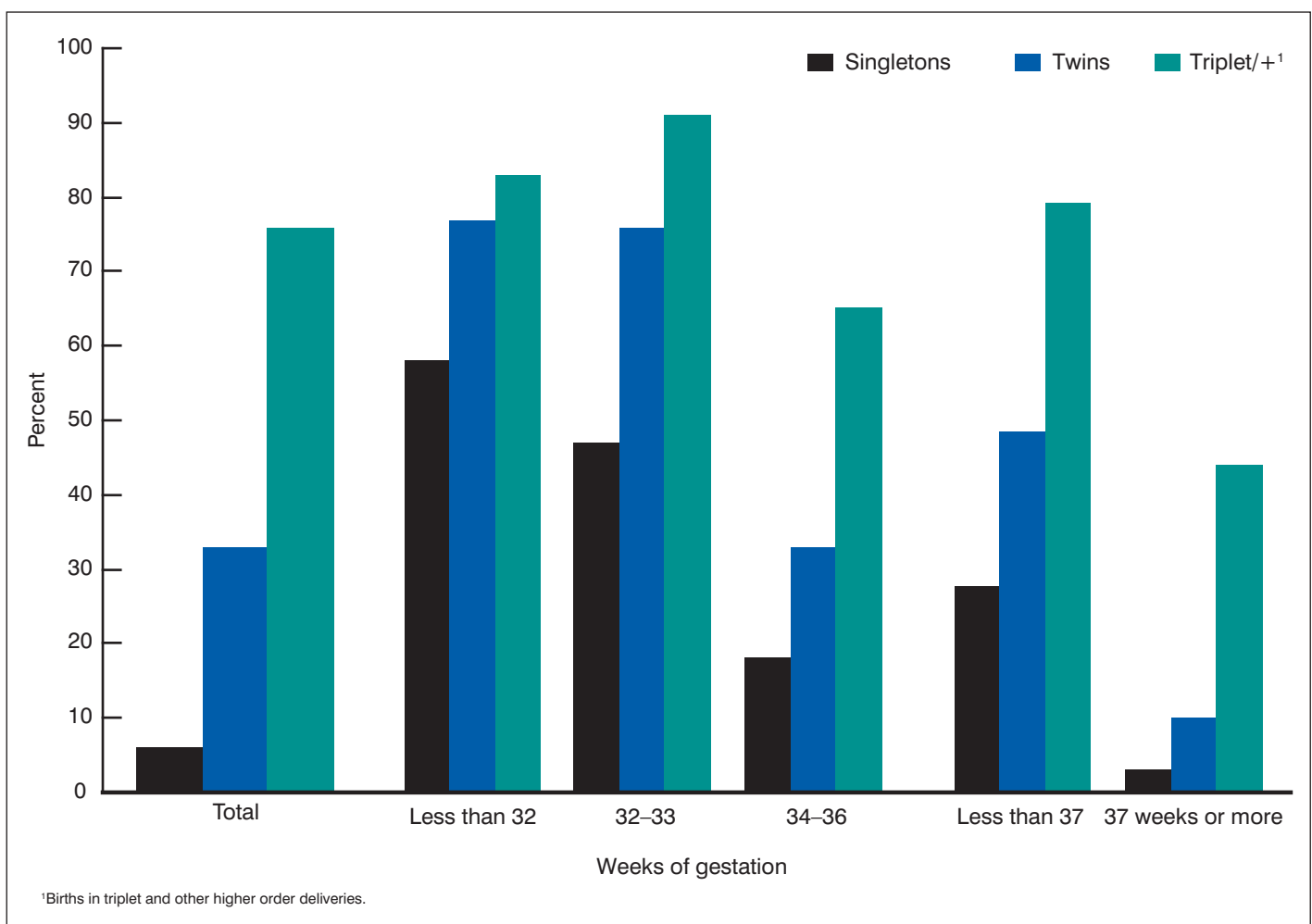


Figure 1. Neonatal intensive care unit admission by gestational age and plurality: seven-state reporting area, 2004

Abstract

Objectives—This is the first report to present maternal and infant health information exclusive to the 2003 revision of the U.S. Standard

Certificate of Live Birth. Information is shown for the items: Risk factors in this pregnancy, Obstetric procedures, Characteristics of labor and delivery, Method of delivery, Abnormal conditions of the newborn, and Congenital anomalies of the newborn. These items are

included on both the 1989 and the 2003 U.S. Standard Certificate of Live Birth; however, many of the specific checkboxes were modified, or are new to the 2003 certificate. The new checkboxes are the focus of this report.

Methods—Descriptive tabulations are presented on births occurring in 2004 to residents of the seven states (Idaho, Kentucky, New York (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington), which implemented the 2003 U.S. Standard Certificate of Live Birth as of January 1, 2004.

Results—There were 571,858 births to residents of the seven-state area in 2004 (14 percent of all U.S. births). Gestational and prepregnancy diabetes were reported at rates of 44.0 and 7.2 per 1,000; levels for both types of diabetes increased steadily with maternal age. One percent (1.4) of births were reported to have resulted from infertility therapies; nearly all (90 percent) of the infertility therapy-related births were to non-Hispanic white mothers. More than one-half of all attempts at external cephalic version successfully converted the infant to vertex position. Steroids for fetal lung maturation were administered prior to delivery to 13 of every 1,000 newborns and were inversely associated with gestational age. More than two-thirds of all women received epidurals to help control the pain of labor. A trial of labor was reportedly attempted for 36 percent of all women who then had a cesarean delivery. Six percent of singletons, one-third of all twins, and more than three-fourths of triplets were admitted to a neonatal intensive care unit (NICU) at delivery (Figure 1). The most frequently reported congenital anomalies were cyanotic heart disease (81 per 100,000 infants) and hypospadias (174 per 100,000 male births).

Keywords: births • birth certificate • maternal and infant health • pregnancy risk factors • labor and delivery

Introduction

This is the first report to present maternal and infant health information exclusive to the 2003 revision of the U.S. Standard Certificate of Live Birth. (See Tables 1–6, A–D, and Figures 1–6. Items discussed in this report are shown in bold in Tables 1–6.) The 2003 revision is seen as an important opportunity to improve the content and quality of birth certificate data. (Detailed information on the 2003 revision is available elsewhere) (1,2). As of January 1, 2004, seven states had implemented the revision: Idaho, Kentucky, New York (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington. This report presents 2004 data for the seven-state reporting area on the following maternal, labor and delivery, and newborn items: Risk factors in this pregnancy, Obstetric procedures, Characteristics of labor and delivery, Method of delivery, Abnormal conditions of the newborn, and Congenital anomalies of the newborn (Figure 2). Except for small differences in wording, these items are included on both the 1989 and the 2003 U.S. Standard Certificate of Live Birth. Many of the specific checkboxes included in these items, however, were modified, or are entirely new to the 2003 certificate. The new checkboxes are the focus of this report. An earlier report presented 2004 data on items collected on both the 1989 and the 2003 U.S. Standard Certificates of Live Birth (3). A number of items new to the U.S. Standard Certificate of Live Birth and collected by the seven-state reporting area are not presented in this report. Some examples of the new items not shown are breastfeeding, sources of payment for the delivery, the receipt of

Women, Infants, and Children (WIC) food for the pregnancy, and maternal morbidity (including uterine rupture).

Methods

Data are based on 100 percent of births registered in the seven states that implemented the 2003 revision of the birth certificate as of January 1st, 2004: Idaho, Kentucky, New York (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington. Two additional states, Florida and New Hampshire, implemented the revised birth certificate in 2004, but after January 1; data for these states are not shown. The 571,858 births to residents of the seven states (Table A) represent 14 percent of all U.S. 2004 births. Comparison of selected maternal demographic characteristics for the seven-state area with those for the United States indicate substantial differences between the two areas, suggesting that results for this limited reporting area may not be generalizable to the country as a whole; see Table B.

Race and Hispanic origin are reported independently on the birth certificate. This report includes data for these race and Hispanic origin groups: non-Hispanic white, non-Hispanic black, and Hispanic. Information on American Indian or Alaska Native, Asian or Pacific Islander, and Hispanic subgroup births are not shown because of the small numbers of births for this reporting area for many items. See “Technical Notes.”

Results

Risk factors in this pregnancy

The 2003 Standard Certificate of Live Birth includes nine specific pregnancy risk factors: prepregnancy and gestational diabetes, prepregnancy and gestational hypertension, eclampsia, previous preterm birth, other previous poor pregnancy outcome, pregnancy resulted from infertility treatment (see “Technical Notes”), and previous cesarean delivery. Of these nine risk factors, information on diabetes type and the use of infertility treatment have not been previously available from national vital statistics. Information on pregnancy risk factors was missing on 4.3 percent of all records.

Data from the seven-state reporting area indicate that **gestational diabetes** is substantially more prevalent than **pregnancy diabetes**, 44.0 compared with 7.2 per 1,000 births (or, expressed as percents, 4.4 and 0.7) (Table 1). Gestational diabetes (GDM) is a diagnosis of diabetes, that is, any degree of glucose intolerance, *during* pregnancy; prepregnancy diabetes (DM) is diagnosis *prior* to pregnancy. Women with either type of diabetes are more likely to suffer medical complications during pregnancy (4) and their infants are at increased risk of obesity, glucose intolerance, and of developing diabetes as they age (5). Women with GDM are also at increased risk of developing diabetes later in life (5).

These new data show that the risk for both prepregnancy and gestational diabetes increases rapidly with maternal age (Table 1). For example, less than 2 percent (18.4 per 1,000) of mothers under 20 years of age were reportedly diagnosed with GDM, compared with 3 to 4 percent of women in their twenties, and more than 8 percent of mothers 40 years of age and older. Differences were also observed by race and Hispanic origin. Non-Hispanic black women were slightly less

