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Assisted Reproductive Technology Surveillance — United States, 2012

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Front cover photo: Couple in consultation with a physician.

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Assisted Reproductive Technology Surveillance — United States, 2012

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Abstract

Problem/Condition: Since the first U.S. infant conceived with Assisted Reproductive Technology (ART) was born in 1981, both the use of advanced technologies to overcome infertility and the number of fertility clinics providing ART services have increased steadily in the United States. ART includes fertility treatments in which eggs or embryos are handled in the laboratory (i.e., in vitro fertilization [IVF] and related procedures). Because more than one embryo might be transferred during a procedure, women who undergo ART procedures, compared with those who conceive naturally, are more likely to deliver multiple birth infants. Multiple births pose substantial risks to both mothers and infants, including obstetric complications, preterm delivery, and low birthweight infants. This report provides state-specific information for the United States (including Puerto Rico) on ART procedures performed in 2012 and compares infant outcomes that occurred in 2012 (resulting from ART procedures performed in 2011 and 2012) with outcomes for all infants born in the United States in 2012.

Period Covered: 2012.

Description of System: In 1996, CDC began collecting data on ART procedures performed in fertility clinics in the United States, as mandated by the Fertility Clinic Success Rate and Certification Act of 1992 (FCSRCA) (Public Law 102–493). Data are collected through the National ART Surveillance System, a web-based data collecting system developed by CDC. This report includes data from 52 reporting areas (the 50 states, the District of Columbia [DC], and Puerto Rico).

Results: In 2012, a total of 157,635 ART procedures performed in 456 U.S. fertility clinics were reported to CDC. These procedures resulted in 51,261 live-birth deliveries and 65,151 infants. The largest numbers of ART procedures were performed among residents of six states: California (20,241), New York (19,618), Illinois (10,449), Texas (10,281), Massachusetts (9,754), and New Jersey (8,590). These six states also had the highest number of live-birth deliveries as a result of ART procedures, and together they accounted for 50.1% of all ART procedures performed, 48.3% of all infants born from ART, and 48.3% of all ART multiple live-birth deliveries. Nationally, the total number of ART procedures performed per 1 million women of reproductive age (15–44 years), which is a proxy indicator of ART use, was 2,483. This indicator of ART use exceeded the national ratio in 13 reporting areas (California, Connecticut, Delaware, Hawaii, Illinois, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Virginia, and DC) and was more than twice the national ratio in three reporting areas (Massachusetts, New Jersey, and DC).

Nationally, among ART cycles with patients using fresh embryos from their own eggs, in which at least one embryo was transferred, the average number of embryos transferred increased with the increasing age of the woman (1.9 among women aged <35 years, 2.2 among women aged 35–40 years, and 2.7 among women aged >40 years). The percentage of elective single-embryo transfer (eSET) procedures varied substantially between reporting areas for all ages. Among women aged <35 years, who are typically considered to be good candidates for eSET procedures, the national eSET rate was 15.3% (range: 2.1% in Oklahoma to 60.4% in Delaware).

Overall, ART contributed to 1.5% of all infants born in the United States (range: 0.2% in Puerto Rico to 4.7% in Massachusetts) with the highest rates (≥3.0% of all infants born) observed in four reporting areas (Connecticut, Massachusetts, New Jersey, and DC). Infants conceived with ART comprised 19.6% of

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all multiple-birth infants (range: 5.5% in Maine to 39.3% in Massachusetts), 19.2% of all twin infants (range: 4.4% in Puerto Rico to 39.1% in Massachusetts), and 29.6% of all triplet or higher order infants (range: 0 in West Virginia to 69.7% in Idaho). Among infants conceived with ART, 43.6% were born in multiple-birth deliveries (range: 18.7% in Delaware to 56.0% in Idaho), compared with only 3.4% among all infants born in the general population (range: 2.1% in Puerto Rico to 4.5% in New Jersey). Approximately 41% of ART-conceived infants were twin infants, and 2% were triplet and higher order infants.

Nationally, infants conceived with ART comprised 5.7% of all low birthweight (<2,500 grams) infants (range: 0.8% in Puerto Rico to 15.3% in Massachusetts) and 5.8% of all very low birthweight (<1,500 grams) infants (range: 0 in West Virginia to 15.1% in New Jersey). Overall, among ART-conceived infants, 30.2% were low birthweight (range: 18.8% in DC to 45.1% in New Mexico), compared with 8.0% among all infants (range: 5.6% in Alaska to 11.6% in Mississippi and Puerto Rico); 5.5% of ART infants were very low birthweight (range: 0 in West Virginia to 12.9% in Puerto Rico), compared with 1.4% among all infants (range: 0.9% in Alaska and Idaho to 2.1% in Mississippi).

ART-conceived infants comprised 4.6% of all preterm (<37 weeks) infants (range: 0.7% in Puerto Rico to 13.4% in Massachusetts) and 5.2% of all very preterm (<32 weeks) infants (range: 1.0% in Puerto Rico to 14.9% in Vermont). Overall, among infants conceived with ART, 34.9% were born preterm (range: 20.8% in Delaware and DC to 49.4% in Puerto Rico), compared with 11.6% among all infants born in the general population (range: 8.7% in Vermont to 17.1% in Mississippi); 6.5% of ART infants were born very preterm (range: 3.3% in Nevada to 14.8% in South Dakota), compared with 1.9% among all infants born in the general population (range: 1.1% in Vermont to 2.9% in Mississippi).

The percentage of infants conceived with ART who were low birthweight varied from 9.3% (range: 4.1% in South Carolina to 20.9% in Puerto Rico) among singletons, to 55.2% (range: 41.5% in New Hampshire to 83.3% in South Dakota) among twins, and 95.3% (range: 85.2% in Oklahoma to 100% in several reporting areas) among triplets or higher-order multiples; comparable percentages for all infants were 6.3% (range: 4.5% in Alaska to 10.3% in Puerto Rico), 55.4% (range: 46.0% in Alaska to 69.0% in Puerto Rico), and 91.6% (range: 80.6% in Missouri to 100% in several reporting areas), respectively.

The percentage of ART infants who were preterm varied from 13.2% (range: 9.4% in West Virginia to 25.4% in North Dakota) among singletons, to 61.0% (range: 47.8% in DC to 80.0% in Maine and West Virginia) among twins, and 97.7% (range: 92.7% in Massachusetts to 100% in several reporting areas) among triplets or higher-order multiples; comparable percentages for all infants were 9.9% (range: 7.3% in Vermont to 15.8% in Puerto Rico), 56.8% (range: 47.2% in Connecticut to 67.2% in Puerto Rico), and 92.6% (range: 36.4% in Oregon to 96.8% in Ohio), respectively.

Interpretation: The percentage of infants conceived with ART varied considerably by reporting area. In most reporting areas, multiples from ART comprised a substantial proportion of all twin, triplet, and higher-order infants born, and the rates of low birthweight and preterm infants were disproportionately higher among ART infants than in the birth population overall. Among women aged <35 years, eSET procedures warrant consideration because these patients might have extra embryos available for cryopreservation, which is a good predictor of embryo quality, and might have a more favorable prognosis for a live birth than older patients. However, on average, two embryos were transferred per cycle in ART procedures among women aged <35 years, influencing the overall multiple-birth rates in the United States. Compared with ART singletons, ART twins were approximately four and a half times more likely to be born preterm, and approximately six times more likely to be born with low birthweight. Singleton infants conceived with ART had slightly higher rates of preterm delivery and low birthweight than all singleton infants born in the United States. ART use per population unit was geographically varied, with 12 states showing ART use above the national rate. Of the four states (Illinois, Massachusetts, New Jersey, and Rhode Island) with comprehensive statewide-mandated health insurance coverage for ART procedures (e.g., coverage for at least four cycles of in vitro fertilization), two states (Massachusetts and New Jersey) had rates of ART use exceeding twice the national level. This type of mandated insurance has been associated with greater use of ART and might account for some of the difference in per capita ART use observed among states.

Public Health Actions: Reducing the number of embryos transferred per ART procedure and increasing use of eSET, when clinically appropriate (typically age <35 years), might reduce multiple births and related adverse consequences of ART. Improved patient education and counseling on the maternal and infant health risks of having twins are needed given that twins account for the majority of ART-conceived multiple births. Although ART contributes to increasing rates of multiple births, it does not explain all of the increases. Other explanations for multiple births not investigated in this report might include age-related factors and the role of non-ART fertility treatments, and warrant further study.

Introduction

Since the birth of the first U.S. infant conceived with Assisted Reproductive Technology (ART) in 1981, use of advanced technologies to overcome infertility has increased steadily, as has the number of fertility clinics providing ART services and procedures in the United States (*1*). In 1992, Congress passed the Fertility Clinic Success Rate and Certification Act (FCSRCA; Public Law 102–493), which requires that all U.S. fertility clinics performing ART procedures report data to CDC annually on every ART procedure performed. CDC initiated data collection in 1996 and published the first annual ART Success Rates Report in 1997 (*2*). Several measures of success for ART are presented in the annual ART Fertility Clinic Success Rates Report and the ART National Summary Report (*1,3*), including the percentage of ART cycles and transfers that result in pregnancies, live-birth deliveries, singleton live births, and multiple live births.

Although ART helps thousands of infertile couples to achieve pregnancy, potential health risks exist for both mother and infant. Because multiple embryos are transferred in the majority of ART procedures, ART often results in multiple-gestation pregnancies and multiple births (*4–11*). Risks to the mother of multiple births include higher rates of caesarean deliveries, maternal hemorrhage, pregnancy-related high blood pressure, and gestational diabetes (*12,13*). Risks to the infant include prematurity, low birthweight, infant death, elevated risk for birth defects, and developmental disability (*4–16*). Further, even singleton infants conceived with ART have a higher risk for low birthweight compared with singleton infants not conceived with ART (*17,18*).

This report was compiled on the basis of ART surveillance data reported to CDC's Division of Reproductive Health for procedures performed in 2012. Data are presented on the use of ART in each U.S. state, the District of Columbia (DC), and the Commonwealth of Puerto Rico as well as ART infant outcomes in 2012 resulting from ART procedures performed in 2011 and 2012. Additionally, the report examines the contribution of ART to selected adverse outcomes (e.g., multiple birth, low birthweight, and preterm delivery) and compares 2012 ART infant outcomes to outcomes among all infants born in the United States in 2012.

Methods

National ART Surveillance System

In 1996, CDC initiated data collection of ART procedures performed in the United States. ART data for 1995–2003 were obtained from the Society of Assisted Reproductive Technology (SART). Since 2004, CDC has contracted with Westat, Inc., a statistical survey research organization, to obtain data from fertility clinics in the United States through the National ART Surveillance System (NASS), a web-based data collection system developed by CDC (http://www.cdc.gov/art/NASS.htm). Clinics enter their data into NASS and verify the data's accuracy before sending the data to Westat. SART-member clinics can report their data to NASS through SART. The data then are compiled by Westat and reviewed by both CDC and Westat. A few clinics (6.0%) did not report their data to CDC and are listed as nonreporting programs in the 2012 ART Fertility Clinic Success Rates Report, as required by FCSRCA (Public Law 102–493). Because nonreporting clinics tend to be smaller than reporting clinics, NASS is estimated to contain information on 98.0% of all ART cycles in the United States (*1*).

Data collected include patient demographics, medical history, and infertility diagnoses; clinical information pertaining to the ART procedure type; and information regarding resultant pregnancies and births. The data file is organized with one record per ART procedure (or cycle of treatment) performed. Multiple procedures from individual patients are not linked. Because ART providers typically do not provide continued prenatal care after a pregnancy is established, information on live births for all procedures is collected by ART clinics either directly from the patients (83.0%) or from the patients' obstetric providers (17.0%).

ART Procedures

ART includes fertility treatments such as in vitro fertilization (IVF), gamete intrafallopian transfer, and zygote intrafallopian transfer. Approximately 99% of ART cycles performed are IVF. ART does not include treatments in which only sperm are handled (i.e., intrauterine insemination) or procedures in which a woman takes drugs only to stimulate egg production without the intention of having eggs retrieved. Because an ART procedure consists of several steps over an interval of approximately 2 weeks, a procedure often is referred to as a cycle of treatment. An ART cycle generally begins with drug-induced ovarian stimulation. If eggs are produced, the cycle progresses to the egg-retrieval stage. After the eggs are retrieved, they are combined with sperm in the laboratory through IVF. If this is successful, the most viable embryos (i.e., those that are morphologically most likely to develop and implant) are selected for transfer by clinicians. If an embryo implants in the uterus, a clinical pregnancy is diagnosed by the presence of a gestational sac detectable by ultrasound. Most pregnancy losses occur within the first 12 weeks. Beyond 12 weeks of gestation, the pregnancy usually progresses to a live-birth

delivery (with survival ranging from 95.0% at 16 weeks to 98.0% at 20 weeks), which is defined as the delivery of one or more live-born infants (*19*).

ART procedures are classified into four types on the basis of the source of the egg (patient or donor) and the status of the embryos (fresh or thawed). Both fresh and thawed embryos can result from either the patient's eggs or from the donor's eggs. ART procedures involving fresh embryos include an egg-retrieval stage. ART procedures that use thawed embryos do not include egg retrieval because the eggs were fertilized during a previous procedure, and the resulting embryos were frozen until the current procedure. An ART procedure can be discontinued at any step for medical reasons or by patient choice.

Variables and Definitions

ART data and outcomes from ART procedures are presented by the patient's residence (i.e., state or reporting area) at the time of treatment. If this information was missing, residence was assigned as the location where the procedure was performed. Cycles performed in the United States among non-U.S. residents are included in NASS data but might be excluded from certain calculations for which the exact denominators were not known. To protect confidentiality in the presentation of data in tables, cells with values from 1 through 4 are suppressed, as are data that can be used to derive cell values of 1–4. These values are included in the totals. Because of small numbers, ART data for territories (with the exception of Puerto Rico) are not included in this report to protect data confidentiality. In addition, rates derived on the basis of <20 in the denominator have been suppressed because they are unstable, and rates could not be calculated for a denominator of 0 (e.g., preterm birth among triplets, in states with no triplet births).