MEDICAL AND HEALTH INFORMATION		
<p>41. RISK FACTORS IN THIS PREGNANCY (Check all that apply)</p> <p>Diabetes</p> <ul style="list-style-type: none"> <input type="checkbox"/> Prepregnancy (Diagnosis prior to this pregnancy) <input type="checkbox"/> Gestational (Diagnosis in this pregnancy) <p>Hypertension</p> <ul style="list-style-type: none"> <input type="checkbox"/> Prepregnancy (Chronic) <input type="checkbox"/> Gestational (PIH, preeclampsia) <input type="checkbox"/> Eclampsia <ul style="list-style-type: none"> <input type="checkbox"/> Previous preterm birth <input type="checkbox"/> Other previous poor pregnancy outcome (Includes perinatal death, small-for-gestational age/intrauterine growth restricted birth) <input type="checkbox"/> Pregnancy resulted from infertility treatment-If yes, check all that apply: <ul style="list-style-type: none"> <input type="checkbox"/> Fertility-enhancing drugs, Artificial insemination or Intrauterine insemination <input type="checkbox"/> Assisted reproductive technology (e.g., in vitro fertilization (IVF), gamete intrafallopian transfer (GIFT)) <input type="checkbox"/> Mother had a previous cesarean delivery If yes, how many _____ <input type="checkbox"/> None of the above 	<p>43. OBSTETRIC PROCEDURES (Check all that apply)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cervical cerclage <input type="checkbox"/> Tocolysis <p>External cephalic version:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Successful <input type="checkbox"/> Failed <input type="checkbox"/> None of the above <p>44. ONSET OF LABOR (Check all that apply)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Premature Rupture of the Membranes (prolonged \geq 12 hrs.), <input type="checkbox"/> Precipitous Labor (<3 hrs.) <input type="checkbox"/> Prolonged Labor (\geq 20 hrs.) <input type="checkbox"/> None of the above <p>45. CHARACTERISTICS OF LABOR AND DELIVERY (Check all that apply)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Induction of labor <input type="checkbox"/> Augmentation of labor <input type="checkbox"/> Non-vertex presentation <input type="checkbox"/> Steroids (glucocorticoids) for fetal lung maturation received by the mother prior to delivery <input type="checkbox"/> Antibiotics received by the mother during labor <input type="checkbox"/> Clinical chorioamnionitis diagnosed during labor or maternal temperature \geq 38°C (100.4°F) <input type="checkbox"/> Moderate/heavy meconium staining of the amniotic fluid <input type="checkbox"/> Fetal intolerance of labor such that one or more of the following actions was taken: in-utero resuscitative measures, further fetal assessment, or operative delivery <input type="checkbox"/> Epidural or spinal anesthesia during labor <input type="checkbox"/> None of the above 	<p>46. METHOD OF DELIVERY</p> <p>A. Was delivery with forceps attempted but unsuccessful?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>B. Was delivery with vacuum extraction attempted but unsuccessful?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>C. Fetal presentation at birth</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cephalic <input type="checkbox"/> Breech <input type="checkbox"/> Other <p>D. Final route and method of delivery (Check one)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Vaginal/Spontaneous <input type="checkbox"/> Vaginal/Forceps <input type="checkbox"/> Vaginal/Vacuum <input type="checkbox"/> Cesarean <p>If cesarean, was a trial of labor attempted?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>42. INFECTIONS PRESENT AND/OR TREATED DURING THIS PREGNANCY (Check all that apply)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Gonorrhea <input type="checkbox"/> Syphilis <input type="checkbox"/> Chlamydia <input type="checkbox"/> Hepatitis B <input type="checkbox"/> Hepatitis C <input type="checkbox"/> None of the above 	<p>47. MATERNAL MORBIDITY (Check all that apply) (Complications associated with labor and delivery)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Maternal transfusion <input type="checkbox"/> Third or fourth degree perineal laceration <input type="checkbox"/> Ruptured uterus <input type="checkbox"/> Unplanned hysterectomy <input type="checkbox"/> Admission to intensive care unit <input type="checkbox"/> Unplanned operating room procedure following delivery <input type="checkbox"/> None of the above 	
NEWBORN INFORMATION		
<p>48. NEWBORN MEDICAL RECORD NUMBER: _____</p> <p>49. BIRTHWEIGHT (grams preferred, specify unit)</p> <p>_____</p> <p><input type="checkbox"/> grams <input type="checkbox"/> lb/oz</p> <p>50. OBSTETRIC ESTIMATE OF GESTATION: _____ (completed weeks)</p> <p>51. APGAR SCORE:</p> <p>Score at 5 minutes: _____</p> <p>If 5 minute score is less than 6,</p> <p>Score at 10 minutes: _____</p> <p>52. PLURALITY - Single, Twin, Triplet, etc. (Specify) _____</p> <p>53. IF NOT SINGLE BIRTH - Born First, Second, Third, etc. (Specify) _____</p>	<p>54. ABNORMAL CONDITIONS OF THE NEWBORN (Check all that apply)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Assisted ventilation required immediately following delivery <input type="checkbox"/> Assisted ventilation required for more than six hours <input type="checkbox"/> NICU admission <input type="checkbox"/> Newborn given surfactant replacement therapy <input type="checkbox"/> Antibiotics received by the newborn for suspected neonatal sepsis <input type="checkbox"/> Seizure or serious neurologic dysfunction <input type="checkbox"/> Significant birth injury (skeletal fracture(s), peripheral nerve injury, and/or soft tissue/solid organ hemorrhage which requires intervention) <input type="checkbox"/> None of the above 	<p>55. CONGENITAL ANOMALIES OF THE NEWBORN (Check all that apply)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Anencephaly <input type="checkbox"/> Meningocele/Spina bifida <input type="checkbox"/> Cyanotic congenital heart disease <input type="checkbox"/> Congenital diaphragmatic hernia <input type="checkbox"/> Omphalocele <input type="checkbox"/> Gastroschisis <input type="checkbox"/> Limb reduction defect (excluding congenital amputation and dwarfing syndromes) <input type="checkbox"/> Cleft Lip with or without Cleft Palate <input type="checkbox"/> Cleft Palate alone <input type="checkbox"/> Down Syndrome <ul style="list-style-type: none"> <input type="checkbox"/> Karyotype confirmed <input type="checkbox"/> Karyotype pending <input type="checkbox"/> Suspected chromosomal disorder <ul style="list-style-type: none"> <input type="checkbox"/> Karyotype confirmed <input type="checkbox"/> Karyotype pending <input type="checkbox"/> Hypospadias <input type="checkbox"/> None of the anomalies listed above

NOTE: Data in this report on the use of infertility treatment under "Risk factors in this pregnancy" are based on an earlier draft version of the item that did not ask for the type of infertility treatment used; see "Technical Notes." Shaded portions are items shown in this report.

Figure 2. 2003 U.S. Standard Certificate of Live Birth, selected medical, health, and newborn sections

likely than their non-Hispanic white and Hispanic counterparts to develop diabetes during pregnancy, but were nearly twice as likely to be diagnosed with diabetes prior to pregnancy (Table 1). The higher risk of DM among non-Hispanic black mothers became more pronounced with advancing age. See Figure 3.

In the 2004 seven-state reporting area, 14 of every 1,000 births, or just over 1 percent of all births, were reported to have resulted from **infertility treatment**. Levels ranged from 0.6 percent in South Carolina, to 2.3 percent in New York State (excluding New York City). See Table C. Infertility treatments are used to overcome fecundity

Table A. Number and percentage of live births by state: Total of seven-state reporting area, 2004

[By place of residence]

	Number	Percent
Total	571,858	100
Idaho	22,532	4
Kentucky	55,720	10
New York State ¹	130,879	23
Pennsylvania	144,748	25
South Carolina	56,590	10
Tennessee	79,642	14
Washington	81,747	14

¹Excludes New York City.

disorders. As defined for the U.S. Standard Certificate of Live Birth, these therapies include fertility-enhancing drugs, artificial insemination, and assisted reproductive technologies such as in vitro fertilization (6). Data available for this reporting area do not distinguish between types of therapies, see “[Technical Notes.](#)”

Large differences in the uses of these treatments were observed by maternal age and by race and Hispanic origin. Women 40 years of age and older were more than twice as likely as women in their thirties to give birth as a result of this treatment (5.3 and 2.5 percent, respectively); infertility therapy-induced births were comparatively rare among women under 30 years of age (0.5 percent) ([Table 1](#)). Eighteen percent of all births to mothers 45 years of age and older resulted from these therapies. See [Figure 4](#). Among the race and Hispanic origin groups studied, births to non-Hispanic white women were markedly more likely than those born to non-Hispanic black and Hispanic mothers to result

Table B. Percentage of live births by selected demographic characteristics: United States and seven-state reporting area, 2004

Characteristic of mother	Seven states ¹	United States
	Percent	
Non-Hispanic white ²	72.4	56.3**
Non-Hispanic black ²	13.1	14.2**
Hispanic ³	10.4	23.2**
Unmarried women	34.2	35.8**
Mothers under 20 years	9.7	10.3**
Mothers 40 years and older	2.7	2.7

** Difference significant at $P = 0.05$.

¹Idaho, Kentucky, New York (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington.

²Race and Hispanic origin are reported separately on birth certificates. Persons of Hispanic origin may be of any race. Race categories are consistent with the 1977 Office of Management and Budget (OMB) standards. All states in the seven-state reporting area reported multiple-race data for 2004. These multiple-race data were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see “[Technical Notes.](#)”

³Includes all persons of Hispanic origin of any race.

from infertility therapies (1.7 compared with 0.25 and 0.4 percent) ([Table 1](#)). Indeed, 90 percent of *all* infertility-therapy births were to non-Hispanic white women.

Infertility therapies have long been associated with multifetal pregnancies (7–10). Differences in the risk of a multiple birth according to whether the pregnancy resulted from infertility treatment are demonstrated in [Figure 5](#). Twin births were more than 10 times, and triplets/+ more than 60 times more likely to occur when infertility therapies were used compared with when they were not; 33 compared with 3 percent for twins, and 6.6 compared with 0.1 percent for triplets.

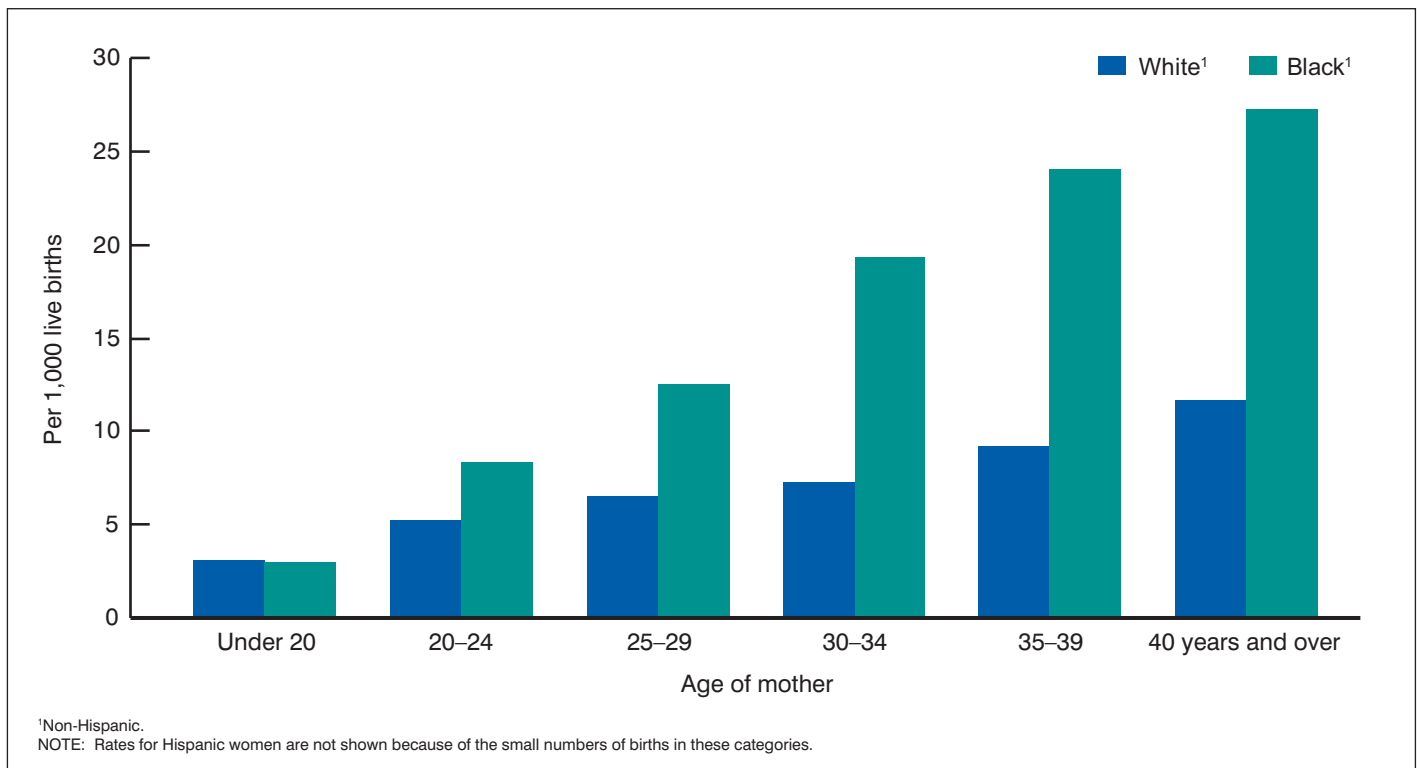


Figure 3. Rates of pre-pregnancy diabetes by race and Hispanic origin of mother: seven-state reporting area, 2004

Table C. Percentage of births resulting from infertility treatment: Total of reporting area and each state, 2004

[By place of residence]

	Percent
Total	1.36
Idaho	0.67
Kentucky	0.98
New York State ¹	2.30
Pennsylvania	1.57
South Carolina	0.60
Tennessee	0.80
Washington	1.06

¹Excludes New York City.