This report presents data on all cycles initiated; however, birth outcomes are determined on the basis of cycles that involved embryo transfer. The number of ART procedures performed per 1 million women of reproductive age (15–44 years) was calculated, and the resulting ratio approximates the proportion of women of reproductive age who used ART in each reporting area. However, this proxy measure of ART use is only an approximation because some women who used ART might fall outside the age range of 15–44 years, and some women might have had more than one procedure during the reporting period.

Live-birth delivery was defined as birth of one or more live-born infants, with delivery of multiple infants counted as one live-birth delivery. A singleton live-birth was defined as a birth of one infant where that infant was born live. A multiple birth was defined as a birth of two or more infants, at least one of whom was live-born.

Elective single-embryo transfer (eSET) is a procedure in which one embryo, selected from a larger number of available embryos, is placed in the uterus, with extra embryos cryopreserved. Fresh transfer procedures in which only one embryo was transferred but no embryos were cryopreserved are not considered eSET. The remaining embryos might be set aside for future use through cryopreservation. In this report, both eSET procedures and the average number of embryos transferred were calculated for fresh, nondonor cycles in which at least one embryo was transferred.

The average number of embryos transferred for three age groups (<35 years, 35–40 years, and >40 years) was calculated by dividing the total number of embryos transferred by the total number of embryo-transfer procedures performed in that age group. The percentage of eSET was calculated by dividing the total number of transfer procedures in which only one embryo was transferred and one or more embryos were cryopreserved, by the sum of this numerator (total number of single embryo transfer procedures where extra embryos were cryopreserved) and the total number of transfer procedures in which more than one embryo were transferred. Transfer procedures in which only one embryo was transferred but no embryos were cryopreserved were excluded from the calculation of eSET percentages.

The number and percentage of infants (ART-conceived and all infants) born in the reporting area were calculated for all infants by plurality (singleton, multiple, twin, and triplet or higher order births) by dividing the number of infants in each group by the total number of infants in that group. The contribution of ART to an outcome was calculated by dividing the total number of outcomes among ART-conceived infants by the total number of outcomes among all infants born. The contribution of ART to all infants born in a particular reporting area was used as a second measure of ART use. Additionally, the percentages of infants with low birthweight and preterm delivery were calculated for each group of plurality (singleton, twins, and triplets and higher order births) for both ART-conceived infants and all infants, by dividing the number of low birthweight or preterm infants in each group of plurality by the total number of infants in that group.

Low birthweight was defined as <2,500 grams, very low birthweight as <1,500 grams, and extremely low birthweight as <1,000 grams. For comparability with births to women who did not undergo ART, for which gestational age is determined on the basis of the date of the last menstrual period, gestational age was calculated for fresh ART cycles by subtracting the date of egg retrieval from the birth date and adding 14 days. For frozen embryo cycles, and for fresh ART cycles for which the date of retrieval was not available, gestational age was calculated by subtracting the date of embryo transfer from

the birth date and adding 17 days (to account for an average of 3 days in embryo culture). Preterm delivery was defined as gestational age <37 weeks, very preterm delivery as gestational age <32 weeks, and extremely preterm delivery as gestational age <28 weeks (*20*).

Content of This Report

This report provides information on U.S. ART procedures performed in 2012 and compares infant outcomes that occurred in 2012 (resulting from procedures performed in 2011 and 2012) with outcomes for all infants born in the United States in 2012. Specifically, this report provides data on the number and outcomes of all ART procedures performed in 52 reporting areas (the 50 states,* DC, and the Commonwealth of Puerto Rico) in 2012. For each of these reporting areas, live-birth delivery rates, the number of live-born infants, live singleton and multiple birth deliveries, and data regarding the number of ART procedures in relation to the number of women in the reproductive age group (15–44 years) are reported (*21*).† Data also are presented on the number of embryo-transfer procedures performed, the average number of embryos transferred, and the percentage of eSET procedures performed among women who used fresh embryos from their own eggs, by age group.

For each reporting area, the proportions of singleton, multiple, including twin and triplet or higher order infants resulting from ART are compared to their respective ratios among all infants born in that location in 2012. Infants born in the reporting area during that year include those who were conceived naturally as well as those resulting from ART and other infertility treatments. To accurately assess the proportion of ART births among overall U.S. births in 2012, ART births were aggregated from 2 reporting years: 1) infants conceived from ART procedures performed in 2011 and born in 2012 (68% of the live-birth deliveries reported to the ART surveillance system for 2012), and 2) infants conceived from ART procedures performed in 2012 and born in 2012 (32% of the live-birth deliveries reported to the ART surveillance system for 2012). Data on the total number of live-birth and multiple birth infants in each reporting area in 2012 were obtained from U.S. natality files (*22*). The report presents the number and percentage of select adverse perinatal outcomes (low birthweight, very low birthweight, preterm delivery, and very preterm delivery) among ART-conceived infants and all infants, as well as the contribution of ART to these outcomes. Additionally, the percentages of adverse perinatal outcomes are reported for singleton, twin, and triplet and higher order infants for ART-conceived infants and all infants.

* For 2012, outcomes for New York City are included in those for New York state.
† Data regarding population size was compiled on the basis of July 1, 2012 estimates from the U.S. Census Bureau.

Results

Overview of Fertility Clinics

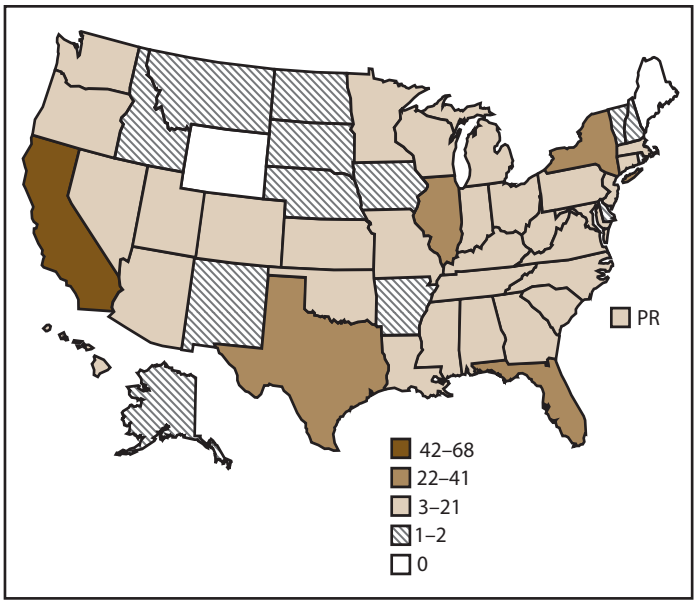
Of 486 fertility clinics in the United States that performed ART procedures in 2012, a total of 456 (94.0%) provided data to CDC (Figure 1) with the majority located in or near major cities in the United States. The number of fertility clinics performing ART procedures varied by reporting area. The largest number of fertility clinics reporting data for 2012 were in California (68), Texas (41), New York (38), Florida (28), Illinois (25), and New Jersey (21).

Number and Type of ART Procedures

The number, type, and outcome of ART procedures performed in 2012 are provided for all 52 reporting areas (Table 1). Residency data were missing for approximately 1.6% of procedures performed and 2.0% of live-birth deliveries, but are included in the totals. Approximately 16.2% of ART cycles were conducted among out-of-state residents. Non-U.S. residents accounted for approximately 2.1% of ART procedures, 2.4% of live-birth deliveries, and 2.5% of infants born.

A total of 176,247 ART procedures were reported to CDC in 2012 (*1*). This report includes data for 157,635

FIGURE 1. Location and number* of assisted reproductive technology clinics, by state — United States and Puerto Rico, 2012



Abbreviation: PR = Puerto Rico.
* In 2012, of the 486 clinics in the United States, 456 (94%) submitted data.

ART procedures performed in the United States (including Puerto Rico) with the intent to transfer at least one embryo (Table 1). It excludes 18,585 egg/embryo freezing and banking procedures because these procedures did not result in an embryo transfer and also excludes 27 procedures performed in the remaining territories. Of the 157,635 procedures performed in the reporting areas, a total of 134,419 (85.3%) progressed to embryo transfer (Table 1). Overall, 46.9% (62,977 of 134,419) of ART procedures that progressed to the transfer stage resulted in a pregnancy, 38.1% (51,261 of 134,419) resulted in a live-birth delivery, 28.1% (37,699 of 134,419) in a singleton live-birth delivery, and 10.1% (13,562 of 134,419) in a multiple live-birth delivery. The 51,261 live-birth deliveries included 37,699 singleton live-birth deliveries (73.5%) and 13,562 multiple live-birth deliveries (26.5%), and resulted in 65,151 infants (Table 1, Figure 2).

Six states (California, Illinois, Massachusetts, New Jersey, New York, and Texas) accounted for 50.1% (78,933 of 157,635) of ART procedures performed, 50.0% (67,241 of 134,419) of all embryo transfer procedures, 48.3% (31,488 of 65,151) of all infants born from ART, and 48.3% (6,548 of 13,562) of all ART multiple live-birth deliveries in the United States (Table 1); however, these six states only accounted for 36.7% of all U.S. births (*21*).

The number of ART procedures per 1 million women of reproductive age varied from 323 in Puerto Rico to 7,221 in DC, with an overall national ratio of 2,483 procedures per 1 million women of reproductive age (15–44 years). Thirteen reporting areas (California, Connecticut, Delaware, Hawaii, Illinois, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Virginia, and DC) had ratios higher than the national ratio. Of these reporting areas, Massachusetts (7,206), New Jersey (4,974), and DC (7,221) had ratios exceeding twice the national level, whereas Connecticut, Illinois, Maryland, and New York had ratios exceeding one-and-a-half times the national level (4,585, 3,999, 4,813, and 4,859, respectively) (Figure 3).

FIGURE 2. Number of outcomes of assisted reproductive technology cycles, by stage — United States and Puerto Rico, 2012

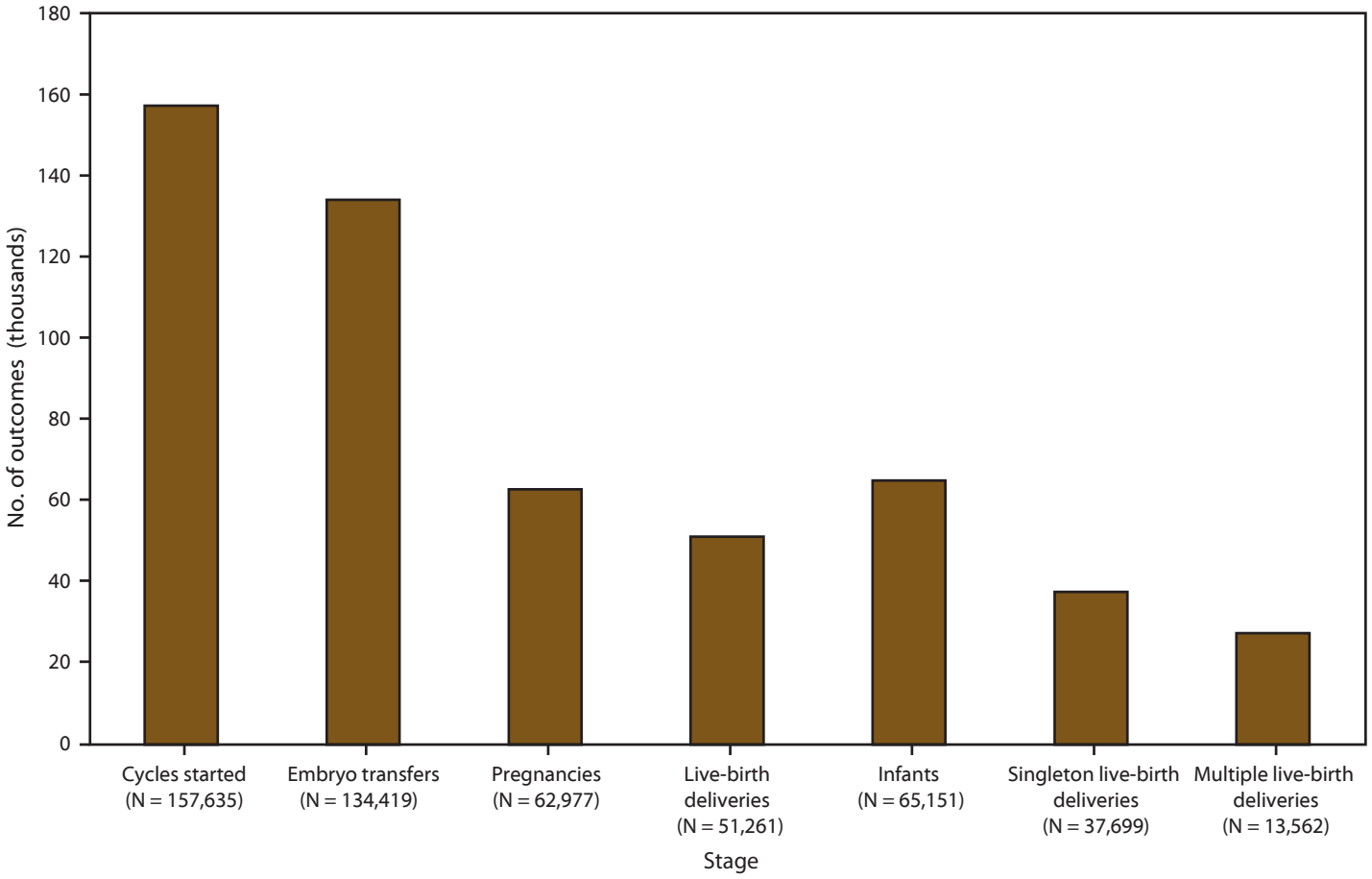
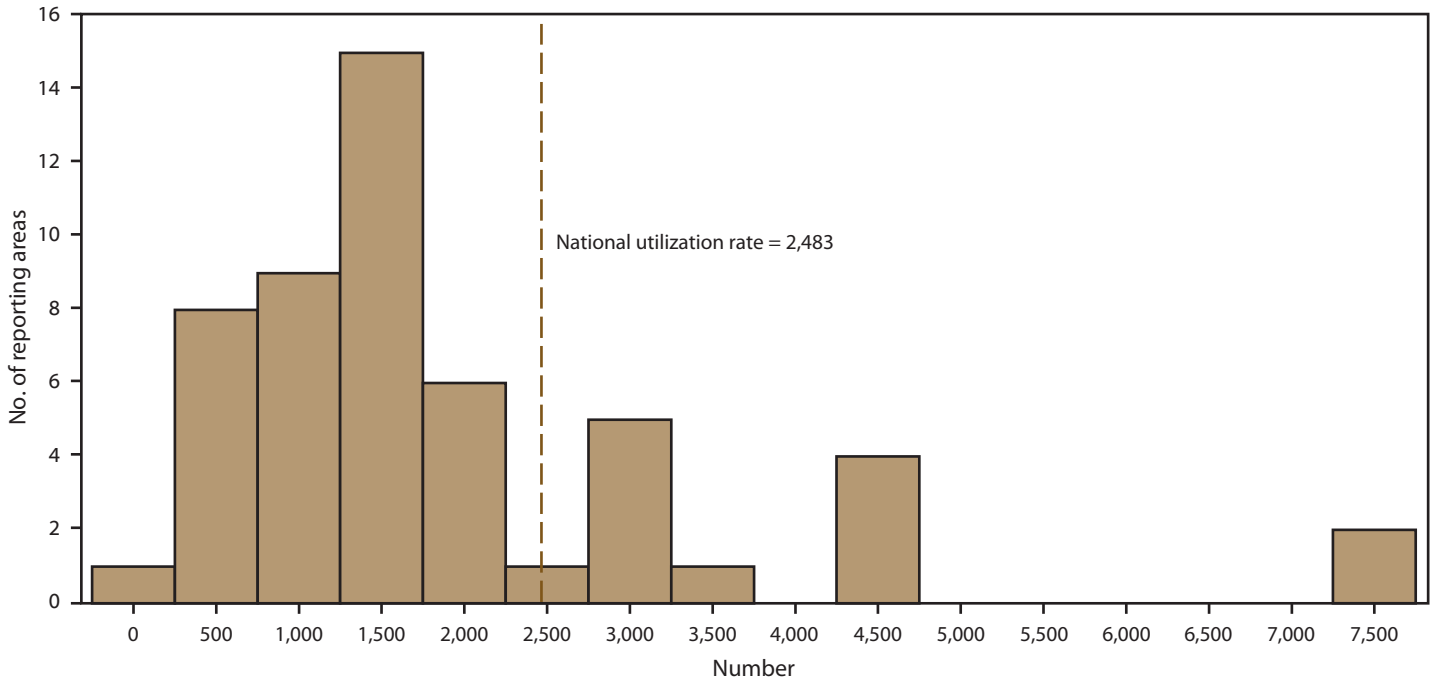


FIGURE 3. Number of procedures performed using assisted reproductive technology, among women of reproductive age* (ages 15–44 years) — United States and Puerto Rico, 2012



* Per 1 millon women aged 15–44 years.

Embryo Transfer and Patient's Age

The number of embryo-transfer procedures performed, the average number of embryos transferred per procedure, and the percentage of eSET procedures performed among women who used fresh embryos from their own eggs are provided by age group (Table 2). Overall, the number of embryo-transfer procedures performed among women aged <35 years was highest (36,101) and lowest among women aged >40 years (12,074). Nationally, the average number of embryos transferred per procedure varied from 1.9 among women aged <35 years (range: 1.4 to 2.4) to 2.2 among women aged 35–40 years (range: 1.7 to 2.6), and 2.7 among women aged >40 years (range: 1.6 to 3.8). In eight reporting areas (Alaska, California, Hawaii, Maryland, Massachusetts, New York, Virginia, and DC), more embryo-transfer procedures were performed among women aged 35–40 years than among younger women. Nationally, rates of eSET ranged from a high of 15.3% among women aged <35 years (range: 2.1% in Oklahoma to 60.4% in Delaware) to 6.7% among women aged 35–40 years (range: 0 in several reporting areas to 37.3% in Delaware) and a low of 1.2% among women aged >40 years (range: 0 in most reporting areas to 2.8% in Louisiana). Among women aged <35 years, eSET rates exceeded the national rate in 19 reporting areas (Arkansas, California, Colorado, Connecticut, Delaware, Georgia, Iowa, Maine, Maryland, Massachusetts, Montana, New Hampshire, South Dakota, Tennessee, Virginia, Washington, Wisconsin, Wyoming, and DC).

Singleton and Multiple Births

Among 3,991,741 infants born in the United States and Puerto Rico in 2012 (*21*), a total of 61,432 (1.5%) were conceived with ART procedures performed in 2011 and 2012 (Tables 3 and 4). California, Texas, and New York ranked among the three highest states in total number of U.S. births. ART-conceived births were also highest in California, followed by New York, and Texas. The contribution of ART to all infants born was highest in Massachusetts (4.7%), followed by New Jersey (3.6%), DC (3.5%), and Connecticut (3.1%) (Table 3). Although singletons accounted for 96.6% of total infants born in 2012 (range: 95.5% in New Jersey to 97.9% in Puerto Rico), singletons accounted for only 56.4% of all ART infants (range: 44.0% in Idaho to 81.3% in Delaware). Nationwide, 43.6% (range: 18.7% in Delaware to 56.0% in Idaho) of ART infants were multiples, compared with only 3.4% (range: 2.1% in Puerto Rico to 4.5% in New Jersey) of all infants (Table 4). ART multiple-birth infants represent 19.6% (range: 5.5% in Maine to 39.3% in Massachusetts) of total multiple-birth infants. Approximately 41.2% (range: 18.7% in Delaware to 51.8% in New Mexico) of all ART-conceived infants were twins, compared with only 3.3% (range: 2.0% in Puerto Rico to 4.4% in New Jersey) of all infants. ART-conceived twin infants accounted for 19.2% (range: 4.4% in Puerto Rico to 39.1% in Massachusetts) of all twins born in 2012. Finally, 2.4% of ART-conceived infants were triplets

or higher order multiples (range: 0 in several reporting areas to 13.5% in Puerto Rico), compared with 0.1% (with very little variation by reporting area) of all infants. ART triplet or higher order multiple infants contributed to 29.6% (range: 0 in West Virginia to 69.7% in Idaho) of all triplet or higher order infants born in 2012.

Adverse Perinatal Outcomes

Nationally, ART infants represented approximately 5.7% of all low birthweight and 5.8% of very low birthweight infants (Table 5). The contribution of ART to low birthweight infants ranged from 0.8% in Puerto Rico to 15.3% in Massachusetts. The contribution of ART to very low birthweight infants ranged from 0 in West Virginia to 15.1% in New Jersey. In five states (Connecticut, Hawaii, Massachusetts, New Jersey, and Rhode Island), >10% of all low birthweight infants born were conceived with ART. In four states (Massachusetts, New Jersey, Rhode Island, and Vermont) >10% of all very low birthweight infants were conceived with ART.

In all reporting areas, rates of low birthweight and very low birthweight infants were higher among infants conceived with ART than among all infants (Table 5). Among ART infants, 30.2% were low birthweight infants (range: 18.8% in DC to 45.1% in Puerto Rico), compared with 8.0% among all infants (range: 5.6% in Alaska to 11.6 in Mississippi and Puerto Rico). Approximately 5.5% of ART infants were very low birthweight infants (range: 0 in West Virginia to 12.9% in Puerto Rico), compared with 1.4% among all infants (range: 0.9% in Alaska and Idaho to 2.1% in Mississippi) (Table 5). Additional analyses show that among very low birthweight (<1,500 grams) ART-conceived infants, 41.2% were born with extremely low birthweight of <1,000 grams.

Nationally, infants conceived with ART contributed approximately 4.6% and 5.2%, respectively, to all preterm and very preterm infants (Table 6). The contribution of ART to preterm infants ranged from 0.7% in Puerto Rico to 13.4% in Massachusetts. The contribution of ART to very preterm infants ranged from 1.0% in Puerto Rico to 14.9% in Vermont. In two states (Massachusetts and New Jersey), >10% of all preterm infants in the state were conceived with ART, and in four states (Massachusetts, New Jersey, Rhode Island, and Vermont), >10% of all very preterm infants in the state were conceived with ART.

As with low birthweight, rates of preterm and very preterm infants were higher among ART infants than in the general birth population. Among ART infants, 34.9% were born preterm (range: 20.8% in Delaware and DC to 49.4% in Puerto Rico), compared with 11.6% among all infants (range: 8.7% in Vermont to 17.1% in Mississippi). Approximately 6.5% of ART infants were very preterm (range: 3.3% in Nevada to 14.8% in South Dakota), compared with 1.9% among all infants (range: 1.1% in Vermont to 2.9% in Mississippi) (Table 6). Additional analyses show that among all ART-conceived infants born very preterm (<32 weeks), 45.5% were born extremely preterm (<28 weeks of gestation).

The percentage of ART infants who were low birthweight varied from 9.3% (range: 4.1% in South Carolina to 20.9% in Puerto Rico) among singletons, to 55.2% (range: 41.5% in New Hampshire to 83.3% in South Dakota) among twins, and 95.3% (range: 85.2% in Oklahoma to 100% in several reporting areas) among triplets or higher-order multiples; comparable percentages among all infants born were 6.3% (range: 4.5% in Alaska to 10.3% in Puerto Rico), 55.4% (range: 46.0% in Alaska to 69.0% in Puerto Rico), and 91.6% (range: 80.6% in Missouri to 100% in several reporting areas), respectively (Table 7).

The percentage of ART infants who were very low birthweight varied from 1.8% (range: 0 in several reporting areas to 2.9% in Maryland) among singletons, to 8.7% (range: 0 in West Virginia to 20.6% in Vermont) among twins, and 37.6% (range: 18.5% in Oklahoma to 53.8% in Pennsylvania) among triplets or higher-order multiples; comparable percentages among all infants were 1.1% (range: 0.7% in several reporting areas to 1.7% in Mississippi), 9.6% (range: 6.2% in Idaho to 13.5% in Rhode Island), and 39.3% (range: 25.6% in Arizona to 72.7% in Hawaii), respectively.

The percentage of ART infants who were preterm varied from 13.2% (range: 9.4% in West Virginia to 25.4% in North Dakota) among singletons, to 61.0% (range: 47.8% in DC to 80.0% in Maine and West Virginia) among twins, and 97.7% (range: 92.7% in Massachusetts to 100% in several reporting areas) for triplets or higher-order multiples; comparable percentages among all infants were 9.9% (range: 7.3% in Vermont to 15.8% in Puerto Rico), 56.8% (range: 47.2% in Connecticut to 67.2% in Puerto Rico), and 92.6% (range: 36.4% in Oregon to 96.8% in Ohio), respectively (Table 8).

The percentage of ART infants who were very preterm varied from 2.2% (range: 0 in several reporting areas to 3.8% in Delaware) among singletons, to 10.5% (range: 4.6% in Nevada to 40.0% in South Dakota) among twins, and 40.5% (range: 22.2% in Indiana to 58.8% in Pennsylvania) among triplets or higher-order multiples; comparable percentages among all infants were 1.6% (range: 0.9% in Oregon to 2.5% in Mississippi), 11.1% (range: 0% in Vermont to 16.5% in North Dakota), and 40.0% (range: 23.3% in Utah to 61.8% in Puerto Rico), respectively.

Discussion

Overview

The use of ART has increased substantially in the United States since the beginning of ART surveillance in 1996. In 1996 (the first full year for which ART data were reported to CDC), a total of 20,597 infants were born from 64,036 ART cycles (*23*). Since then, the number of cycles reported to CDC has more than doubled and the number of infants born from ART procedures has approximately tripled. Several trends can be observed in ART use and outcomes since 2009, when state-specific ART surveillance was introduced (*24*). ART utilization rates, as measured by procedures performed per 1 million women of reproductive age (15–44 years), increased by 5.2%, from 2,361 to 2,483. The average number of embryos transferred declined consistently among all age groups (2.1 to 1.9 among women aged <35 years, 2.5 to 2.2 among women aged 35–40 years, and 3.0 to 2.7 among women aged >40 years). Elective single embryo transfer rates increased among all age groups (7.4% to 15.3% among women aged <35 years, 2.8% to 6.7% among women aged 35–40 years, and 0.5% to 1.2% among women aged >40 years). Overall, rates of ART-conceived infants born in multiple-birth deliveries declined from 47.3% to 43.6%. Rates of ART-conceived twin infants fell from 43.7% to 41.2% and rates of ART-conceived triplet and higher order-infants fell from 3.6% to 2.4%. However, the contribution of ART-conceived twin infants to all twin infants remained unchanged at approximately 19.0%, and the contribution of ART-conceived preterm to all preterm infants increased from 3.9% to 4.6%.

Comparable data on ART use and embryo transfer practices from 16 European countries show that in 2010, overall, ART use as defined by the number of procedures performed per 1 million women of reproductive age was 6,258, which was 2.5 times higher than in the United States (*25*). Rates of single embryo transfers (SET) (eSET rates are not reported) varied widely in Europe, as they did across the reporting areas in the United States, and a few countries reported an SET rate of over 50%. Overall, in these 16 reporting countries, approximately 80% of all IVF deliveries were singleton deliveries, which was higher than in the United States (*25*).