Another way to look at the impact of infertility therapy is to examine the proportion of all births resulting from infertility therapy according to plurality. Nearly one-half (49 percent) of all triplets/+ and 14 percent of all twins, but just under 1 percent (0.85 percent) of all singletons births in these seven states were reported to have resulted from these therapies (data not shown). See “Discussion” section for information on possible reporting issues for this item.

Obstetric procedures

The specific obstetric procedures reported on the 2003 revision of the birth certificate are those used to prevent premature labor (tocolysis) or delivery (cervical cerclage) or to change fetal position if the fetus is not in vertex presentation (external cephalic version). Two

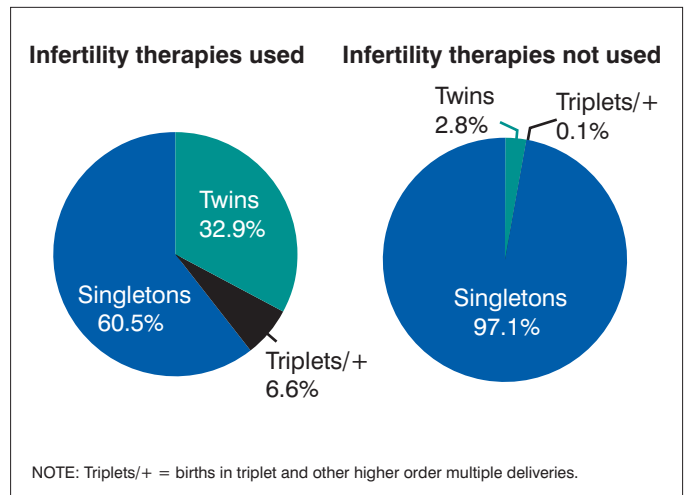


Figure 5. Distribution of births resulting from infertility therapies and distribution of births not resulting from infertility therapies by plurality: seven-state reporting area, 2004

have not previously been reported on the U.S. Standard Certificate of Live Birth: cervical cerclage and external cephalic version. Information on these procedures was missing on 4.5 percent of all records for the seven state reporting area for 2004.

The rate of **cervical cerclage** was 4.4 per 1,000 births for the seven state reporting area (Table 2). Cervical cerclage is

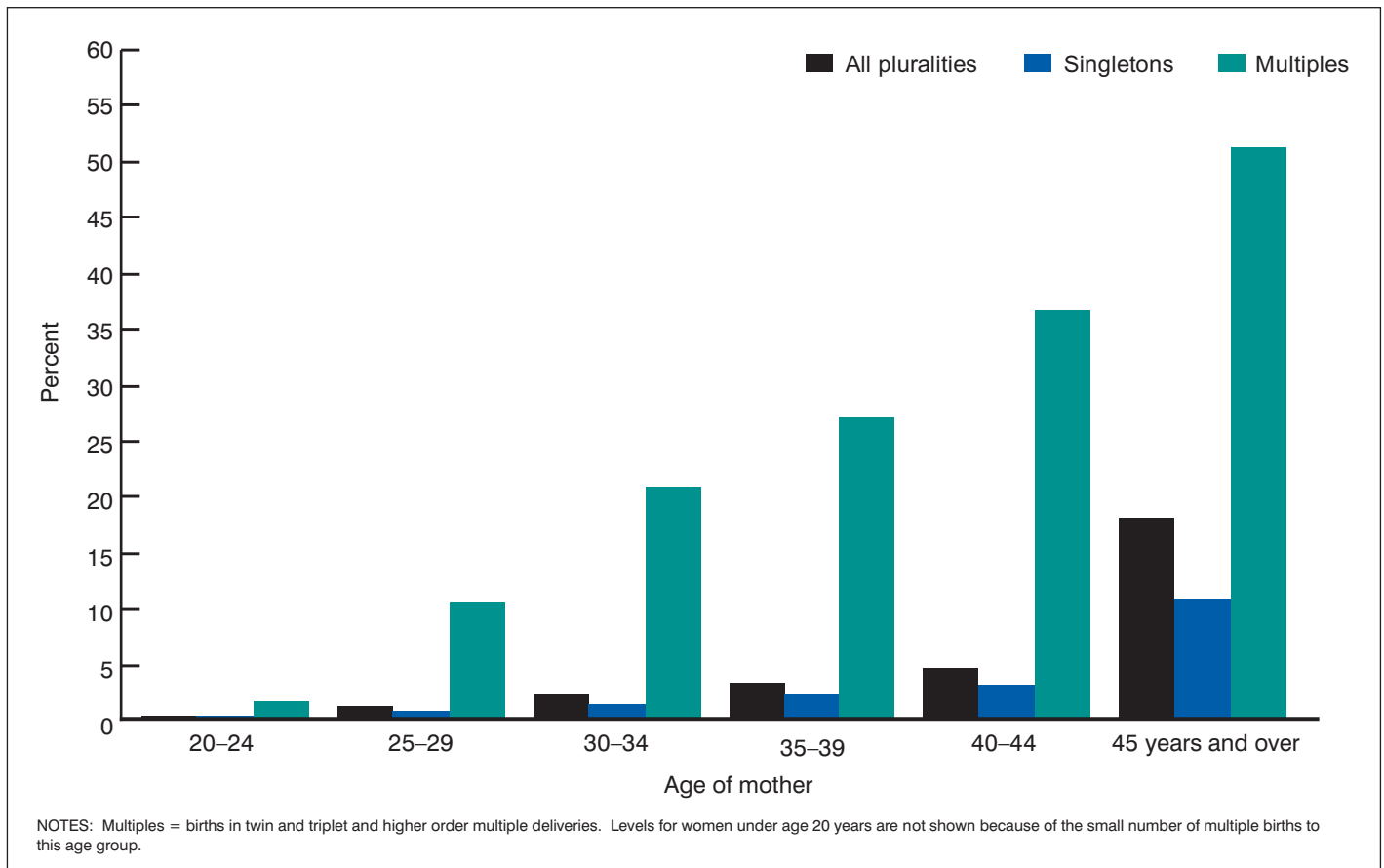


Figure 4. Pregnancies initiated by infertility therapy by age of mother and plurality: seven-state reporting area, 2004

circumferential banding or suture of the cervix to prevent or treat early cervical dilation (e.g., incompetent cervix) and prevent premature delivery. Rates of cervical cerclage increased fairly steadily by maternal age and were more than twice as high among non-Hispanic black women (8.9 per 1,000) as for non-Hispanic white and Hispanic women, (3.9 and 3.3, respectively). The effectiveness of cervical cerclage in prolonging pregnancy is unclear; a National Institutes of Health randomized clinical trial testing the efficacy of the procedure is underway (11).

External cephalic version (ECV) is the procedure of external manipulation to convert a fetus from a nonvertex or breech to a vertex presentation to avoid breech presentation at delivery. ECV was performed at a rate of 3.4 per 1,000, or for less than 1 percent of deliveries. The procedure was reported to be successful (i.e., the fetus was converted to a vertex presentation) more than one-half of the time (58 percent) (Table 2). Non-Hispanic black women were more likely to have a successful ECV (67 percent) compared with non-Hispanic white (59 percent) and Hispanic women (49 percent).

When ECV is successful, the need for cesarean delivery may decrease. These new birth certificate data show that women who had a successful ECV were much less likely than those with a failed ECV to have a cesarean delivery (13 percent compared with 90 percent) (data not shown).

Characteristics of labor and delivery

Data on seven of the nine characteristics of labor and delivery presented in Table 3 have not previously been reported on the U.S. Standard Certificate of Live Birth: augmentation of labor, nonvertex presentation, steroids (glucocorticoids) for fetal lung maturation received by the mother prior to delivery, antibiotics received by the mother, chorioamnionitis, fetal intolerance of labor, and epidural or spinal anesthesia. Information on characteristics of labor and delivery was missing on 4.0 percent of all records for 2004.

The rate of **nonvertex presentation** (i.e., presentation of a part of the infant's body other than the upper or back part of the head) was 28.7 per 1,000 births, or about 3 percent of all births. The rate of nonvertex presentation rose with increasing maternal age and was more than twice as high for infants of mothers 40 years and over (50 per 1,000) compared with those born to mothers under age 25 (21 per 1,000). This pattern by maternal age was seen for all racial and Hispanic origin groups. There is evidence for underreporting of nonvertex presentation in these new data, see "Technical Notes."

The rate for **steroids (glucocorticoids) for fetal lung maturation received by the mother prior to delivery** was 12.5 per 1,000, or just over 1 percent of all births in the reporting area. Steroids are considered a beneficial intervention for infants at risk of preterm delivery; they are used to treat neonatal respiratory distress syndrome, thereby reducing the risk of neonatal mortality (12). As expected, earlier gestational age was strongly associated with higher levels of steroid receipt. Among mothers of infants delivered very preterm (less than 32 weeks), the rate of steroid therapy was 203 per 1,000, compared with levels of 40 and 3 per 1,000 for infants delivered late preterm (34 to 36 weeks), and at term or greater. See Figure 6. Overall, that is, for births at all gestational ages, non-Hispanic black women were markedly more likely to receive this therapy (18.6 compared with 12.1 and 9.0 per 1,000 for non-Hispanic white and Hispanic women). The elevated overall level of steroid receipt for non-Hispanic black mothers likely is related to their

higher risk of preterm birth (18 compared with 12 percent for non-Hispanic white and Hispanic mothers in 2004 for this reporting area) (data not shown).

Almost 1 of every 5 women **received antibiotics during labor** (188 per 1,000 or 18.8 percent). Antibiotics are given to mothers at risk of preterm labor, premature rupture of the membranes (PROM), and other risk factors to prevent neonatal sepsis (severe infection) (13,14). Non-Hispanic black mothers were more likely than other groups studied to receive antibiotics (230 per 1,000 compared with 183 (non-Hispanic white) and 170 (Hispanic)), again, likely reflecting their increased risk of preterm birth. Rates also were generally higher for mothers under 20 years of age compared with their older counterparts. About one-third of mothers of preterm infants received antibiotics; a substantial proportion of mothers of term infants (172 per 1,000 or 17 percent) also received this medication during delivery (Figure 6). Among mothers with PROM, 417 per 1,000 or more than 40 percent reportedly received antibiotics during labor (tabular data not shown).

Epidural or spinal anesthesia was the most frequently reported characteristic of labor and delivery, received by more than two-thirds (68 percent) of all mothers. Very little difference in use was reported by age—between 66 and 70 percent of mothers in each age group received anesthetics to control the pain of labor. Non-Hispanic white mothers were significantly more likely to receive anesthesia (70.2 percent) than non-Hispanic black and Hispanic mothers (65.6 and 57.8 percent, respectively).

Method of delivery

Of the items shown under method of delivery in Table 4, attempted but unsuccessful forceps delivery, attempted but unsuccessful vacuum delivery, and trial of labor prior to cesarean delivery have not previously been reported on the U.S. Standard Certificate of Live Birth. Information on these items was missing as follows: attempted forceps or attempted vacuum delivery about 6 percent each, and trial of labor 3.6 percent.

Unsuccessful attempts at delivery with **forceps or vacuum** were reportedly very rare—only 0.4 and 0.9 percent, respectively. Or, put another way, almost all (more than 99 percent) of deliveries using either forceps or vacuum resulted in a successful vaginal delivery.

These new birth certificate data also include an item on **whether a trial of labor was attempted prior to cesarean delivery**, that is, whether vaginal delivery was attempted, but the delivery ultimately was by cesarean. This item may be especially informative given the continued steady rise in first and repeat cesarean deliveries (3), and the controversies surrounding nonmedically indicated cesarean deliveries (15,16). It is important to note that certain medical conditions, such as breech presentation at delivery, may preclude an attempt at a trial of labor. The new data indicate that a trial of labor was attempted among slightly more than one-third (36.2) of all women who had a cesarean delivery (Table 4). Levels differed only slightly by race, ranging from 36 (non-Hispanic white and Hispanic) to 39 percent (non-Hispanic black women). Among women having their first (primary) cesarean delivery in the seven-state area, almost one-half (47.7 percent) were reported to have attempted a trial of labor (tabular data not shown). Only 9.1 percent of women having a repeat cesarean delivery were reported to have undergone a trial of labor (data not shown). The comparatively small percentage of vaginal deliveries attempted among women with a previous cesarean may reflect concerns regarding the benefits and risks of vaginal birth after cesarean delivery (VBAC) (17).

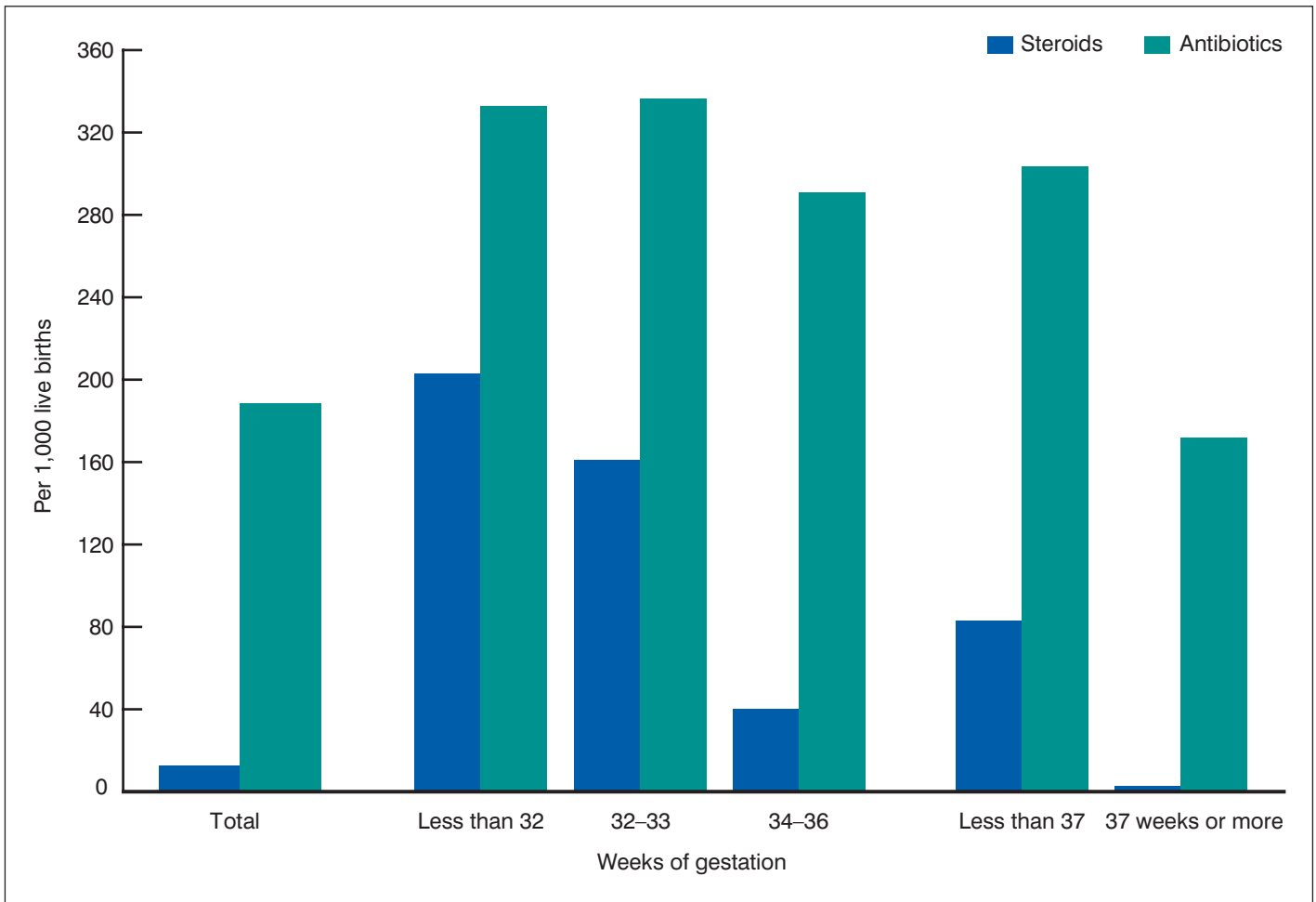


Figure 6. Steroids for fetal lung maturation received by the mother prior to delivery, and antibiotics received by the mother during delivery, by gestational age: seven-state reporting area, 2004

Abnormal conditions of the newborn

The 2003 Revision of the U.S. Standard Certificate of Live Birth includes seven abnormal conditions of the newborn not previously reported on the birth certificate: assisted ventilation required immediately following delivery, assisted ventilation required for more than 6 hours, NICU admission (admission to a neonatal intensive care unit), surfactant replacement, antibiotics for suspected neonatal sepsis, seizures or serious neurologic dysfunction, and significant birth injury (Table 5). Information on abnormal conditions of the newborn was missing on 4.3 percent of all records for 2004.

The duration of an infant's need for **assisted ventilation** (breathing assistance) following delivery is an indication of the severity of newborn respiratory distress. Newborns needing only immediate ventilation differ from those who require ventilation for more than 6 hours. The need for prolonged assisted ventilation indicates an infant with severe and persistent respiratory failure after birth. Just over 5 percent of all births (52.5 per 1,000 infants) required **assisted ventilation immediately following delivery**. Prolonged **assisted ventilation for more than 6 hours** was reported for 1.3 per 1,000 infants. Non-Hispanic black newborns were more likely than their non-Hispanic white and Hispanic counterparts to receive breathing assistance both immediately following, and for more than 6 hours after delivery (Table 5).

Surfactant replacement therapy has been established as an appropriate preventive and treatment therapy for prematurity-related surfactant deficiency to improve lung function and decrease the risk for respiratory distress syndrome (RDS). Surfactant therapy was reported for 4.3 per 1,000 births. As would be expected, treatment with surfactant replacement therapy was inversely associated with gestational age. Less than 1 of every 1,000 infants born at term (37 or more weeks of gestation) received surfactant treatment, compared with 30 per 1,000 preterm infants (under 37 weeks of gestation) (tabular data not shown).

Non-Hispanic black infants were also the most likely to receive surfactant replacement therapy, 5.8 per 1,000, compared with non-Hispanic white and Hispanic infants (about 4 per 1,000). The higher level of surfactant replacement therapy for non-Hispanic black infants compared with those for the other racial or Hispanic origin groups likely is associated with their higher rate of preterm birth.

Among all infants in the seven-state reporting area 66 per 1,000 (nearly 7 percent) were **admitted to a neonatal intensive care unit (NICU)** in 2004 (Table 5). Non-Hispanic black infants (8.5 percent) were more likely than non-Hispanic white (6.3 percent) and Hispanic infants (6.1 percent) to be admitted to a NICU. By maternal age, rates of admission were highest among infants born to younger (under 20 years of age) and older mothers (aged 35 years and over).

Figure 1 shows a strong association between NICU admission and the gestational age and plurality of the newborn. At each plurality, preterm births were more likely than those born at term or later to require intensive care upon delivery. Infants born in plural deliveries were also more likely to be admitted to the NICU; three-fourths of all triplets and one-third of all twins compared with 6 percent of singletons required intensive care. The higher risk of NICU admission for plural births is at least in part related to their greater likelihood of being born preterm (3). Regardless of gestational age, however, twins and triplets were more likely to require this care; among term and greater infants only, 10 percent of twins and 44 percent of triplets compared with only 3 percent of singletons were admitted to a NICU.

Congenital anomalies

Congenital anomalies are the leading cause of infant death in the United States (18). Infants with congenital anomalies are likely to have long term physical and metabolic disorders (19). Of the 12 congenital anomalies in **Table 6, 5** (cyanotic congenital heart disease, limb reduction defect, cleft palate alone, suspected chromosomal disorder, and hypospadias) have not been previously reported in national birth certificate data. Information on congenital anomalies was missing for 4.5 percent of all births. Due to the small numbers of anomalies reported, detailed information by race and Hispanic origin is not shown; overall levels shown should be interpreted with caution. See “Technical Notes.”

The most commonly reported anomalies were **cyanotic heart disease** (heart malformations resulting in lack of oxygen) and **hypospadias** (malformation of the penis, usually correctable by surgery). The rate for cyanotic heart disease was 80.6 per 100,000 births (**Table 6**). Among male births, hypospadias was reported at a rate of 173.7 per 100,000 (data not shown). **Limb reduction defect** and **cleft palate alone** were reported at the comparatively lower levels of 33.9 and 33.3 per 100,000, respectively.

The overall rate of suspected **chromosomal disorder** (malformations caused by detectable defects in chromosome structure) was 58.8 per 100,000 births. Rates for suspected chromosomal disorder for mothers 35 years of age and older were at least double those of younger mothers. The new certificates also include an item indicating whether the karyotype for the suspected disorder was confirmed, i.e., tested positive. About one-fourth (26 percent) of suspected chromosomal disorders were reported as “confirmed” either prenatally, or in the short time between delivery and completion of the birth certificate (approximately within 24 to 48 hours) (data not shown).

Discussion

This first report on data exclusive to the 2003 U.S. Standard Certificate of Live Birth, although based on a limited reporting area, demonstrates some of the considerable potential of these new data. Findings on differences by race and Hispanic origin on births resulting from fertility therapy, cervical cerclage, surfactant replacement therapy, and NICU admission for just a few examples, add to the literature on these quite rare, but important topics. As the reporting area grows, so too should the utility and strength of the data. Information from a larger, more representative reporting area will allow for reporting on topics such as the prevalence of prepregnancy and gestational diabetes among detailed race and Hispanic origin

subgroups. These data also may be used to better elucidate the risks associated with the use of infertility therapies (including more rare outcomes such as congenital anomalies), the efficacy of obstetrical procedures such as cervical cerclage and external cephalic version, and of treatments for the newborn such as surfactant therapy, steroids for fetal lung maturation, and antibiotics. Data on attempted trial of labor prior to cesarean delivery will allow for more in-depth exploration of trends surrounding nonmedically indicated cesarean deliveries, and also to examine differences in outcomes among infants whose mothers have undergone a trial of labor compared with those who have not.