The impact of ART on rates of multiple births and poor birth outcomes remains substantial because almost half of ART infants (44%) were born in multiple births (compared with only 3% of infants among the general birth population). On average, two embryos were transferred among women aged <35 years, even though single embryo transfers have been associated with better perinatal outcomes in most women in this age group (*26–28*). Nationally, rates of eSET procedures were low among women aged <35 years. Rates of low birthweight and preterm births were substantially higher among ART infants (30% and 35%, respectively) than among all infants (8% and 12%, respectively). Compared with ART singletons, ART twin and triplet or higher order infants were approximately four and a half and seven times more likely to be preterm. Although infants conceived with ART accounted for approximately 1.5% of total births in the United States in 2012, the proportion of twin and triplet or higher order infants attributed to ART were 19% and 30%, respectively, which is similar to the rates for previous years.

Variations by Reporting Area

ART use (as measured by the number of ART procedures performed per 1 million women of reproductive age, 15–44 years) varied widely by reporting area after controlling for the size of the population of women of reproductive age. Although some women who used ART might fall outside the age range of 15–44 years, this ratio is still useful as a proxy indicator of ART use in each reporting area. Residents of California, Illinois, Massachusetts, New York, New Jersey, and Texas had 48% of all ART infants. Rates of ART use were not correspondingly high in all six states. ART use exceeded twice the national average in two of these six states (Massachusetts and New Jersey). By this measure, Massachusetts ranked highest in ART use whereas California, despite having the highest overall number of ART procedures and the highest number of ART infants, ranked 12th nationally, with a rate of ART use that was slightly higher than the national rate. Furthermore, the contribution of ART to all infants born in the state was 4.7% in Massachusetts, compared with 1.7% in California. Similarly, residents of Connecticut, Delaware, DC, Hawaii, Illinois, Maryland, New Hampshire, New Jersey, New York, Rhode Island, and Virginia had higher ART use than the national level, as reflected by the high number of ART procedures performed per 1 million women of reproductive age in those areas.

Such differences might be explained in part by variations in state health insurance coverage. A total of 15 states (Arkansas, California, Connecticut, Hawaii, Illinois, Louisiana, Maryland, Massachusetts, Montana, New Jersey, New York, Ohio, Rhode Island, Texas, and West Virginia) have passed legislation mandating insurance coverage for infertility treatments; four of these states (Illinois, Massachusetts, New Jersey, and Rhode Island) include comprehensive coverage for at least four cycles of IVF.[§] Three of the four states with mandates (Illinois,

[§] Eight states (Arkansas, Connecticut, Hawaii, Illinois, Maryland, Massachusetts, New Jersey, and Rhode Island) have mandates that cover at least one ART cycle. Seven states (California, Louisiana, Montana, New York, Ohio, Texas and West Virginia) have insurance mandates that exclude IVF coverage. Information available at http://www.resolve.org/family-building-options/insurance_coverage/state-coverage.html.

Massachusetts, and New Jersey) had rates of ART use that were at least 50% higher than the national level. This type of mandated insurance has been associated with greater use of ART (*29–31*).

Elective Single-Embryo Transfer Rates

According to the American Society of Reproductive Medicine (ASRM) and SART, eSET is appropriate for favorable prognosis among patients aged <35 years, who have extra embryos available for transfer, which is a good predictor of embryo quality because these patients might be undergoing their first or second treatment cycle, or had a previously successful IVF, or might be recipients of donor oocytes (*32*). However, ASRM/SART guidelines on the number of embryos transferred allow for up to two embryos to be transferred in this group with patient counseling regarding risks of multifetal pregnancies (*33*). The percentage of eSET procedures was higher among women aged <35 years than older age groups but varied widely among reporting areas (range: 2.1% to 60.4%). Although many factors (e.g., patient's age and diagnostic factors) influence eSET rates, broad insurance mandates for IVF might increase access to ART services and might decrease multiple-embryo transfer procedures (*30,34*). National eSET rates increased in the United States among younger women from 7.4% in 2009 to 15.3% in 2012 (*24*). However, these rates are lower than eSET rates in countries that impose restrictions on the number of embryos transferred in exchange for extensive public funding for ART services (*35*). In the United States, even where mandated, coverage for infertility treatment can vary in scope (*29*). In the four states with mandatory comprehensive insurance for ART, among women aged <35 years, eSET rates were higher than the national average of 15.3% only in Massachusetts (30.1%) but lower in Illinois (14.3%), New Jersey (13.4%), and Rhode Island (5.7%). Because ART procedures are expensive, wider acceptance and use of eSET procedures still face considerable barriers and might require strengthening the guidelines on eSET practices as well as greater expansion of insurance coverage for ART services (*36,37*).

ART Multiple Births

Since 2000, the percentage of ART-conceived multiple birth infants in the United States declined by 17.7% (from 53% in 2000 to 43.6% in 2012) (*38*). A sharp decline of 73.3% was noted in the rate of ART-conceived triplets and higher order infants (from 9% in 2000 to 2.4% in 2012) and a lesser decline of 6.4% in the rate of ART-conceived twin infants (from 44% in 2000 to 41.2% in 2012).

The slow decline in twin rates among women who undergo ART procedures is largely because of low rates of eSET and transfer of two embryos among favorable prognosis patients aged <35 years (*36,37*). On average, two embryos were transferred per ART cycle in this age group in 2012, and showed little variation among the four states with comprehensive mandated ART coverage. Additionally, insurance mandates might increase ART use and thereby contribute to a higher overall number of multiple infants in mandated states (*29–31*).

High ART-twin rates can also be partially explained by a desire for parenthood among couples experiencing infertility who might underestimate the risks for such pregnancies (*39–41*). Therefore, understanding the viewpoint of couples undergoing infertility treatments about multiple births is an important consideration. The use and acceptance of eSET among younger patients with good prognosis can be promoted through patient education. Patient education focusing on maternal and perinatal morbidity and mortality as well as economic costs of twin gestation has been effective in reducing the preference for twins among patients (*42–44*).

Singleton live-birth deliveries have lower risks than multiple births for adverse birth outcomes such as prematurity, low birthweight, disability, and death (*45–47*). To optimize birth outcomes, the transfer of fewer embryos should be encouraged among patients and providers, taking into consideration patient age and prognosis (*27*). These findings show that ART twins and higher order multiples were approximately four and a half and seven times more likely to be born preterm than were ART singletons. The ASRM Practice Committee has noted that the most direct way to limit the risk for multiple gestations from ART is to transfer a single embryo at a time (*32*). Although the guidelines issued by ASRM/SART on the number of embryos transferred were revised several times (*33,48–51*), they still allow a maximum of two embryos to be transferred for women aged <35 years who have good prognosis. A high number of double embryo transfers occur among patients who otherwise appear to be good candidates for transferring one embryo (*36*). Reducing the number of embryos transferred from two to one among those patients who have a good chance of pregnancy and live birth with single embryo transfers will lower ART-twin rates and improve ART outcomes (*36,37*).

The economic costs of multiple births also provide a compelling argument for renewing efforts to reduce ART-related multiple births. In 2013, the mean medical cost of ART-singleton deliveries was estimated at $26,922, compared with ART-twins at $115,238, and ART-triplet and higher order infants at $434,668 (*52*). Transferring two embryos is associated with a slight increase in birth rate and a greater increase in the twin birth rate, as compared with transferring a single embryo (*27,53*). Given the economic data on the higher

costs from maternal and neonatal complications, insurance companies could consider expanding coverage for ART services in return for clinically appropriate limitations on the number of embryos transferred (*23,26,37,52*).

ART Low Birthweight Infants and Preterm Births

The rates of low birthweight and very low birthweight infants were disproportionately higher among ART infants than among infants in the general birth population. Two states (Massachusetts and New Jersey) with a large number of ART cycles and births also had high ART contributions (>10%) to both categories of low birthweight and preterm births. The contribution of ART to preterm births in the United States, most of which are also low birthweight, is a key concern. Since 1981, the rate of preterm births in the United States has increased >24% to its present level of 11.5% (*22,46*). Fertility treatments, both ART and controlled ovarian stimulations, contribute substantially to preterm births (*46,54*). Preterm births are a leading cause of infant mortality and morbidity, and preterm infants are at increased risk for death and have more health and developmental problems than full-term infants (*46,55–57*). Among ART infants, a substantial proportion of very preterm and very low birthweight infants were born extremely preterm at <28 weeks of gestation and with extremely low birthweight of <1,000 grams. The health risks associated with preterm births have contributed to increasing health-care costs. In 2005, the estimated economic cost associated with preterm births in the United States was $26 billion ($51,600 per infant born preterm) (*46*). ART infants born preterm accounted for approximately 5% of all preterm births in the United States in 2012, a total economic cost estimated at >$1.3 billion annually (*58*).

In addition to the known multiple-birth risks associated with ART, singleton infants conceived from ART procedures are at increased risk for low birthweight and preterm delivery. In 2012, of all singleton infants conceived with ART, 9.3% were low birthweight, compared with 6.3% in the general U.S. population. Approximately 2% of singleton infants conceived from ART were very low birthweight, compared with approximately 1% of singletons conceived in the general U.S. population. The percentage of ART singletons born preterm was 13.2%, in comparison to 9.9% for the general U.S. population. Therefore, adverse infant health outcomes among singletons (e.g., low birthweight and preterm delivery) also should be considered when assessing the effects of ART.

Limitations

The findings in this report are subject to at least five limitations. First, ART surveillance data were reported for each ART procedure performed rather than for each patient who used ART. Linking procedures among patients who underwent more than one ART procedure, even within a given year, is difficult. Second, because patients can achieve a successful pregnancy after undergoing multiple procedures, the cycle-specific success rates reported here underestimate the true per-patient success rates. Third, prematurity and low birthweight could be associated with factors contributing to underlying infertility and not entirely to ART procedures. Fourth, a small percentage of fertility clinics that performed ART in 2012 did not report their data to CDC and might have had results different from clinics that reported their data. Finally, four states had a substantial percentage of residency information missing for procedures performed in 2012 (California [4.4%], Hawaii [13.1%], Maryland [9.5%], and Pennsylvania [6.7%]). Overall, residency data were missing for approximately 1.6% of procedures performed and 2.0% of all live-birth deliveries resulting from ART procedures performed in 2012, and this might have resulted in underestimation of state-specific rates and percentages for outcomes.

Conclusion

Since 1996 (the first full year for which ART data were reported), the number of ART procedures performed in the United States doubled, and the number of infants born as a result of these procedures nearly tripled. With this increasing use, ART-conceived infants now represent 1.5% of infants born in the United States and had a noticeable impact on the prevalence of low birthweight and preterm deliveries, as nearly half of these infants were born in multiple-gestation pregnancies that resulted in multiple births. Furthermore, among ART-conceived infants, although rates of triplet or higher order infants have declined during the last decade, rates of twin infants have remained persistently high. Therefore, the impact of ART on poor birth outcomes remains substantial despite the overall decline in multiple birth rates. This report documents the rates and contribution of ART to multiple birth, low birthweight, and preterm infants by each state. It also highlights the differences in rates of low birthweight and prematurity between ART-conceived singleton, twin, and triplet and higher order infants compared with infants born in the general population. This allows state health departments to monitor the extent of ART-related adverse perinatal outcomes in their individual states.

Comprehensive insurance coverage of ART might increase access to fertility treatments. The findings in this report indicate that ART use was higher than the national rate in all four states with mandated comprehensive insurance coverage. Three of these four states had utilization rates exceeding 1.5 times national levels. However, embryo transfer practices were similar to the national rates in all four states providing comprehensive insurance coverage. The use of eSET was higher only in Massachusetts, which had a correspondingly lower rate of ART-conceived multiple-birth infants. Further research is needed to ascertain the influence of state insurance mandates on ART use, embryo transfer practices, and infant outcomes as well as the economic costs of multiple births (*28,32,36–37*), including out-of-pocket costs to patients. Increased use of ART in states with insurance mandates can also result in a higher number of ART-conceived multiple-birth infants. Addressing the risk for multiple births also requires understanding the perspectives of couples undergoing infertility treatments who might view a multiple birth, especially twins, as an acceptable or desired outcome and lack awareness of the increased risks associated with multiple birth to the mother and infants. Clinicians need to be aware of ongoing efforts to limit the number of embryos transferred to reduce twin rates and encourage wider implementation of eSET, when clinically appropriate, as mechanisms of promoting singleton infant births among ART-conceived pregnancies (*27,32,37*).

CDC is working to improve state-based surveillance of ART, infertility, and related issues by linking data from NASS to data collected by states (i.e., birth certificate, infant deaths, hospital discharge, birth defect registries). This initiative, the States Monitoring ART (SMART) Collaborative,¶ has been determined to be feasible and useful, especially for monitoring long-term outcomes of ART (*59*). Data from NASS have been linked with vital records from three states (Florida, Massachusetts, and Michigan) and will soon be linked to vital records of Connecticut, which joined the Collaborative in 2013. The overarching purpose of the SMART Collaborative is to strengthen the capacity of states to evaluate maternal and perinatal outcomes and programs through state-based public health surveillance and research (*60*).

Other factors influencing multiple births include maternal age at conception and non-ART fertility treatments (*46,54,61*). The older age of women at childbirth accounted for a substantial rise in twins during 1980–2009 (*61*). Further efforts also are needed to monitor the use of non-ART fertility treatments and their role in the rising number of multiple births (*46,54*). In 2011, an estimated 19% of twin births in the United States were attributable to non-IVF fertility treatments (*54*). ART only partially explains the overall prevalence of these adverse outcomes in the United States. Preterm births resulting from controlled ovarian stimulation (superovulation-intrauterine insemination and conventional ovulation induction) also might contribute to multiple gestations (*46,54*). More research is needed to identify the causes and consequences of preterm births that occur because of infertility treatments and to institute guidelines to reduce the number of multiple gestations (*46,54*). The risk for multiple gestations associated with non-ART fertility treatments is less well documented, as clinics are not similarly mandated to report data on their use. Studies have demonstrated that singleton infants conceived with ovulation stimulation are more likely than naturally conceived infants to be small for gestational age (*62*). CDC is monitoring the prevalence of non-ART fertility treatment use among women who had live births and their resultant outcomes in several states participating in the Pregnancy Risk Assessment Monitoring System (*63*). The most recent ART Surveillance Summary was published by CDC in 2014 (*64*). CDC will continue to provide updates of ART use in the United States as data become available.

¶ SMART is a collaboration between CDC and state health departments in Connecticut, Florida, Massachusetts, and Michigan. Information is available at http://www. cdc.gov/art/smart/index.htm.

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Map created by Jennifer Rothkopf, MPH, CHES, Women's Health and Fertility Branch, Division of Reproductive Health, CDC.

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TABLE 1. Number* and outcomes of assisted reproductive technology procedures, by female patient's reporting area of residence† at time of treatment — United States and Puerto Rico, 2012

Patient's reporting area of residence	No. ART clinics	No. procedures performed	No. embryo transfer procedures§	No. pregnancies	No. live-birth deliveries	No. singleton live-birth deliveries	No. multiple live-birth deliveries	No. live-born infants	ART procedures per million women aged 15–44 yrs¶
Alabama	6	873	747	356	298	217	81	380	910.3
Alaska	1	207	182	72	57	41	16	73	1,405.2
Arizona	10	2,261	1,926	887	698	519	179	886	1,764.9
Arkansas	1	492	427	189	160	116	44	204	859.1
California**	68	20,241	17,491	8,487	6,795	5,078	1,717	8,558	2,543.0
Colorado	8	1,705	1,589	1,003	846	586	260	1,109	1,622.9
Connecticut	9	3,148	2,541	1,125	895	680	215	1,113	4,584.5
Delaware	2	585	438	228	190	174	16	206	3,258.3
District of Columbia	3	1,228	965	398	308	257	51	359	7,221.0
Florida	28	6,785	5,675	2,628	2,138	1,584	554	2,710	1,878.1
Georgia	8	3,176	2,854	1,437	1,183	849	334	1,534	1,520.7
Hawaii**,††	5	886	745	355	288	192	96	387	3,343.0
Idaho	1	399	370	210	179	110	69	255	1,287.8
Illinois	25	10,449	8,585	3,795	3,094	2,294	800	3,911	3,998.7
Indiana	10	1,729	1,469	643	553	387	166	716	1,343.9
Iowa	2	1,225	1,045	598	480	376	104	586	2,113.2
Kansas	4	689	618	312	270	170	100	370	1,235.1
Kentucky	5	1,172	1,048	481	409	281	128	541	1,375.6
Louisiana	4	1,013	839	377	313	214	99	413	1,083.7
Maine	0	506	404	139	108	83	25	135	2,133.0
Maryland**,††	8	5,770	4,808	2,296	1,830	1,493	337	2,164	4,813.8
Massachusetts	9	9,754	8,391	3,462	2,785	2,194	591	3,390	7,206.4
Michigan	12	3,532	3,052	1,370	1,104	794	310	1,424	1,862.2
Minnesota	5	2,130	1,894	1,015	860	596	264	1,126	2,035.7
Mississippi	3	461	403	171	145	101	44	193	765.4
Missouri	8	1,847	1,624	761	630	443	187	825	1,575.0
Montana	1	210	192	99	81	60	21	102	1,154.6
Nebraska	2	649	525	242	199	140	59	262	1,809.9
Nevada	3	914	729	413	338	234	104	445	1,648.8
New Hampshire	1	817	692	308	249	197	52	302	3,324.8
New Jersey	21	8,590	7,244	3,603	2,933	2,070	863	3,816	4,974.0
New Mexico	1	359	304	153	129	89	40	171	899.3
New York	38	19,618	16,563	6,669	5,296	3,981	1,315	6,636	4,858.7
North Carolina††	11	3,219	2,770	1,423	1,162	854	308	1,480	1,639.6
North Dakota	1	239	212	104	88	58	30	118	1,764.9

See table footnotes on next page.

TABLE 1. (*Continued*) Number* and outcomes of assisted reproductive technology procedures, by female patient's reporting area of residence† at time of treatment — United States and Puerto Rico, 2012

Patient's reporting area of residence	No. ART clinics	No. procedures performed	No. embryo transfer procedures§	No. pregnancies	No. live-birth deliveries	No. singleton live-birth deliveries	No. multiple live-birth deliveries	No. live-born infants	ART procedures per million women aged 15–44 yrs.¶
Ohio	11	3,601	3,124	1,513	1,259	894	365	1,633	1,627.7
Oklahoma	3	759	673	363	298	211	87	388	1,014.7
Oregon	4	1,104	968	548	483	319	164	648	1,445.3
Pennsylvania**	19	5,984	5,035	2,221	1,794	1,373	421	2,231	2,467.0
Puerto Rico	3	243	214	93	64	50	14	79	323.3
Rhode Island	1	699	624	242	197	133	64	263	3,310.0
South Carolina	3	791	708	354	288	214	74	365	849.3
South Dakota	1	257	233	111	92	71	21	114	1,657.9
Tennessee	8	1,234	1,073	504	420	317	103	531	961.5
Texas	41	10,281	8967	4,681	3,884	2,622	1,262	5,177	1,877.2
Utah	4	1,398	1,228	687	572	371	201	777	2,257.0
Vermont	1	220	179	78	67	50	17	84	1,889.0
Virginia	13	5,642	4,559	2,031	1,604	1,267	337	1,942	3,376.9
Washington††	10	3,301	2,854	1,361	1,138	897	241	1,381	2,397.5
West Virginia	3	263	219	106	98	74	24	123	774.4
Wisconsin	7	1,657	1,461	727	618	426	192	818	1,522.4
Wyoming	0	88	81	48	40	25	15	55	807.4
Non-Resident		3,235	2,858	1,500	1,254	873	381	1,642	§§
Total	**456**	**157,635**	**134,419**	**62,977**	**51,261**	**37,699**	**13,562**	**65,151**	**2,483.0**

Abbreviation: ART = assisted reproductive technology.

* Excludes 18,585 egg/embryo freezing and banking procedures and 27 procedures performed in territories not included in this report.

† In cases of missing residency data (approximately 2%), the patient's residence was assigned as the location in which the ART procedure was performed.

§ Embryo transfer procedures include all procedures performed with the intent to transfer at least one embryo.

¶ Annual estimates of the population for the United States, regions, states, and Puerto Rico: April 1, 2011 to July 1, 2012 (NST-EST2012–01). Source: U.S. Census Bureau, Population Division. Release date: December 2012.

** A substantial percentage (4%–13%) of residency information was missing for procedures performed in these four states (California, Hawaii, Maryland, and Pennsylvania). Overall, residency information was missing for 2,497 (1.6%) procedures performed and 1,038 (2.0%) of live-birth deliveries.

†† Of all ART procedures, 0.5% were reported from military medical centers located in Hawaii, Maryland, North Carolina, and Washington. In each of these areas, ≥1% of ART procedures among residents were performed in a military medical center.

§§ Non-U.S. residents were excluded from the ratio because the appropriate denominators were not available.

TABLE 2. Number of assisted reproductive technology embryo transfer procedures* among patients who used fresh embryos from their own eggs, by female patient's age group and reporting area of residence† at time of treatment — United States and Puerto Rico, 2012

Patient's reporting area of residence	Age group (years)								
	<35 years			35–40 years			>40 years		
	No. embryo transfer procedures	Average no. embryos transferred (mean)	eSET§ (%)	No. embryo transfer procedures	Average no. embryos transferred (mean)	eSET (%)	No. embryo transfer procedures	Average no. embryos transferred (mean)	eSET (%)
Alabama	316	2.0	6.7	152	2.3	0.8	31	3.3	0.0
Alaska	45	2.4	7.0	49	2.3	8.7	7	—¶	—
Arizona	495	2.0	10.9	340	2.3	8.0	128	2.7	0.9
Arkansas	151	1.8	16.5	93	2.0	3.9	13	—	—
California**	3,248	1.9	16.5	4,264	2.4	7.5	2,090	3.0	1.4
Colorado	316	1.8	19.3	232	2.2	8.9	42	2.6	0.0
Connecticut	745	1.9	16.5	700	2.2	5.8	291	2.8	0.0
Delaware	108	1.4	60.4	66	1.7	37.3	14	—	—
District of Columbia	162	1.7	33.1	305	1.8	20.1	168	2.5	2.1
Florida	1,620	1.9	14.4	1,555	2.2	4.5	462	2.7	0.3
Georgia	763	1.9	17.5	669	2.3	8.4	158	3.0	1.4
Hawaii**	131	2.1	10.9	209	2.6	3.5	108	3.5	0.0
Idaho	146	2.0	2.8	35	2.6	0.0	13	—	—
Illinois	2,446	1.9	14.3	2,099	2.1	6.2	773	2.6	2.7
Indiana	631	2.0	5.5	294	2.2	1.9	54	2.4	0.0
Iowa	420	1.7	23.4	200	2.0	13.1	37	2.5	0.0
Kansas	242	1.9	10.5	99	2.3	2.2	20	2.9	0.0
Kentucky	398	2.0	8.2	235	2.4	1.8	32	2.8	0.0
Louisiana	334	2.1	2.5	194	2.2	2.9	47	2.4	2.8
Maine	128	1.7	17.7	108	2.2	4.8	63	2.4	2.3
Maryland**	1,171	1.5	38.9	1,187	1.9	15.3	454	2.5	1.1
Massachusetts	2,477	1.7	30.1	2,720	2.2	8.8	1,058	3.3	0.6
Michigan	991	2.0	9.4	644	2.4	2.6	160	2.5	2.3
Minnesota	734	1.8	14.0	434	2.1	3.1	85	2.8	1.3
Mississippi	130	2.0	3.2	85	2.2	1.3	13	—	—
Missouri	585	2.0	5.6	298	2.4	0.7	46	3.0	0.0
Montana	68	1.7	29.7	44	2.0	7.9	5	—	—
Nebraska	201	2.0	4.9	110	2.2	4.3	8	—	—
Nevada	113	1.9	9.4	97	1.9	4.1	17	—	—
New Hampshire	260	1.6	30.6	181	2.1	4.4	54	2.8	0.0
New Jersey	1,838	1.9	13.4	1,747	2.2	7.8	673	2.7	1.5
New Mexico	77	2.0	9.3	49	2.6	0.0	13	—	—
New York	3,532	2.0	11.2	4,433	2.3	4.5	2,581	2.8	1.5
North Carolina	799	1.9	13.0	620	2.2	4.7	150	2.9	2.3
North Dakota	89	1.9	12.9	29	2.2	3.4	7	—	—

See table footnotes on next page.

TABLE 2. (*Continued*) Number of assisted reproductive technology embryo transfer procedures* among patients who used fresh embryos from their own eggs, by female patient's age group and reporting area of residence† at time of treatment — United States and Puerto Rico, 2012

	Age group (years)								
	<35 years			35–40 years			>40 years		
Patient's reporting area of residence	No. embryo transfer procedures	Average no. embryos transferred (mean)	eSET§ (%)	No. embryo transfer procedures	Average no. embryos transferred (mean)	eSET (%)	No. embryo transfer procedures	Average no. embryos transferred (mean)	eSET (%)
Ohio	1,100	2.0	8.2	691	2.3	3.5	157	2.9	0.0
Oklahoma	306	2.0	2.1	129	2.1	0.0	16	—	—
Oregon	230	2.0	7.6	210	2.2	5.2	49	3.0	0.0
Pennsylvania**	1,540	1.9	14.5	1,222	2.3	5.2	316	2.8	1.6
Puerto Rico	74	2.1	2.9	81	2.4	1.3	27	2.5	0.0
Rhode Island	209	1.9	5.7	177	2.2	3.2	80	3.3	0.0
South Carolina	247	2.0	7.0	147	2.4	2.2	29	2.7	0.0
South Dakota	93	1.7	24.7	43	2.0	8.6	5	—	—
Tennessee	321	2.0	16.8	221	2.2	4.0	42	2.7	0.0
Texas	2,589	1.9	9.9	2,081	2.2	4.4	581	2.7	0.2
Utah	596	2.0	6.8	247	2.2	2.7	28	2.6	0.0
Vermont	52	2.0	8.5	47	2.0	10.3	14	—	—
Virginia	1,114	1.7	25.5	1,276	2.0	12.6	445	2.4	0.3
Washington	711	1.7	25.6	689	2.0	13.2	180	2.7	0.7
West Virginia	80	2.0	12.7	46	2.2	5.3	††	—	—
Wisconsin	512	1.8	17.4	280	2.1	7.2	63	2.6	0.0
Wyoming	37	1.8	21.2	6	—	—	††	—	—
Non-Resident	380	2.0	9.6	416	2.2	6.0	160	2.6	1.7
Total	**36,101**	**1.9**	**15.3**	**32,585**	**2.2**	**6.7**	**12,074**	**2.7**	**1.2**

Abbreviation: eSET = elective Single Embryo Transfer.

* Includes all procedures in which at least one embryo was transferred.

† In cases of missing residency data (approximately 2%), the patient's residence was assigned as the location in which the ART procedure was performed.

§ A procedure in which one embryo, selected from a larger number of available embryos, is placed in the uterus. A cycle in which only one embryo is available is not defined as eSET.

¶ Rates derived on the basis of N <20 in the denominator have been suppressed because such rates are considered unstable.

** A substantial percentage (4%–13%) of residency information was missing for procedures performed in these four states (California, Hawaii, Maryland, and Pennsylvania).

†† To protect confidentiality, cells with values from 1–4 are suppressed, as are data that can be used to derive cell values of 1–4. These values are included in totals.