The revised certificates are being gradually adopted across the country; a total of 19 states had implemented the new certificate by the end of 2006. As of this writing (early 2007), however, a number of states, largely as a result of resource constraints, still have no definite plans to do so. This gradual implementation weakens what has been an important strength of birth certificate data, that is, its availability on essentially all U.S. births—about 4 million each year. Although national data continue to be available on a large number of critical items such as maternal age, marital status, and infant’s birthweight (3), national information on many new and modified items will not be available until all reporting areas have adopted the new certificate.

As noted earlier, although data are based on all births reported in the seven-state area, and as such, are representative of these states, data for this area may not be representative of those for the country as a whole. Comparison of selected demographic characteristics for the seven-state area with those for the entire U.S. indicate substantial differences between the two, and findings from this report may not be generalizable to the total U.S.

Comparison of levels for selected items reported in this report with those reported for surveys and other surveillance sources yield mixed results. Whereas patterns by age and race are generally consistent with those expected, these data may underrepresent actual prevalence. The rate of pregnancies complicated by gestational diabetes reported here (4.4 percent) is higher than earlier studies based on the National Hospital Discharge Survey (20) and the National Survey of Family Growth (4) (2.8 and 3.6 percent), but lower than estimates from the American Diabetes Association (7 percent) (5). The level reported for hypospadias (for males only), a new item on the revised certificates, was 174 per 100,000 for this seven-state reporting area; other sources report levels ranging from 190 to 500 per 100,000 (19,21,22).

The completeness of reporting of births resulting from the use of infertility therapies is difficult to estimate. The new birth certificate question is intended to capture information on births resulting from *both* assisted reproductive technologies (ART) (procedures in which both eggs and sperm are handled (e.g., in vitro fertilization)) and non-ART procedures (treatments in which *only* sperm are handled (i.e., infertility drugs or intrauterine or artificial insemination)). The birth certificate data now available, however, do not differentiate between ART and non-ART therapies (birth certificate information on the type of fertility treatment used should begin to become available for a limited reporting area for data year 2005, see “Technical Notes”). Although the U.S. Assisted Reproductive Technology (ART) Reporting System provides annual information on ART births (23), no such reporting system for non-ART pregnancies exists, and accordingly, the contribution of these therapies to all births is not well understood. (Non-ART therapies have been estimated, however, to account for more than 20 percent of twin and

triplet and higher order births (24) in recent years.) Once birth certificate data that differentiates between ART and non-ART therapies become available, it will be possible to better evaluate the extent, if any, of underreporting of this important birth certificate item.

In reviewing these findings it is important to bear in mind that 2004 marks the first year of implementation of the new certificates for five of the seven reporting areas presented. It has been expected that data quality may suffer initially as hospitals and states become familiar with the new data items and new collection processes.

The 2003 revision is viewed as an opportunity to improve the quality and content of birth certificate data (2). Further study will be necessary to adequately assess whether the reliability and validity of these data have been enhanced. This report, however, amply demonstrates substantive enrichment to the content of this key data source.

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Table 1. Number and rate of live births by pregnancy risk factors, by age and race and Hispanic origin of mother: Total of seven reporting states, 2004

[Rates are number of live births with specified risk factor per 1,000 live births in specified group]

Risk factor and race and Hispanic origin of mother	All births ¹	Factor reported	All ages	Under 20 years	20–24 years	25–29 years	30–34 years	35–39 years	40–54 years	Not stated ²
All races ³										
Diabetes	571,858	28,033	51.2	21.3	33.6	50.3	63.0	81.5	98.7	24,489
Prepregnancy (Diagnosis prior to this pregnancy) . . .	571,858	3,950	7.2	2.9	5.5	7.1	8.3	11.1	14.0	24,489
Gestational (Diagnosis in this pregnancy)	571,858	24,083	44.0	18.4	28.1	43.2	54.7	70.4	84.7	24,489
Hypertension	571,858	32,615	59.6	57.9	53.9	58.4	60.2	68.0	90.2	24,489
Prepregnancy (Chronic)	571,858	7,659	14.0	5.7	9.2	12.7	17.0	23.9	32.8	24,489
Gestational (PIH, preeclampsia)	571,858	24,956	45.6	52.1	44.7	45.6	43.2	44.1	57.4	24,489
Previous preterm birth	571,858	14,332	26.2	10.0	25.9	28.4	28.1	30.6	29.6	24,489
Other previous poor pregnancy outcome	571,858	19,977	36.5	14.2	29.4	35.9	41.6	53.9	70.6	24,489
Pregnancy resulted from infertility treatment	571,858	7,430	13.6	*	1.5	10.4	21.6	32.9	52.7	24,489
Mother had a previous cesarean delivery ⁴	571,858	55,795	101.1	22.2	75.1	97.9	128.4	160.4	163.8	20,000
Non-Hispanic white ⁵										
Diabetes	410,668	19,393	49.4	23.0	33.9	47.4	57.8	72.5	88.4	18,245
Prepregnancy (Diagnosis prior to this pregnancy) . . .	410,668	2,596	6.6	3.1	5.2	6.5	7.3	9.2	11.6	18,245
Gestational (Diagnosis in this pregnancy)	410,668	16,797	42.8	19.9	28.7	40.9	50.5	63.2	76.8	18,245
Hypertension	410,668	23,858	60.8	60.0	57.4	60.9	59.9	64.0	83.4	18,245
Prepregnancy (Chronic)	410,668	5,229	13.3	5.6	9.0	12.1	15.4	20.8	28.1	18,245
Gestational (PIH, preeclampsia)	410,668	18,629	47.5	54.4	48.4	48.7	44.5	43.2	55.3	18,245
Previous preterm birth	410,668	9,729	24.8	9.3	24.3	25.8	26.6	28.5	27.9	18,245
Other previous poor pregnancy outcome	410,668	14,635	37.3	14.1	28.8	34.6	41.8	55.4	73.6	18,245
Pregnancy resulted from infertility treatment	410,668	6,718	17.1	*	1.9	12.8	25.3	38.1	61.2	18,245
Mother had a previous cesarean delivery ⁴	410,668	39,487	99.9	18.7	69.6	91.7	125.1	157.3	160.0	15,502
Non-Hispanic black ⁵										
Diabetes	74,012	3,707	51.6	19.1	34.7	59.2	81.1	108.9	119.3	2,211
Prepregnancy (Diagnosis prior to this pregnancy) . . .	74,012	823	11.5	3.0	8.3	12.5	19.3	24.0	27.2	2,211
Gestational (Diagnosis in this pregnancy)	74,012	2,884	40.2	16.2	26.5	46.7	61.7	84.9	92.1	2,211
Hypertension	74,012	5,559	77.4	64.9	61.3	75.3	99.5	124.3	155.6	2,211
Prepregnancy (Chronic)	74,012	1,802	25.1	8.0	14.4	25.1	45.7	62.3	77.0	2,211
Gestational (PIH, preeclampsia)	74,012	3,757	52.3	56.9	47.0	50.2	53.8	61.9	78.5	2,211
Previous preterm birth	74,012	2,893	40.3	11.2	37.0	52.5	53.8	59.1	51.4	2,211
Other previous poor pregnancy outcome	74,012	3,351	46.7	17.4	40.3	59.3	63.0	68.0	77.0	2,211
Pregnancy resulted from infertility treatment	74,012	182	2.5	-	*	2.6	5.0	9.6	15.9	2,211
Mother had a previous cesarean delivery ⁴	74,012	7,866	109.0	28.5	94.9	129.7	157.6	191.6	183.9	1,832

See footnotes at end of table.

Table 1. Number and rate of live births by pregnancy risk factors, by age and race and Hispanic origin of mother: Total of seven reporting states, 2004—Con.

[Rates are number of live births with specified risk factor per 1,000 live births in specified group]

Risk factor and race and Hispanic origin of mother	All births ¹	Factor reported	All ages	Under 20 years	20–24 years	25–29 years	30–34 years	35–39 years	40–54 years	Not stated ²
Hispanic ⁶										
Diabetes	58,908	2,988	52.6	17.8	30.0	54.9	78.1	118.3	161.7	2,085
Prepregnancy (Diagnosis prior to this pregnancy) . . .	58,908	351	6.2	*	3.4	6.0	7.9	17.6	26.4	2,085
Gestational (Diagnosis in this pregnancy)	58,908	2,637	46.4	16.0	26.6	48.9	70.3	100.7	135.3	2,085
Hypertension	58,908	2,108	37.1	39.2	29.6	33.8	40.6	55.9	84.6	2,085
Prepregnancy (Chronic).	58,908	391	6.9	2.9	4.1	6.0	8.7	19.7	27.5	2,085
Gestational (PIH, preeclampsia).	58,908	1,717	30.2	36.4	25.5	27.8	31.9	36.2	57.1	2,085
Previous preterm birth	58,908	1,200	21.1	10.7	20.6	24.7	22.8	26.1	23.3	2,085
Other previous poor pregnancy outcome	58,908	1,331	23.4	9.2	20.7	26.2	28.7	35.1	42.3	2,085
Pregnancy resulted from infertility treatment	58,908	231	4.1	-	*	4.1	8.6	11.8	*	2,085
Mother had a previous cesarean delivery ⁴	58,908	6,030	105.0	24.9	81.6	120.3	150.9	173.7	189.8	1,483

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

- Quantity zero.

¹Total number of births to residents of areas reporting specified pregnancy risk factor.

²No response reported for pregnancy risk factor item; includes births to residents of states using the 2003 Standard Certificate of Live Birth occurring in states using the 1989 Standard Certificate of Live Birth.

³Includes other races not shown.

⁴Differences in not stated levels for this risk factor compared with other risk factors are the result of editing procedures; see "Technical Notes."

⁵Race and Hispanic origin are reported separately on birth certificates. Persons of Hispanic origin may be of any race. Race categories are consistent with the 1977 Office of Management and Budget (OMB) standards. All states in the seven-state reporting area reported multiple-race data for 2004. These multiple-race data were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see "Technical Notes."

⁶Includes all persons of Hispanic origin of any race.

NOTE: Includes Idaho, Kentucky, New York (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington.

Table 2. Rates of obstetric procedures, by age and race and Hispanic origin of mother: Total of seven reporting states, 2004

[Rates are number of live births with specified obstetric procedure per 1,000 live births in specified group]

Obstetric procedure and race and Hispanic origin of mother	All births ¹	Procedure reported	All ages	Under 20 years	20–24 years	25–29 years	30–34 years	35–39 years	40–54 years	Not stated ²
All races ³										
Cervical cerclage	571,858	2,425	4.4	2.4	3.5	4.4	5.4	6.1	6.2	25,522
Tocolysis	571,858	13,357	24.4	29.2	25.9	24.3	22.8	21.7	20.2	25,522
External cephalic version	571,858	1,839	3.4	3.4	3.6	3.2	3.3	3.1	4.4	25,522
Percent successful⁴	571,858	1,073	58.3	62.3	61.4	55.8	59.2	52.6	53.2	25,522
Non-Hispanic white ⁵										
Cervical cerclage	410,668	1,524	3.9	1.9	2.9	3.5	4.8	5.3	6.4	18,908
Tocolysis	410,668	9,284	23.7	30.2	25.1	23.3	22.6	21.3	19.4	18,908
External cephalic version	410,668	1,504	3.8	4.4	4.5	3.7	3.5	3.1	4.4	18,908
Percent successful⁴	410,668	885	58.8	63.2	61.4	56.3	59.6	53.2	59.2	18,908
Non-Hispanic black ⁵										
Cervical cerclage	74,012	641	8.9	3.4	6.5	11.1	14.5	15.7	*	2,295
Tocolysis	74,012	1,858	25.9	24.3	26.1	29.6	25.1	21.1	16.8	2,295
External cephalic version	74,012	129	1.8	1.6	2.0	1.4	2.2	*	*	2,295
Percent successful⁴	74,012	86	66.7	71.4	66.7	70.8	66.7	*	*	2,295
Hispanic ⁶										
Cervical cerclage	58,908	186	3.3	*	2.7	4.4	2.9	5.3	*	2,261
Tocolysis	58,908	1,661	29.3	34.7	30.6	27.6	25.6	28.1	30.9	2,261
External cephalic version	58,908	129	2.3	2.8	2.1	2.0	2.2	*	*	2,261
Percent successful⁴	58,908	63	48.8	52.2	54.1	43.3	54.5	*	*	2,261

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

¹Total number of births to residents of areas reporting specified obstetric procedure.

²No response reported for obstetric procedure item; includes births to residents of states using the 2003 Standard Certificate of Live Birth occurring in states using the 1989 Standard Certificate of Live Birth.

³Includes other races not shown.

⁴Percentage successful external cephalic version (ECV) is the number of successful ECVs per 100 live births to women with an attempted ECV in specified group.

⁵Race and Hispanic origin are reported separately on birth certificates. Persons of Hispanic origin may be of any race. Race categories are consistent with the 1977 Office of Management and Budget (OMB) standards. All states in the seven-state reporting area reported multiple-race data for 2004. These multiple-race data were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see "Technical Notes."

⁶Includes all persons of Hispanic origin of any race.

NOTE: Includes Idaho, Kentucky, New York (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington.

Table 3. Number and rate of live births by characteristics of labor and delivery, by age and race and Hispanic origin of mother: Total of seven reporting states, 2004

[Rates are number of live births with specified characteristic per 1,000 live births in specified group]

Labor and delivery characteristic and race and Hispanic origin of mother	All births ¹	Characteristic reported	All ages	Under 20 years	20–24 years	25–29 years	30–34 years	35–39 years	40–54 years	Not stated ²
All races³										
Induction of labor	571,858	145,649	265.2	275.5	274.7	274.2	256.2	240.1	238.6	22,734
Augmentation of labor.	571,858	135,407	246.6	306.7	268.0	247.1	225.5	204.8	189.3	22,734
Nonvertex presentation	571,858	15,765	28.7	18.4	21.7	27.2	34.2	39.7	50.5	22,734
Steroids (glucocorticoids) for fetal lung maturation	571,858	6,882	12.5	14.8	12.5	12.1	11.9	12.4	15.2	22,734
Antibiotics received by mother during labor.	571,858	103,275	188.1	226.7	195.7	185.0	177.3	172.4	169.0	22,734
Clinical chorioamnionitis during labor	571,858	5,606	10.2	15.8	11.0	9.7	9.4	7.1	7.7	22,734
Moderate/heavy meconium staining of amniotic fluid.	571,858	29,173	53.1	60.6	53.3	52.3	51.4	51.3	55.6	22,734
Fetal intolerance of labor	571,858	36,547	66.6	79.1	67.2	65.6	63.3	62.7	69.8	22,734
Epidural or spinal anesthesia during labor.	571,858	373,674	680.5	689.3	659.8	671.1	701.1	697.1	679.6	22,734
Non-Hispanic white⁴										
Induction of labor	410,668	112,688	286.4	315.2	304.3	297.9	271.1	250.4	251.3	17,145
Augmentation of labor.	410,668	94,622	240.4	298.4	263.9	244.2	222.9	201.5	189.2	17,145
Nonvertex presentation	410,668	11,789	30.0	19.8	22.3	27.5	35.0	40.6	49.2	17,145
Steroids (glucocorticoids) for fetal lung maturation	410,668	4,779	12.1	15.2	11.8	11.9	11.6	11.9	15.1	17,145
Antibiotics received by mother during labor.	410,668	72,043	183.1	213.2	187.5	182.5	177.2	172.3	171.5	17,145
Clinical chorioamnionitis during labor	410,668	3,407	8.7	12.1	9.4	8.6	8.4	6.1	7.7	17,145
Moderate/heavy meconium staining of amniotic fluid.	410,668	18,490	47.0	49.7	46.5	46.2	46.7	46.9	53.9	17,145
Fetal intolerance of labor	410,668	24,957	63.4	72.4	63.1	63.4	61.9	60.6	68.6	17,145
Epidural or spinal anesthesia during labor.	410,668	276,324	702.2	718.1	682.2	692.4	720.7	714.0	692.3	17,145
Non-Hispanic black⁴										
Induction of labor	74,012	16,624	230.6	239.5	232.8	235.3	220.2	208.1	212.7	1,919
Augmentation of labor.	74,012	18,948	262.8	313.6	279.8	247.6	223.2	207.4	183.5	1,919
Nonvertex presentation	74,012	1,913	26.5	15.9	21.8	29.0	35.3	40.4	62.2	1,919
Steroids (glucocorticoids) for fetal lung maturation	74,012	1,341	18.6	15.8	18.6	17.7	21.6	20.9	24.7	1,919
Antibiotics received by mother during labor.	74,012	16,582	230.0	265.9	240.4	219.7	199.7	197.9	186.5	1,919
Clinical chorioamnionitis during labor	74,012	956	13.3	20.2	12.9	10.7	12.6	8.2	*	1,919
Moderate/heavy meconium staining of amniotic fluid.	74,012	5,325	73.9	78.0	67.5	74.4	78.5	81.7	71.2	1,919
Fetal intolerance of labor	74,012	6,794	94.2	103.5	91.8	93.0	89.3	91.7	109.4	1,919
Epidural or spinal anesthesia during labor.	74,012	47,312	656.3	681.9	655.4	643.7	650.1	649.7	650.2	1,919

See footnotes at end of table.

Table 3. Number and rate of live births by characteristics of labor and delivery, by age and race and Hispanic origin of mother: Total of seven reporting states, 2004—Con.

[Rates are number of live births with specified characteristic per 1,000 live births in specified group]

Labor and delivery characteristic and race and Hispanic origin of mother	All births ¹	Characteristic reported	All ages	Under 20 years	20–24 years	25–29 years	30–34 years	35–39 years	40–54 years	Not stated ²
Hispanic ⁵										
Induction of labor	58,908	11,078	194.0	200.8	197.8	183.6	193.1	200.9	204.8	1,811
Augmentation of labor.	58,908	14,887	260.7	328.2	273.1	244.8	230.3	225.4	179.6	1,811
Nonvertex presentation	58,908	1,368	24.0	17.3	18.4	25.1	30.1	34.3	54.6	1,811
Steroids (glucocorticoids) for fetal lung maturation	58,908	515	9.0	11.9	8.2	9.1	7.6	10.5	*	1,811
Antibiotics received by mother during labor.	58,908	9,687	169.7	209.6	175.6	160.9	154.9	147.8	106.1	1,811
Clinical chorioamnionitis during labor	58,908	727	12.7	20.2	14.3	10.6	8.9	9.6	*	1,811
Moderate/heavy meconium staining of amniotic fluid.	58,908	3,679	64.4	70.8	66.5	63.1	60.7	59.4	53.6	1,811
Fetal intolerance of labor	58,908	2,961	51.9	65.2	54.5	47.6	44.5	50.0	38.9	1,811
Epidural or spinal anesthesia during labor.	58,908	32,992	577.8	606.8	563.6	559.0	586.9	614.3	617.6	1,811

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

¹Total number of births to residents of areas reporting specified labor and delivery characteristic.

²No response reported for characteristic of labor and delivery item; includes births to residents of states using the 2003 Standard Certificate of Live Birth occurring in states using the 1989 Standard Certificate of Live Birth.

³Includes other races not shown.

⁴Race and Hispanic origin are reported separately on birth certificates. Persons of Hispanic origin may be of any race. Race categories are consistent with the 1977 Office of Management and Budget (OMB) standards. All states in the seven-state reporting area reported multiple-race data for 2004. These multiple-race data were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see "Technical Notes."

⁵Includes all persons of Hispanic origin of any race.

NOTE: Includes Idaho, Kentucky, New York (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington.

Table 4. Live births by method of delivery, by age and race and Hispanic origin of mother: Total of seven reporting states, 2004

[Percentages are number of live births with specified method of delivery per 100 live births in specified group]

Method of delivery and race and Hispanic origin of mother	All births ¹	Method reported	All ages	Under 20 years	20–24 years	25–29 years	30–34 years	35–39 years	40–54 years	Not stated ²
All races³			Percent							
Attempted forceps/unsuccessful	571,858	1,895	0.4	0.5	0.4	0.3	0.3	0.3	0.3	32,364
Attempted vacuum extraction/unsuccessful	571,858	4,626	0.9	1.1	0.9	0.8	0.8	0.8	0.9	36,021
Fetal presentation at birth										
Cephalic	571,858	507,793	93.1	94.8	94.0	93.2	92.4	91.4	89.8	26,214
Breech	571,858	21,471	3.9	2.7	3.2	3.9	4.5	5.2	6.0	26,214
Other	571,858	16,380	3.0	2.5	2.8	2.9	3.2	3.3	4.1	26,214
Final route and method of delivery										
Vaginal/Spontaneous	571,858	354,479	64.3	70.2	69.1	65.6	60.9	56.2	51.6	20,751
Vaginal/Forceps	571,858	6,569	1.2	1.8	1.2	1.2	1.0	1.0	1.0	20,751
Vaginal/Vacuum	571,858	27,702	5.0	7.2	5.1	4.9	4.7	4.2	4.2	20,751
Cesarean	571,858	162,357	29.5	20.9	24.6	28.3	33.3	38.7	43.1	20,751
Cesarean/trial of labor attempted⁴	162,357	56,683	36.2	57.6	42.3	36.6	31.2	28.5	28.5	5,901
Non-Hispanic white ⁵										
Attempted forceps/unsuccessful	410,668	1,292	0.3	0.4	0.4	0.3	0.3	0.3	0.3	23,273
Attempted vacuum extraction/unsuccessful	410,668	3,283	0.9	1.2	0.9	0.8	0.8	0.8	0.9	25,979
Fetal presentation at birth										
Cephalic	410,668	363,921	93.1	94.8	94.2	93.3	92.5	91.5	90.2	19,750
Breech	410,668	16,452	4.2	3.1	3.4	4.1	4.6	5.3	5.9	19,750
Other	410,668	10,545	2.7	2.1	2.4	2.6	2.9	3.1	3.9	19,750
Final route and method of delivery										
Vaginal/Spontaneous	410,668	252,303	63.9	69.5	68.8	65.5	61.1	56.6	52.4	15,981
Vaginal/Forceps	410,668	4,845	1.2	1.9	1.3	1.3	1.0	1.0	1.1	15,981
Vaginal/Vacuum	410,668	20,135	5.1	7.6	5.3	5.1	4.7	4.2	4.3	15,981
Cesarean	410,668	117,404	29.7	21.0	24.5	28.1	33.2	38.2	42.1	15,981
Cesarean/trial of labor attempted⁴	117,404	40,296	35.6	57.6	42.7	36.7	30.8	28.2	29.1	4,133
Non-Hispanic black ⁵										
Attempted forceps/unsuccessful	74,012	329	0.5	0.6	0.5	0.4	0.4	0.4	*	2,692
Attempted vacuum extraction/unsuccessful	74,012	617	0.9	1.0	0.8	0.7	0.9	1.0	*	2,960
Fetal presentation at birth										
Cephalic	74,012	66,354	92.3	94.7	93.1	92.0	90.2	89.3	86.8	2,128
Breech	74,012	2,227	3.1	1.9	2.7	3.0	4.3	4.9	6.9	2,128
Other	74,012	3,303	4.6	3.4	4.2	5.0	5.5	5.8	6.3	2,128
Final route and method of delivery										
Vaginal/Spontaneous	74,012	46,598	64.6	69.9	67.6	65.1	58.8	51.8	47.9	1,872
Vaginal/Forceps	74,012	779	1.1	1.8	1.1	0.9	0.8	0.8	0.5	1,872
Vaginal/Vacuum	74,012	2,959	4.1	6.2	4.2	3.3	3.2	3.2	3.0	1,872
Cesarean	74,012	21,804	30.2	22.1	27.1	30.7	37.3	44.2	48.5	1,872
Cesarean/trial of labor attempted⁴	21,804	8,076	39.1	57.3	41.7	36.3	32.2	30.5	28.7	1,157