TABLE 3. Number, proportion, and percentage of infants born with the use of assisted reproductive technology, by female patient's reporting area of residence* at time of treatment — United States and Puerto Rico, 2012†

Patient's reporting area of residence	Total no. infants born§	No. ART infants born	Proportion of ART infants among all infants (%)	Singleton infants among ART infants		Singleton infants among all infants§		Proportion of ART singleton infants among all singleton infants (%)
				No.	%	No	%	
Alabama	58,448	391	0.7	218	55.8	56,453	96.6	0.4
Alaska	11,187	73	0.7	40	54.8	10,873	97.2	0.4
Arizona	86,441	801	0.9	489	61.0	84,032	97.2	0.6
Arkansas	38,347	197	0.5	109	55.3	37,197	97.0	0.3
California¶	503,755	7,831	1.6	4,552	58.1	488,098	96.9	0.9
Colorado	65,187	1,152	1.8	590	51.2	62,972	96.6	0.9
Connecticut	36,539	1,143	3.1	691	60.5	35,015	95.8	2.0
Delaware	11,023	193	1.8	157	81.3	10,681	96.9	1.5
District of Columbia	9,399	328	3.5	236	72.0	9,067	96.5	2.6
Florida	213,148	2,498	1.2	1,407	56.3	206,280	96.8	0.7
Georgia	130,280	1,528	1.2	796	52.1	125,829	96.6	0.6
Hawaii¶	18,980	398	2.1	197	49.5	18,345	96.7	1.1
Idaho	22,963	232	1.0	102	44.0	22,254	96.9	0.5
Illinois	159,160	3,788	2.4	2,144	56.6	152,964	96.1	1.4
Indiana	83,227	694	0.8	357	51.4	80,473	96.7	0.4
Iowa	38,702	591	1.5	352	59.6	37,333	96.5	0.9
Kansas	40,341	372	0.9	173	46.5	38,947	96.5	0.4
Kentucky	55,758	522	0.9	257	49.2	53,921	96.7	0.5
Louisiana	62,642	419	0.7	203	48.4	60,456	96.5	0.3
Maine	12,798	66	0.5	43	65.2	12,377	96.7	0.3
Maryland¶	72,883	2,127	2.9	1,408	66.2	69,996	96.0	2.0
Massachusetts	72,439	3,387	4.7	2,136	63.1	69,256	95.6	3.1
Michigan	113,091	1,497	1.3	825	55.1	108,954	96.3	0.8
Minnesota	68,772	1,120	1.6	540	48.2	66,296	96.4	0.8
Mississippi	38,669	179	0.5	85	47.5	37,392	96.7	0.2
Missouri	75,446	716	0.9	404	56.4	72,802	96.5	0.6
Montana	12,118	116	1.0	70	60.3	11,724	96.7	0.6
Nebraska	25,942	234	0.9	142	60.7	25,021	96.4	0.6
Nevada	34,911	398	1.1	211	53.0	33,799	96.8	0.6
New Hampshire	12,352	261	2.1	156	59.8	11,828	95.8	1.3
New Jersey	104,230	3,765	3.6	2,019	53.6	99,545	95.5	2.0
New Mexico	27,068	193	0.7	87	45.1	26,371	97.4	0.3
New York	240,916	6,561	2.7	3,880	59.1	231,560	96.1	1.2
North Carolina	119,831	1,524	1.3	840	55.1	115,765	96.6	0.7
North Dakota	10,106	124	1.2	63	50.8	9,811	97.1	0.6
Ohio	138,483	1,514	1.1	789	52.1	133,526	96.4	0.6
Oklahoma	52,751	408	0.8	182	44.6	51,097	96.9	0.4
Oregon	45,067	577	1.3	303	52.5	43,580	96.7	0.7
Pennsylvania¶	142,514	2,211	1.6	1,305	59.0	137,343	96.4	1.0
Puerto Rico	38,900	89	0.2	43	48.3	38,088	97.9	0.1
Rhode Island	10,926	254	2.3	123	48.4	10,511	96.2	1.2
South Carolina	57,155	512	0.9	293	57.2	55,179	96.5	0.5
South Dakota	12,104	88	0.7	58	65.9	11,743	97.0	0.5
Tennessee	80,371	507	0.6	286	56.4	77,771	96.8	0.4
Texas	382,727	4,911	1.3	2,428	49.4	370,456	96.8	0.7
Utah	51,465	674	1.3	308	45.7	49,768	96.7	0.6
Vermont	6,009	76	1.3	39	51.3	5,838	97.2	0.7
Virginia	103,013	1,928	1.9	1,208	62.7	99,213	96.3	1.2
Washington	87,463	1,334	1.5	799	59.9	84,680	96.8	0.9
West Virginia	20,827	103	0.5	53	51.5	20,233	97.1	0.3
Wisconsin	67,295	780	1.2	404	51.8	64,910	96.5	0.6
Wyoming	7,572	47	0.6	28	59.6	7,363	97.2	0.4
Total	**3,991,741**	**61,432**	**1.5**	**34,628**	**56.4**	**3,854,986**	**96.6**	**0.9**

Abbreviation: ART = assisted reproductive technology.

* In cases of missing residency data (approximately 2%), the patient's residence was assigned as the location in which the ART procedure was performed.

† Includes infants conceived from ART procedures performed in 2011 and born in 2012, and infants conceived from ART procedures performed in 2012 and born in 2012. Total ART births exclude nonresidents.

§ Source: U.S. natality file, CDC, National Center for Health Statistics. U.S. births include nonresidents.

¶ A substantial percentage (4%–13%) of residency information was missing for procedures performed in these four states (California, Hawaii, Maryland, and Pennsylvania).

TABLE 4. Number, percentage, and proportion of multiple-birth, twins, and triplets, and higher order infants born with use of an assisted reproductive technology procedure, by female patient's reporting area of residence* at time of treatment — United States and Puerto Rico, 2012†

Patient's reporting area of residence	Multiple-birth infants among ART infants§		Multiple-birth infants among all infants¶	Proportion of ART multiple-birth infants among all multiple-birth infants (%)		Twin infants among ART infants§		Twin infants among all infants¶		Proportion of ART twin infants among all twin infants (%)	Triplet (plus) infants among ART infants§		Triplet (plus) infants among all infants¶		Proportion of ART triplet (plus) infants among all triplet (plus) infants (%)
	No.	%	No.	%	%	No.	%	No.	%	%	No.	%	No.	%	%
Alabama	173	44.2	1,995	3.4	8.7	158	40.4	1,882	3.2	8.4	15	3.8	113	0.2	13.3
Alaska	33	45.2	314	2.8	10.5	—**	—	—	—	—	—	—	—	—	—§§
Arizona	312	39	2,409	2.8	13.0	296	37.0	2,327	2.7	12.7	16	2.0	82	0.1	19.5
Arkansas	88	44.7	1,150	3.0	7.7	—	—	1,125	2.9	—	—	—	25	0.1	—
California††	3,279	41.9	15,657	3.1	20.9	3,104	39.6	15,111	3.0	20.5	175	2.2	546	0.1	32.1
Colorado	562	48.8	2,215	3.4	25.4	—	—	2,158	3.3	—	—	—	57	0.1	—
Connecticut	452	39.5	1,524	4.2	29.7	434	38.0	1,473	4.0	29.5	18	1.6	51	0.1	35.3
Delaware	36	18.7	342	3.1	10.5	36	18.7	331	3.0	10.9	0	0.0	11	0.1	§§
District of Columbia	92	28.0	332	3.5	27.7	92	28.0	319	3.4	28.8	0	0.0	13	0.1	§§
Florida	1,091	43.7	6,868	3.2	15.9	1,009	40.4	6,607	3.1	15.3	82	3.3	261	0.1	31.4
Georgia	732	47.9	4,451	3.4	16.4	672	44.0	4,295	3.3	15.6	60	3.9	156	0.1	38.5
Hawaii††	201	50.5	635	3.3	31.7	—	—	613	3.2	—	—	—	22	0.1	—
Idaho	130	56.0	709	3.1	18.3	107	46.1	676	2.9	15.8	23	9.9	33	0.1	69.7
Illinois	1,644	43.4	6,196	3.9	26.5	1,554	41.0	5,958	3.7	26.1	90	2.4	238	0.1	37.8
Indiana	337	48.6	2,754	3.3	12.2	310	44.7	2,658	3.2	11.7	27	3.9	96	0.1	28.1
Iowa	239	40.4	1,369	3.5	17.5	221	37.4	1,322	3.4	16.7	18	3.0	47	0.1	38.3
Kansas	199	53.5	1,394	3.5	14.3	184	49.5	1,343	3.3	13.7	15	4.0	51	0.1	29.4
Kentucky	265	50.8	1,837	3.3	14.4	250	47.9	1,760	3.2	14.2	15	2.9	77	0.1	19.5
Louisiana	216	51.6	2,186	3.5	9.9	197	47.0	2,108	3.4	9.3	19	4.5	78	0.1	24.4
Maine	23	34.8	421	3.3	5.5	—	—	415	3.2	—	—	—	6	<0.1	—§§
Maryland††	719	33.8	2,887	4.0	24.9	677	31.8	2,793	3.8	24.2	42	2.0	94	0.1	44.7
Massachusetts	1,251	36.9	3,183	4.4	39.3	1,210	35.7	3,091	4.3	39.1	41	1.2	92	0.1	44.6
Michigan	672	44.9	4,137	3.7	16.2	612	40.9	3,967	3.5	15.4	60	4.0	170	0.2	35.3
Minnesota	580	51.8	2,476	3.6	23.4	562	50.2	2,393	3.5	23.5	18	1.6	83	0.1	21.7
Mississippi	94	52.5	1,277	3.3	7.4	—	—	1,248	3.2	—	—	—	29	0.1	—
Missouri	312	43.6	2,644	3.5	11.8	285	39.8	2,572	3.4	11.1	27	3.8	72	0.1	37.5
Montana	46	39.7	394	3.3	11.7	—	—	378	3.1	—	—	—	16	0.1	—§§
Nebraska	92	39.3	921	3.6	10.0	86	36.8	885	3.4	9.7	6	2.6	36	0.1	16.7
Nevada	187	47.0	1,112	3.2	16.8	178	44.7	1,087	3.1	16.4	9	2.3	25	0.1	36.0
New Hampshire	105	40.2	524	4.2	20.0	96	36.8	503	4.1	19.1	9	3.4	21	0.2	42.9
New Jersey	1,746	46.4	4,685	4.5	37.3	1,694	45.0	4,555	4.4	37.2	52	1.4	130	0.1	40.0
New Mexico	106	54.9	697	2.6	15.2	100	51.8	685	2.5	14.6	6	3.1	12	<0.1	§§
New York	2,681	40.9	9,356	3.9	28.7	2,546	38.8	8,999	3.7	28.3	135	2.1	357	0.1	37.8
North Carolina	684	44.9	4,066	3.4	16.8	665	43.6	3,948	3.3	16.8	19	1.2	118	0.1	16.1
North Dakota	61	49.2	295	2.9	20.7	—	—	278	2.8	—	—	—	17	0.2	—§§

See table footnotes on next page.

TABLE 4. (*Continued*) Number, percentage, and proportion of multiple-birth, twins, and triplets, and higher order infants born with use of an assisted reproductive technology procedure, by female patient's reporting area of residence* at time of treatment — United States and Puerto Rico, 2012†

Patient's reporting area of residence	Multiple-birth infants among ART infants§		Multiple-birth infants among all infants¶	Proportion of ART multiple-birth infants among all multiple-birth infants (%)		Twin infants among ART infants§		Twin infants among all infants¶		Proportion of ART twin infants among all twin infants (%)	Triplet (plus) infants among ART infants§		Triplet (plus) infants among all infants¶		Proportion of ART triplet (plus) infants among all triplet (plus) infants (%)
	No.	%	No.	%	%	No.	%	No.	%	%	No.	%	No.	%	%
Ohio	725	47.9	4,957	3.6	14.6	689	45.5	4,707	3.4	14.6	36	2.4	250	0.2	14.4
Oklahoma	226	55.4	1,654	3.1	13.7	199	48.8	1,581	3.0	12.6	27	6.6	73	0.1	37.0
Oregon	274	47.5	1,487	3.3	18.4	268	46.4	1,454	3.2	18.4	6	1.0	33	0.1	18.2
Pennsylvania††	906	41.0	5,171	3.6	17.5	826	37.4	4,949	3.5	16.7	80	3.6	222	0.2	36.0
Puerto Rico	46	51.7	812	2.1	5.7	34	38.2	778	2.0	4.4	12	13.5	34	0.1	35.3
Rhode Island	131	51.6	415	3.8	31.6	119	46.9	400	3.7	29.8	12	4.7	15	0.1	§§
South Carolina	219	42.8	1,976	3.5	11.1	213	41.6	1,919	3.4	11.1	6	1.2	57	0.1	10.5
South Dakota	30	34.1	361	3.0	8.3	30	34.1	353	2.9	8.5	0	0.0	8	0.1	§§
Tennessee	221	43.6	2,600	3.2	8.5	200	39.4	2,519	3.1	7.9	21	4.1	81	0.1	25.9
Texas	2,483	50.6	12,271	3.2	20.2	2,327	47.4	11,745	3.1	19.8	156	3.2	526	0.1	29.7
Utah	366	54.3	1,697	3.3	21.6	336	49.9	1,611	3.1	20.9	30	4.5	86	0.2	34.9
Vermont	37	48.7	171	2.8	21.6	—	—	163	2.7	—	—	—	8	0.1	—§§
Virginia	720	37.3	3,800	3.7	18.9	702	36.4	3,667	3.6	19.1	18	0.9	133	0.1	13.5
Washington	535	40.1	2,783	3.2	19.2	514	38.5	2,687	3.1	19.1	21	1.6	96	0.1	21.9
West Virginia	50	40.1	594	2.9	8.4	50	48.5	563	2.7	8.9	0	0.0	31	0.1	0.0
Wisconsin	376	48.2	2,385	3.5	15.8	358	45.9	2,326	3.5	15.4	18	2.3	59	0.1	30.5
Wyoming	19	40.4	209	2.8	9.1	19	40.4	—	—	—	0	0.0	—	—	—
Total	**26,804**	**43.6**	**136,755**	**3.4**	**19.6**	**25,337**	**41.2**	**131,802**	**3.3**	**19.2**	**1,467**	**2.4**	**4,953**	**0.1**	**29.6**

Abbreviation: ART = assisted reproductive technology.