See footnotes at end of table.

Table 4. Live births by method of delivery, by age and race and Hispanic origin of mother: Total of seven reporting states, 2004—Con.

[Percentages are number of live births with specified method of delivery per 100 live births in specified group]

Method of delivery and race and Hispanic origin of mother	All births ¹	Method reported	All ages	Under 20 years	20–24 years	25–29 years	30–34 years	35–39 years	40–54 years	Not stated ²
Hispanic ⁶										
Attempted forceps/unsuccesful	58,908	198	0.4	0.3	0.4	0.3	0.3	*	*	3,202
Attempted vacuum extraction/unsuccesful	58,908	477	0.9	1.1	0.9	0.7	0.7	0.9	*	3,706
Fetal presentation at birth										
Cephalic	58,908	52,954	93.4	94.6	94.1	93.2	92.3	91.8	88.7	2,184
Breech	58,908	1,831	3.2	2.3	2.6	3.4	3.8	4.8	6.9	2,184
Other	58,908	1,939	3.4	3.1	3.3	3.3	3.9	3.5	4.4	2,184
Final route and method of delivery										
Vaginal/Spontaneous	58,908	38,515	67.2	72.7	71.4	67.0	61.8	56.1	49.9	1,567
Vaginal/Forceps	58,908	519	0.9	1.5	0.9	0.8	0.7	0.7	*	1,567
Vaginal/Vacuum	58,908	2,706	4.7	6.9	4.7	4.1	4.3	3.7	3.8	1,567
Cesarean	58,908	15,601	27.2	18.8	22.9	28.1	33.2	39.5	45.7	1,567
Cesarean/trial of labor attempted⁴	15,601	5,529	36.2	58.2	41.0	33.3	30.0	28.0	23.2	346

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

¹Total number of births to residents of areas reporting the specified item.

²No response reported for method of delivery item; includes births to residents of states using the 2003 Standard Certificate of Live Birth occurring in states using the 1989 Standard Certificate of Live Birth.

³Includes other races not shown.

⁴Cesarean/trial of labor attempted is number of women who attempted a trial of labor prior to cesarean delivery per 100 cesarean births.

⁵Race and Hispanic origin are reported separately on birth certificates. Persons of Hispanic origin may be of any race. Race categories are consistent with the 1977 Office of Management and Budget (OMB) standards. All states in the seven-state reporting area reported multiple-race data for 2004. These multiple-race data were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see "Technical Notes."

⁶Includes all persons of Hispanic origin of any race.

NOTE: Includes Idaho, Kentucky, New York (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington.

Table 5. Abnormal conditions of the newborn, by age and race and Hispanic origin of mother: Total of seven reporting states, 2004

[Rates are number of live births with specified condition per 1,000 live births in specified group]

Abnormal condition and race and Hispanic origin of mother	All births ¹	Condition reported	All ages	Under 20 years	20–24 years	25–29 years	30–34 years	35–39 years	40–54 years	Not stated ²
All races ³										
Assisted ventilation required immediately following delivery	571,858	28,738	52.5	58.6	52.5	50.8	50.4	53.6	60.6	24,333
Assisted ventilation required for more than six hours	571,858	7,038	12.9	14.9	12.8	12.6	11.9	13.6	14.7	24,333
NICU admission	571,858	36,004	65.8	68.4	62.4	61.9	65.8	75.2	84.7	24,333
Surfactant replacement therapy given to newborn	571,858	2,348	4.3	4.8	4.4	4.2	4.0	4.4	4.4	24,333
Antibiotics received by mother for suspected neonatal sepsis	571,858	12,263	22.4	27.6	23.0	21.3	21.0	22.1	22.9	24,333
Seizure/serious neurologic dysfunction	571,858	311	0.6	0.9	0.5	0.6	0.4	0.5	*	24,333
Significant birth injury	571,858	498	0.9	1.1	0.9	1.0	1.0	0.7	*	24,333
Non-Hispanic white ⁴										
Assisted ventilation required immediately following delivery	410,668	20,759	52.9	58.6	53.3	51.9	51.0	53.1	61.2	18,381
Assisted ventilation required for more than six hours	410,668	4,815	12.3	14.5	12.0	12.3	11.4	12.7	14.1	18,381
NICU admission	410,668	24,810	63.2	65.9	59.6	60.0	63.1	71.4	81.5	18,381
Surfactant replacement therapy given to newborn	410,668	1,667	4.2	5.0	4.4	4.1	4.0	4.3	4.9	18,381
Antibiotics received by mother for suspected neonatal sepsis	410,668	8,602	21.9	28.0	22.3	21.3	20.4	21.8	23.1	18,381
Seizure/serious neurologic dysfunction	410,668	216	0.6	0.9	0.5	0.6	0.4	0.6	*	18,381
Significant birth injury	410,668	343	0.9	1.2	0.9	0.8	0.9	0.7	*	18,381
Non-Hispanic black ⁴										
Assisted ventilation required immediately following delivery	74,012	4,445	61.8	64.6	59.0	58.3	65.2	68.8	72.1	2,059
Assisted ventilation required for more than six hours	74,012	1,331	18.5	17.0	17.3	16.7	22.0	24.8	24.8	2,059
NICU admission	74,012	6,119	85.0	77.8	77.2	79.1	103.0	113.1	119.5	2,059
Surfactant replacement therapy given to newborn	74,012	417	5.8	4.8	5.3	6.5	6.6	6.8	*	2,059
Antibiotics received by mother for suspected neonatal sepsis	74,012	1,873	26.0	28.1	23.7	22.9	31.5	29.3	29.3	2,059
Seizure/serious neurologic dysfunction	74,012	46	0.6	*	*	*	*	*	*	2,059
Significant birth injury	74,012	72	1.0	*	*	1.3	*	*	-	2,059
Hispanic ⁵										
Assisted ventilation required immediately following delivery	58,908	2,321	40.9	47.0	41.0	37.8	36.7	47.8	43.4	2,109
Assisted ventilation required for more than six hours	58,908	625	11.0	11.8	11.2	10.9	9.5	11.4	*	2,109
NICU admission	58,908	3,438	60.5	59.2	57.8	57.8	60.1	79.0	83.7	2,109
Surfactant replacement therapy given to newborn	58,908	203	3.6	4.2	3.5	3.7	3.2	*	*	2,109
Antibiotics received by mother for suspected neonatal sepsis	58,908	1,295	22.8	25.6	26.2	19.3	20.0	22.2	21.2	2,109
Seizure/serious neurologic dysfunction	58,908	35	0.6	*	*	*	*	*	-	2,109
Significant birth injury	58,908	62	1.1	*	*	*	*	*	*	2,109

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

- Quantity zero.

¹Total number of births to residents of areas reporting specified abnormal condition.

²No response reported for abnormal condition of the newborn item. Includes births to residents of states using the 2003 Standard Certificate of Live Birth occurring in states using the 1989 Standard Certificate of Live Birth.

³Includes other races not shown.

⁴Race and Hispanic origin are reported separately on birth certificates. Persons of Hispanic origin may be of any race. Race categories are consistent with the 1977 Office of Management and Budget (OMB) standards. All states in the seven-state reporting area reported multiple-race data for 2004. These multiple-race data were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see "Technical Notes."

⁵Includes all persons of Hispanic origin of any race.

NOTE: Includes Idaho, Kentucky, New York (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington.

Table 6. Number and rate of live births by congenital anomaly of the newborn, by age of mother: Total of seven reporting states, 2004

[Rates are number of live births with specified anomaly per 100,000 live births in specified group]

Congenital anomaly	All births ¹	Congenital anomaly reported	All ages	Under 20 years	20–24 years	25–29 years	30–34 years	35–39 years	40–54 years	Not stated ²
Total										
Anencephaly	571,858	76	13.9	*	14.6	13.6	*	*	*	25,709
Meningomyelocele/spina bifida	571,858	100	18.3	*	14.6	19.1	*	*	*	25,709
Cyanotic congenital heart disease.	571,858	440	80.6	46.3	85.5	74.9	72.8	109.5	162.6	25,709
Congenital diaphragmatic hernia	571,858	84	15.4	*	16.1	15.7	16.9	*	*	25,709
Omphalocele.	571,858	57	10.4	*	*	*	*	*	*	25,709
Gastroschisis	571,858	140	25.6	89.0	50.5	*	*	*	*	25,709
Limb reduction defect	571,858	185	33.9	40.8	44.6	40.2	22.2	*	*	25,709
Cleft lip with or without cleft palate	571,858	364	66.6	81.5	75.3	62.6	55.2	62.6	*	25,709
Cleft palate alone	571,858	182	33.3	*	33.6	36.8	32.2	*	*	25,709
Down syndrome.	571,858	388	71.0	46.3	34.4	40.2	52.1	189.3	480.6	25,709
Suspected chromosomal disorder.	571,858	321	58.8	48.2	51.2	47.0	47.5	101.7	205.0	25,709
Hypospadias ³	571,858	511	93.6	87.1	92.1	96.7	86.6	106.4	*	25,709

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

¹Total number of births to residents of areas reporting specified congenital anomaly.

²No response reported for congenital anomaly of the newborn item; includes births to residents of states using the 2003 Standard Certificate of Live Birth occurring in states using the 1989 Standard Certificate of Live Birth.

³Denominator includes both male and female births. For rates for males only see section on congenital anomalies.

NOTE: Includes Idaho, Kentucky, New York (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington.

Technical Notes

Sources of data

Data in this report are based on 100 percent of births registered in the seven states, Idaho, Kentucky, New York (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington, that implemented the 2003 U.S. Standard Certificate of Live Birth as of January 1, 2004. Two additional states, Florida and New Hampshire, implemented the revised birth certificate in 2004, but after January 1; data for these two states are not presented. The 571,858 births to residents of the seven states represent 14 percent of all U.S. 2004 births, see [Table A](#).

The 2003 Revision of the U.S. Standard Certificate of Live Birth

The 2003 revision of the birth certificate is seen as an important opportunity to improve data quality, primarily through the development of detailed, standardized collection techniques. For example, detailed requirements for electronic birth registration systems, separate worksheets for the mother and the hospital staff, and a comprehensive guidebook for birthing facilities were developed (1,6). The new electronic systems incorporate standardized data-collection instruments, improved methods for capturing data, immediate query of suspect data, query and edit guidelines, and detailed item definitions. The guidebook for birthing facilities, available both electronically and in hard copy, includes detailed item definitions, recommended sources, and common key words and abbreviations to help hospital staff accurately and completely report the necessary information. See http://www.cdc.gov/nchs/vital_certs_rev.htm for more information on the 2003 revision.

A number of items new to the U.S. Standard Certificate of Live Birth and collected by the seven-state reporting area are not presented in this report. Some examples of the new items not shown are, breastfeeding, sources of payment for the delivery, the receipt of WIC food for the pregnancy, and maternal morbidity (including uterine rupture).

Age of mother

Age of mother is computed from the mother's and infant's dates of birth as reported on the birth certificate. Births reported to occur to mothers younger than age 10 or older than age 54 years are imputed according to the age of mother from the previous records with the same race and total birth order (total of live births and fetal deaths).

Hispanic origin

Race and Hispanic origin are reported separately on the birth certificate. Data shown by race include persons of Hispanic or non-Hispanic origin. Data shown for Hispanic persons include all persons of Hispanic origin of any race. Data are shown separately for non-Hispanic white women because there are substantial differences in childbearing patterns between Hispanic and non-Hispanic white women.

Single, multiple, and "bridged" race

The 2003 revision of the U.S. Standard Certificate of Live Birth allows the reporting of more than one race (multiple races) for each parent (1). Accordingly, multiple-race data were reported by each of the states included in this report. Race data for 2004 from the vital records of the majority of states, however, are still based on the 1989 revision of the U.S. Standard Certificate of Live Birth. The 1989 revision follows the 1977 Office of Management and Budget (OMB) standard that allows only a single race to be reported (25,26). In order to provide uniformity and comparability of the data during the transition period, before all or most of the data are available in the new multiple race format, it was necessary to "bridge" the responses of those who reported more than one race (multiple race) to one, single race. Information on the processing and tabulation of data by race is presented in a recent report (3).

Gestational age

The primary measure used to determine the gestational age of the newborn is the interval between the first day of the mother's last normal menstrual period (LMP) and the date of birth. It is subject to error for several reasons, including imperfect maternal recall or misidentification of the LMP because of post conception bleeding, delayed ovulation, or intervening early miscarriage. These data are edited for LMP-based gestational ages that are clearly inconsistent with the infant's plurality and birthweight, but reporting problems for this item persist and may occur more frequently among some subpopulations and among births with shorter gestations (3,27).

Risk factors in the pregnancy

The 2003 U.S. Standard Certificate of Live Birth includes a question on whether the **pregnancy resulted from infertility treatment**, and also asks for the type of infertility treatment used (i.e., fertility-enhancing drugs or assisted reproductive technologies) ([Figure 2](#)). The 2003 revision was formally adopted in November 2003 (1). Draft versions of the certificate in circulation up to that point, however, did not include the type of fertility treatment used. As a result, states that adopted the revised certificate in 2003 or 2004 did not include the more detailed item. Information on the type of fertility treatment used should begin to become available for a limited reporting area for data year 2005.

Data on whether the **mother had a previous cesarean delivery** are edited for consistency between this item and the number of previous cesarean deliveries reported, and to include only women reported to have a second or higher order birth (28).

Characteristics of labor and delivery

The 2003 U.S. Standard Certificate of Live Birth includes the item "**nonvertex presentation**" under the category "Characteristics of Labor and Delivery." Nonvertex presentation is defined as any presentation *other than* vertex (i.e., any presentation *other than* the upper or back part of the baby's head) (6). Also included on the 2003 certificate under the category "Method of delivery—Final presentation

at birth," are the items "breech" and "other" (noncephalic) presentation. Although "breech" and "other" presentations are by definition subsets of "nonvertex presentation," the individual and combined levels for "breech" and "other" presentations were higher than those for "nonvertex presentation," suggesting that the latter item is somewhat underreported.

Congenital anomalies

Historically, congenital anomalies have been underreported on the birth certificate (29). This has been attributable, at least in part, to the inclusion of anomalies on the 1989 U.S. Standard Certificate of Live Birth that may have been difficult to detect within the short period between birth and completion of the child's birth certificate (30). The 2003 revision of the U.S. Standard Certificate of Live Birth attempted to improve reporting of congenital anomalies by including only those diagnosable within 24 hours of birth using conventional, widely available diagnostic techniques (2). As more data based on the revised certificate become available, it will be possible to determine whether this change has had the intended effect.

Data for the congenital anomaly "Hypospadias" are edited to exclude this condition where the record was coded female. For 2004, 0.005 percent of records for this reporting area were edited for this anomaly.

Computations of percentages and percent distributions

Births for which a particular characteristic is unknown were subtracted from the figures for total births that were used as denominators before percentages and percent distributions were computed. The percentage of records with missing information for each item is shown by state in [Table D](#). These levels include all births to residents in the reporting area, occurring outside of the reporting area (i.e., in a jurisdiction that has not adopted the 2003 U.S. Standard Certificate of Live Birth). This percentage was 3.5 percent for the seven-state reporting area for 2004 with levels ranging from 0.6 (Washington) to 6.8 (New York State excluding New York City.) The comparatively high level for New York at least partly reflects the fact that a significant number of births to New York State residents occurred in New York City, which does not yet report these data.

Random variation and significance testing for natality data

The number of births reported for an area is essentially a complete count, because more than 99 percent of all births are registered. Although this number is not subject to sampling error, it may be affected by nonsampling errors in the registration process such as mistakes in recording the mother's residence or age during the registration process.

When the number of births is used for analytic purposes (that is, the comparison of numbers, rates, and percentages over time, for different areas, or between different groups), the number of events that *actually* occurred can be thought of as one outcome in a large series of possible results that *could have* occurred under the same (or similar) circumstances. When considered in this way, the number of births is subject to random variation and a probable range of values can be estimated from the actual figures, according to certain statistical assumptions. For further information see the "Technical Notes" of "Births: Final Data for 2004" (3).

Definitions of selected medical terms

Definitions for the data items exclusive to the 2003 revision and discussed in this report are shown below. Detailed definitions, recommended sources, and keywords for the medical and health data items are available in the *Guide to Completing the Facility Worksheets for the Certificate of Live Birth and Report of Fetal Death* (6).

Risk factors in this pregnancy

Diabetes—Glucose intolerance requiring treatment.

Prepregnancy (chronic)—Diagnosis before this pregnancy.

Gestational (PIH, preeclampsia)—Diagnosis during this pregnancy.

Infertility treatment—Any assisted reproductive treatment used to initiate the pregnancy. Includes drugs (such as Clomid, Pergonol), artificial insemination, and technical procedures such as in vitro fertilization.

Table D. Percentage of birth records on which specified items were not stated: Total of reporting area and each state, 2004

[By place of residence]

Area	Pregnancy risk factors	Obstetric procedures	Characteristics of labor and delivery	Method of delivery			Congenital anomalies
				Attempted forceps	Attempted vacuum	Trial of labor	
Total of reporting areas	4.3	4.5	4.0	5.7	6.3	3.6	4.5
Idaho	3.9	3.7	3.6	8.3	8.9	2.8	4.4
Kentucky	4.7	4.9	4.7	4.5	4.5	7.5	4.3
New York (excluding New York City)	8.3	8.6	6.8	9.3	12.2	0.0	9.3
Pennsylvania	2.2	2.2	2.2	2.2	2.2	10.0	2.2
South Carolina	5.0	5.0	5.0	5.0	5.0	0.0	5.0
Tennessee	0.6	0.6	0.6	0.6	0.6	2.5	0.6
Washington	4.5	5.1	4.7	11.3	11.1	0.0	4.4

0.0 Quantity more than zero but less than 0.05.

NOTE: Births to residents of states using the 2003 Standard Certificate of Live Birth occurring in states using the 1989 U.S. Standard Certificate of Live Birth are coded as not stated for these items. See "Technical Notes."

Obstetric procedures

Cervical cerclage—Circumferential banding or suture of the cervix to prevent or treat passive dilation.

External cephalic version—Attempted conversion of a fetus from a nonvertex to a vertex presentation by external manipulation.

Characteristics of labor and delivery

Nonvertex presentation—Includes any nonvertex fetal presentation, that is, presentation of a part of the infant's body other than the upper and back part of the infant's head.

Steroids (glucocorticoids) for fetal lung maturation received by the mother before delivery—Medications given to the mother before delivery specifically to accelerate fetal lung maturation in anticipation of preterm delivery (e.g., betamethasone, dexamethasone).

Antibiotics received by the mother during delivery—Antibacterial medication given systemically (intravenous or intramuscular) to the mother between the onset of labor and the actual delivery (e.g., ampicillin, clindamycin).

Epidural or spinal anesthesia during labor—Administration to the mother of a regional anesthetic to control the pain of labor. The distribution of the analgesic effect is limited to the lower body.

Method of delivery

Was delivery with forceps attempted but unsuccessful?—Obstetric forceps were applied to the fetal head in an unsuccessful attempt at vaginal delivery.

Was delivery with vacuum extraction attempted but unsuccessful?—Ventouse or vacuum cup was applied to the fetal head in an unsuccessful attempt at vaginal delivery.

If cesarean, was a trial of labor attempted?—If the delivery was cesarean, whether prior to the cesarean delivery labor was allowed, augmented, or induced, with plans for a vaginal delivery.

Abnormal conditions of the newborn

Assisted ventilation required immediately following delivery—Infant given minimal breaths for any duration with bag and mask or bag and endotracheal tube within the first several minutes from birth. Excludes free flow oxygen only, and laryngoscopy for aspiration of meconium.

Assisted ventilation required for more than 6 hours—Infant given mechanical ventilation (breathing assistance) by any method for more than 6 hours.

Surfactant replacement therapy—Endotracheal instillation of a surface-active suspension for treating surfactant deficiency due to preterm birth or pulmonary injury resulting in respiratory distress.

Neonatal intensive care unit (NICU) admission—Admission of the newborn into a facility or unit staffed and equipped to provide continuous mechanical ventilatory support at any time during the infant's hospital stay following delivery.

Congenital anomalies

Cleft palate alone—Incomplete fusion of the palatal shelves. May be limited to the soft palate, or may extend into the hard palate.

Cyanotic heart disease—Congenital heart defects resulting in lack of oxygen that cause cyanosis.

Hypospadias—Incomplete closure of the male urethra resulting in the urethral meatus opening on the ventral surface of the penis.

Limb reduction defect—Complete or partial absence of a portion of an extremity, secondary to failure to develop. Excludes congenital amputation and dwarfing syndromes.

Suspected chromosomal disorder—Includes any constellation of congenital malformations resulting from, or compatible with, known syndromes caused by detectable defects in chromosome structure.

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