* In cases of missing residency data (approximately 2%), the patient's residence was assigned as the location in which the ART procedure was performed.

† ART totals include infants conceived from ART procedures performed in 2011 and born in 2012, and infants conceived from ART procedures performed in 2012 and born in 2012. Total ART births exclude nonresidents.

§ Includes only the number of infants live-born in a multiple-birth delivery. For example, if three infants were born in a live-birth delivery and one of the three infants was stillborn, the total number of live born infants would be two. However, the two infants still would be counted as triplets.

¶ Source: U.S. natality file, CDC, National Center for Health Statistics. U.S. totals include nonresidents.

** To protect confidentiality, cells with values from 1–4 are suppressed, as are data that can be used to derive cell values of 1–4. These values are included in totals.

†† A substantial percentage (4%–13%) of residency information was missing for procedures performed in these four states (California, Hawaii, Maryland, and Pennsylvania).

§§ Rates derived on the basis of N <20 in the denominator have been suppressed because such rates are considered unstable.

TABLE 5. Number, percentage, and proportion of infants born with use of assisted reproductive technology, by low birthweight category and by female patient's reporting area of residence* at time of treatment — United States and Puerto Rico, 2012†

Patient's reporting area of residence	<2,500 grams (LBW)					<1500 grams (VLBW)				
	ART infants		All infants§		Proportion of ART LBW infants among all LBW infants (%)	ART infants		All infants§		Proportion of ART VLBW infants among all VLBW infants (%)
	No.	%	No.	%		No.	%	No.	%	
Alabama	125	32.2	5,853	10.0	2.1	28	7.2	1,111	1.9	2.5
Alaska	22	32.4	632	5.6	3.5	—¶	—	97	0.9	—
Arizona	216	27.1	5,997	6.9	3.6	40	5.0	972	1.1	4.1
Arkansas	52	26.4	3,332	8.7	1.6	9	4.6	633	1.7	1.4
California**	2,170	28.8	33,655	6.7	6.4	372	4.9	5,612	1.1	6.6
Colorado	407	35.7	5,749	8.8	7.1	36	3.2	782	1.2	4.6
Connecticut	295	26.0	2,868	7.8	10.3	50	4.4	536	1.5	9.3
Delaware	37	19.2	913	8.3	4.1	8	4.1	178	1.6	4.5
District of Columbia	61	18.8	903	9.6	6.8	13	4.0	160	1.7	8.1
Florida	797	32.2	18,260	8.6	4.4	158	6.4	3,370	1.6	4.7
Georgia	509	33.5	12,014	9.2	4.2	95	6.3	2,218	1.7	4.3
Hawaii**	168	42.2	1,542	8.1	10.9	22	5.5	231	1.2	9.5
Idaho	96	41.4	1,477	6.4	6.5	18	7.8	217	0.9	8.3
Illinois	1,070	28.4	12,935	8.1	8.3	197	5.2	2,410	1.5	8.2
Indiana	231	33.5	6,555	7.9	3.5	34	4.9	1,098	1.3	3.1
Iowa	166	28.1	2,579	6.7	6.4	37	6.3	454	1.2	8.1
Kansas	127	35.1	2,879	7.1	4.4	18	5.0	531	1.3	3.4
Kentucky	158	31.3	4,823	8.6	3.3	28	5.6	892	1.6	3.1
Louisiana	156	37.5	6,740	10.8	2.3	29	7.0	1,267	2.0	2.3
Maine	16	24.2	850	6.6	1.9	—	—	130	1.0	—
Maryland**	586	27.6	6,417	8.8	9.1	120	5.7	1,245	1.7	9.6
Massachusetts	838	25.2	5,478	7.6	15.3	118	3.5	866	1.2	13.6
Michigan	485	32.5	9,548	8.4	5.1	89	6.0	1,758	1.6	5.1
Minnesota	319	28.7	4,550	6.6	7.0	60	5.4	779	1.1	7.7
Mississippi	62	34.8	4,502	11.6	1.4	13	7.3	798	2.1	1.6
Missouri	209	29.9	5,809	7.7	3.6	42	6.0	1,051	1.4	4.0
Montana	33	28.4	891	7.4	3.7	—	—	129	1.1	—
Nebraska	60	25.6	1,734	6.7	3.5	7	3.0	293	1.1	2.4
Nevada	111	28.3	2,781	8.0	4.0	18	4.6	449	1.3	4.0
New Hampshire	58	22.6	898	7.3	6.5	10	3.9	122	1.0	8.2
New Jersey	1,209	32.4	8,534	8.2	14.2	240	6.4	1,594	1.5	15.1
New Mexico	87	45.1	2,381	8.8	3.7	10	5.2	330	1.2	3.0
New York	1,769	21.2	19,074	7.9	9.3	316	4.1	3,494	1.5	9.0
North Carolina	449	29.6	10,563	8.8	4.3	109	7.2	2,035	1.7	5.4
North Dakota	42	33.9	625	6.2	6.7	6	4.8	115	1.1	5.2

See table footnotes on next page.

TABLE 5. (*Continued*) Number, percentage, and proportion of infants born with use of assisted reproductive technology, by low birthweight category and by female patient's reporting area of residence* at time of treatment — United States and Puerto Rico, 2012†

Patient's reporting area of residence	<2,500 grams (LBW)					<1500 grams (VLBW)				
	ART infants		All infants§		Proportion of ART LBW infants among all LBW infants (%)	ART infants		All infants§		Proportion of ART VLBW infants among all VLBW infants (%)
	No.	%	No.	%		No.	%	No.	%	
Ohio	460	30.7	11,857	8.6	3.9	104	7.0	2,389	1.7	4.4
Oklahoma	150	37.1	4,200	8.0	3.6	32	7.9	756	1.4	4.2
Oregon	177	31.2	2,769	6.1	6.4	22	3.9	436	1.0	5.0
Pennsylvania**	655	29.9	11,492	8.1	5.7	140	6.4	2,137	1.5	6.6
Puerto Rico	37	43.5	4501	11.6	0.8	11	12.9	602	1.5	1.8
Rhode Island	94	37.5	877	8.0	10.7	25	10.0	186	1.7	13.4
South Carolina	129	25.4	5,456	9.5	2.4	22	4.3	1,015	1.8	2.2
South Dakota	30	34.1	748	6.2	4.0	7	8.0	135	1.1	5.2
Tennessee	178	35.4	7,377	9.2	2.4	29	5.8	1,258	1.6	2.3
Texas	1,775	36.6	31,607	8.3	5.6	329	6.8	5,591	1.5	5.9
Utah	250	37.3	3,522	6.8	7.1	52	7.8	536	1.0	9.7
Vermont	28	36.8	370	6.2	7.6	8	10.5	59	1.0	13.6
Virginia	482	25.1	8,375	8.1	5.8	57	3.0	1,610	1.6	3.5
Washington	348	26.3	5,347	6.1	6.5	57	4.3	936	1.1	6.1
West Virginia	24	24.5	1,917	9.2	1.3	0	0.0	311	1.5	0.0
Wisconsin	244	31.4	4,809	7.1	5.1	53	6.8	853	1.3	6.2
Wyoming	15	31.9	645	8.5	2.3	—	—	87	1.1	—
Total	**18,272**	**30.2**	**320,210**	**8.0**	**5.7**	**3,311**	**5.5**	**56,854**	**1.4**	**5.8**

Abbreviations: ART = assisted reproductive technology; LBW = low birthweight, VLBW = very low birthweight.

* In cases of missing residency data (approximately 2%), the patient's residence was assigned as the location in which the ART procedure was performed.

† ART totals include infants conceived from ART procedures performed in 2011 and born in 2012, and infants conceived from ART procedures performed in 2012 and born in 2012. Total ART infants exclude nonresidents.

§ Source: U.S. natality file, CDC, National Center for Health Statistics. U.S. totals include nonresidents.

¶ To protect confidentiality, cells with values from 1–4 are suppressed, as are data that can be used to derive cell values of 1–4. These values are included in totals.

** A substantial percentage (4%–13%) of residency information was missing for procedures performed in these four states (California, Hawaii, Maryland, and Pennsylvania).

TABLE 6. Number, percentage, and proportion of infants born with use of assisted reproductive technology, by low gestational age category, and female patient's reporting area of residence* at time of treatment — United States and Puerto Rico, 2012†

Patient's reporting area of residence	<37 weeks (PTB)					<32 weeks (VPTB)				
	ART infants		All infants§		Proportion of ART PTB infants among all PTB infants	ART infants		All infants§		Proportion of ART VPTB infants among all VPTB infants
	No.	%	No.	%	(%)	No.	%	No.	%	(%)
Alabama	155	39.6	8,505	14.6	1.8	31	7.9	1,469	2.5	2.1
Alaska	23	31.5	1,026	9.2	2.2	—¶	—	160	1.4	—
Arizona	263	33.0	10,035	11.6	2.6	45	5.6	1,527	1.8	2.9
Arkansas	74	38.1	5,082	13.3	1.5	14	7.2	743	1.9	1.9
California**	2,469	31.7	48,136	9.6	5.1	462	5.9	7,231	1.4	6.4
Colorado	432	38.0	6,770	10.4	6.4	53	4.7	1,033	1.6	5.1
Connecticut	302	26.6	3,550	9.7	8.5	50	4.4	635	1.7	7.9
Delaware	40	20.8	1,355	12.3	3.0	8	4.2	270	2.4	3.0
District of Columbia	68	20.8	1,203	12.8	5.7	14	4.3	231	2.5	6.1
Florida	953	38.2	29,219	13.7	3.3	187	7.5	4,645	2.2	4.0
Georgia	578	38.2	16,478	12.6	3.5	104	6.9	2,902	2.2	3.6
Hawaii**	156	39.2	2,308	12.2	6.8	26	6.5	319	1.7	8.2
Idaho	112	48.3	2,348	10.2	4.8	21	9.1	282	1.2	7.4
Illinois	1,304	34.6	18,981	11.9	6.9	248	6.6	3,375	2.1	7.3
Indiana	272	39.4	9,052	10.9	3.0	43	6.2	1,429	1.7	3.0
Iowa	198	33.5	4,451	11.5	4.4	42	7.1	698	1.8	6.0
Kansas	176	47.3	4,446	11.0	4.0	22	5.9	704	1.7	3.1
Kentucky	221	42.4	7,103	12.7	3.1	40	7.7	1,257	2.3	3.2
Louisiana	192	46.0	9,563	15.3	2.0	34	8.2	1,725	2.8	2.0
Maine	23	34.8	1,186	9.3	1.9	8	12.1	220	1.7	3.6
Maryland**	665	31.3	8,914	12.2	7.5	142	6.7	1,626	2.2	8.7
Massachusetts	982	29.2	7,327	10.1	13.4	148	4.4	1,202	1.7	12.3
Michigan	562	37.8	13,381	11.8	4.2	119	8.0	2,482	2.2	4.8
Minnesota	409	36.6	6,980	10.1	5.9	72	6.4	1,120	1.6	6.4
Mississippi	80	44.9	6,613	17.1	1.2	16	9.0	1,112	2.9	1.4
Missouri	269	37.8	8,781	11.6	3.1	51	7.2	1,477	2.0	3.5
Montana	44	37.9	1,354	11.2	3.2	—	—	213	1.8	—
Nebraska	86	37.2	2,871	11.1	3.0	9	3.9	404	1.6	2.2
Nevada	132	33.8	4,515	12.9	2.9	13	3.3	651	1.9	2.0
New Hampshire	82	31.9	1,159	9.4	7.1	14	5.4	172	1.4	8.1
New Jersey	1,319	35.3	11,669	11.2	11.3	273	7.3	2,101	2.0	13.0
New Mexico	80	41.5	3,099	11.4	2.6	16	8.3	426	1.6	3.8
New York	1,561	24.0	25,759	10.7	6.1	302	4.6	4,290	1.8	7.0
North Carolina	544	36.0	14,387	12.0	3.8	112	7.4	2,886	2.4	3.9
North Dakota	55	44.4	999	9.9	5.5	8	6.5	170	1.7	4.7

See table footnotes on next page.

TABLE 6. (*Continued*) Number, percentage, and proportion of infants born with use of assisted reproductive technology, by low gestational age category, and female patient's reporting area of residence* at time of treatment — United States and Puerto Rico, 2012†

Patient's reporting area of residence	<37 weeks (PTB)					<32 weeks (VPTB)				
	ART infants		All infants§		Proportion of ART PTB infants among all PTB infants	ART infants		All infants§		Proportion of ART VPTB infants among all VPTB infants
	No.	%	No.	%	(%)	No.	%	No.	%	(%)
Ohio	541	35.8	16,739	12.1	3.2	114	7.5	3,300	2.4	3.5
Oklahoma	188	46.1	6,869	13.0	2.7	37	9.1	1,092	2.1	3.4
Oregon	192	33.4	4,105	9.1	4.7	36	6.3	573	1.3	6.3
Pennsylvania**	715	32.5	15,339	10.8	4.7	155	7.0	2,861	2.0	5.4
Puerto Rico	44	49.4	6,559	16.9	0.7	10	11.2	1,006	2.6	1.0
Rhode Island	98	39.7	1,192	10.9	8.2	29	11.7	240	2.2	12.1
South Carolina	151	29.5	7,817	13.7	1.9	27	5.3	1,448	2.5	1.9
South Dakota	30	34.1	1,291	10.7	2.3	13	14.8	202	1.7	6.4
Tennessee	213	42.3	9,985	12.4	2.1	41	8.2	1,650	2.1	2.5
Texas	2,089	42.8	47,418	12.4	4.4	406	8.3	7,692	2.0	5.3
Utah	292	43.5	5,238	10.2	5.6	56	8.3	693	1.3	8.1
Vermont	31	40.8	520	8.7	6.0	10	13.2	67	1.1	14.9
Virginia	593	30.9	11,661	11.3	5.1	67	3.5	2,095	2.0	3.2
Washington	434	32.6	8,681	9.9	5.0	77	5.8	1,299	1.5	5.9
West Virginia	45	43.7	2,572	12.3	1.7	—	—	398	1.9	—
Wisconsin	297	38.2	7,038	10.5	4.2	66	8.5	1,094	1.6	6.0
Wyoming	17	36.2	819	10.8	2.1	—	—	121	1.6	—
Total	**21,351**	**34.9**	**462,448**	**11.6**	**4.6**	**3,980**	**6.5**	**77,018**	**1.9**	**5.2**

Abbreviations: ART = assisted reproductive technology; PTB = preterm birth; VPTB = very preterm birth.

* In cases of missing residency data (approximately 2%), the patient's residence was assigned as the location in which the ART procedure was performed.

† ART totals include infants conceived from ART procedures performed in 2011 and born in 2012, and infants conceived from ART procedures performed in 2012 and born in 2012. Total ART births exclude nonresidents.

§ Source: U.S. natality file, CDC, National Center for Health Statistics. U.S. totals include nonresidents.

¶ To protect confidentiality, cells with values from 1–4 are suppressed, as are data that can be used to derive cell values of 1–4. These values are included in totals.

** A substantial percentage (4%–13%) of residency information was missing for procedures performed in these four states (California, Hawaii, Maryland, and Pennsylvania).

TABLE 7. Percentages* of low birthweight infants among infants born with assisted reproductive technology and all U.S. infants, by plurality, by female patient's reporting area of residence† at time of treatment — United States and Puerto Rico, 2012§

Patient's state/ reporting area of residence	ART singletons		All singletons¶		ART twins**		All twins¶		ART triplets (plus)**		All triplets (plus)¶	
	<2,500 g (LBW)	<1,500 g (VLBW)	<2,500 g (LBW)	<1,500 g (VLBW)	<2,500 g (LBW)	<1,500 g (VLBW)	<2,500 g (LBW)	<1,500 g (VLBW)	<2,500 g (LBW)	<1,500 g (VLBW)	<2,500g (LBW)	<1,500 g (VLBW)
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Alabama	7.9	—††	8.2	1.6	58.9	11.4	58.8	9.5	§§	§§	92.9	46.9
Alaska	—	0.0	4.5	0.7	63.3	—	46.0	6.4	—§§	§§	NA	NA
Arizona	6.2	—	5.5	0.9	57.6	11.2	55.7	8.1	§§	—§§	96.3	25.6
Arkansas	6.4	—	7.1	1.3	49.4	9.4	60.8	11.7	—§§	§§	100.0	60.0
California¶¶	9.8	1.9	5.2	0.9	53.3	7.9	52.2	7.8	95.3	33.7	93.0	38.6
Colorado	9.7	1.2	7.0	0.9	62.9	5.3	59.3	8.9	—§§	§§	96.5	31.6
Connecticut	8.5	1.3	5.9	1.1	50.7	8.3	50.1	9.7	§§	§§	94.1	35.3
Delaware	10.8	—	6.7	1.3	55.6	—	57.7	12.7	NC***	NC	NA	NA
District of Columbia	8.1	—	8.1	1.4	47.7	12.5	49.8	9.4	NC	NC	§§	NA
Florida	9.8	1.6	6.9	1.3	58.3	10.1	57.5	9.7	96.3	42.7	95.0	41.8
Georgia	7.7	1.3	7.5	1.4	58.5	9.6	57.5	10.3	96.7	35.0	96.2	30.8
Hawaii¶¶	13.7	—	6.3	0.9	69.7	8.1	58.4	8.2	—§§	—§§	NA	72.7
Idaho	9.8	—	4.8	0.7	58.9	—	54.0	6.2	100.0	52.2	100.0	48.5
Illinois	8.3	1.7	6.2	1.1	52.7	8.4	54.4	10.1	92.2	35.6	92.0	34.5
Indiana	10.1	2.5	6.2	1.1	55.0	5.5	55.3	8.2	96.3	29.6	91.7	33.3
Iowa	8.8	2.0	4.9	0.8	53.4	9.5	52.6	9.4	§§	§§	93.6	36.2
Kansas	10.0	0.0	5.5	1.0	54.8	9.6	52.1	9.6	§§	—§§	94.1	37.3
Kentucky	11.0	—	7.0	1.2	49.8	7.2	54.7	10.4	§§	§§	98.7	55.8
Louisiana	7.4	—	8.8	1.6	62.6	9.2	64.1	13.0	§§	§§	93.6	41.0
Maine	—	0.0	5.1	0.8	55.0	—	51.1	8.9	—§§	§§	NA	NA
Maryland¶¶	12.1	2.9	6.8	1.3	56.1	9.2	56.0	10.5	92.3	43.6	95.7	47.9
Massachusetts	8.7	1.3	5.5	0.8	52.2	6.6	51.4	8.0	97.4	34.2	98.9	46.7
Michigan	10.8	2.2	6.6	1.2	55.4	7.9	55.0	10.3	96.7	38.3	94.7	38.8
Minnesota	6.0	1.5	5.0	0.9	49.0	7.3	49.5	7.3	§§	§§	94.0	41.0
Mississippi	11.9	—	9.8	1.7	53.8	9.9	66.3	11.9	—§§	§§	NA	NA
Missouri	9.3	1.8	6.1	1.1	54.0	8.8	52.3	8.7	88.9	40.7	80.6	43.1
Montana	8.6	0.0	5.6	0.7	55.8	—	57.9	10.1	—§§	§§	NA	NA
Nebraska	9.2	—	5.0	0.8	48.8	5.8	49.9	8.6	§§	§§	88.9	30.6
Nevada	10.0	—	6.4	1.0	47.1	7.0	56.0	9.8	§§	—§§	100.0	52.0
New Hampshire	7.1	—	5.3	0.7	41.5	5.3	49.3	6.4	§§	—§§	NA	NA
New Jersey	10.0	1.8	6.0	1.1	57.3	10.8	53.7	9.8	96.0	44.0	93.1	43.8
New Mexico	16.1	—	7.4	1.0	68.0	7.0	61.3	8.8	§§	§§	NA	NA
New York	9.0	1.9	6.0	1.1	54.0	8.6	54.1	9.4	95.7	27.1	91.6	39.5
North Carolina	9.2	2.7	7.1	1.3	53.6	12.3	56.1	11.4	§§	§§	89.0	33.1
North Dakota	17.5	—	4.7	0.9	48.3	—	54.0	9.4	—§§	§§	NA	NA

See table footnotes on next page.

TABLE 7. (*Continued*) Percentages* of low birthweight infants among infants born with assisted reproductive technology and all U.S. infants, by plurality, by female patient's reporting area of residence† at time of treatment — United States and Puerto Rico, 2012§

Patient's state/ reporting area of residence	ART singletons		All singletons¶		ART twins**		All twins¶		ART triplets (plus)**		All triplets (plus)¶	
	<2,500 g (LBW)	<1,500 g (VLBW)	<2,500 g (LBW)	<1,500 g (VLBW)	<2,500 g (LBW)	<1,500 g (VLBW)	<2,500 g (LBW)	<1,500 g (VLBW)	<2,500 g (LBW)	<1,500 g (VLBW)	<2,500 g (LBW)	<1,500 g (VLBW)
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Ohio	8.8	1.9	6.8	1.3	52.4	10.5	54.6	11.8	100.0	50.0	95.6	44.8
Oklahoma	4.4	—	6.4	1.1	60.4	12.7	56.0	10.8	85.2	18.5	87.7	35.6
Oregon	8.7	0.0	4.7	0.7	55.5	8.4	47.8	8.5	§§	§§	87.9	30.3
Pennsylvania¶¶	10.0	2.1	6.3	1.1	55.0	8.6	54.2	9.9	95.0	53.8	91.9	41.4
Puerto Rico	20.9	0.0	10.3	1.3	53.3	—	69.0	10.7	§§	§§	88.2	50.0
Rhode Island	11.5	—	6.1	1.2	58.1	13.7	56.3	13.5	§§	§§	§§	NA
South Carolina	4.1	0.0	7.8	1.5	52.6	9.0	57.2	9.8	§§	—§§	100.0	40.4
South Dakota	8.6	—	4.7	0.8	83.3	20.0	52.7	9.6	NC	NC	NA	NA
Tennessee	11.9	2.1	7.5	1.2	63.8	9.7	59.7	10.6	90.5	—	93.8	35.8
Texas	10.1	2.2	6.5	1.1	60.1	8.8	58.6	9.8	100.0	48.1	96.0	45.4
Utah	9.5	1.6	5.1	0.8	58.1	9.6	55.0	7.8	90.0	50.0	98.8	38.4
Vermont	12.8	–	4.7	0.7	58.8	20.6	55.2	10.4	—§§	§§	NA	NA
Virginia	8.6	1.5	6.3	1.2	51.6	5.1	55.5	9.8	§§	—§§	94.7	31.6
Washington	8.6	1.5	4.6	0.8	50.8	7.5	50.3	8.6	100.0	33.3	90.6	43.8
West Virginia	—	0.0	7.7	1.2	50.0	0.0	60.4	10.3	NC	NC	83.9	41.9
Wisconsin	8.0	2.5	5.4	0.9	54.5	10.9	52.8	9.4	§§	—§§	93.2	37.3
Wyoming	—	—	6.9	0.9	§§	—§§	66.0	9.2	NC	NC	NA	NA
Total	**9.3**	**1.8**	**6.3**	**1.1**	**55.2**	**8.7**	**55.4**	**9.6**	**95.3**	**37.6**	**91.6**	**39.3**

Abbreviations: ART = assisted reproductive technology; LBW = low birthweight; VLBW = very low birthweight; NC = not calculated; NA = not available.

* Data do not include records with missing birthweight.

† In cases of missing residency data (approximately 2%), the patient's residence was assigned as the location in which the ART procedure was performed.

§ ART totals include infants conceived from ART procedures performed in 2011 and born in 2012, and infants conceived from ART procedures performed in 2012 and born in 2012. Total ART births exclude nonresidents.

¶ Source: U.S. natality file, CDC, National Center for Health Statistics. U.S. totals include nonresidents.

** Includes only the number of infants live-born in a multiple-birth delivery. For example, if three infants were born in a live-birth delivery and one of the three infants was stillborn, the total number of liveborn infants would be two. However, the two infants still would be counted as triplets.

†† To protect confidentiality, cells with values from 1–4 are suppressed, as are data that can be used to derive cell values of 1–4. These values are included in totals.

§§ Rates derived on the basis of N <20 in the denominator are suppressed because such rates are considered unstable.

¶¶ A substantial percentage (4%–13%) of residency information was missing for procedures performed in these four states (California, Hawaii, Maryland, and Pennsylvania).

*** Rate not calculated because N = 0 for the denominator.

TABLE 8. Percentages* of preterm infants among infants born with the use of assisted reproductive technology and all U.S. infants, by plurality, by female patient's reporting areas of residence,† at time of treatment — United States and Puerto Rico, 2012§

Patient's reporting area of residence	ART singletons		All singletons¶		ART twins**		All twins¶		ART Triplets (plus)**		All triplets (plus)¶	
	<37 weeks (PTB) (%)	<32 weeks (VPTB) (%)	<37 weeks (PTB) (%)	<32 weeks (VPTB) (%)	<37 weeks (PTB) (%)	<32 weeks (VPTB) (%)	<37 weeks (PTB) (%)	<32 weeks (VPTB) (%)	<37 weeks (PTB) (%)	<32 weeks (VPTB) (%)	<37 weeks (PTB) (%)	<32 weeks (VPTB) (%)
Alabama	13.3	3.2	13.0	2.2	70.3	11.4	58.2	10.6	††	††	86.7	43.4
Alaska	17.5	0.0	8.0	1.2	53.3	§§	52.0	9.6	††	††	NA	NA
Arizona	11.7	§§	10.2	1.5	65.4	11.5	59.5	10.2	††	††	86.6	29.3
Arkansas	16.7	§§	11.8	1.6	63.9	13.3	59.7	11.8	††,§§	††	NA	NA
California¶¶	12.3	2.3	8.1	1.2	56.4	9.5	53.5	9.1	96.6	36.6	95.6	35.5
Colorado	15.8	2.2	8.7	1.3	60.9	7.2	55.9	9.6	††,§§	††	93.0	28.1
Connecticut	10.5	1.6	8.0	1.3	50.5	8.3	47.2	10.5	††	††,§§	41.2	NA
Delaware	14.1	3.8	10.9	2.0	50.0	§§	58.5	16.1	NC***	NC	NA	NA
District Of Columbia	10.2	§§	11.5	2.2	47.8	14.1	51.8	11.2	NC	NC	NA	NA
Florida	14.6	2.0	12.2	1.8	66.7	12.2	57.5	11.1	95.1	43.9	84.3	37.9
Georgia	11.3	1.3	11.0	1.9	64.2	10.0	57.7	12.1	100.0	45.0	90.4	32.7
Hawaii¶¶	14.7	§§	10.9	1.5	62.6	9.1	49.4	7.7	††,§§	††,§§	NA	NA
Idaho	20.6	§§	8.6	1.1	63.6	7.5	61.2	4.4	100.0	47.8	66.7	30.3
Illinois	13.2	2.1	10.0	1.7	60.3	10.6	57.4	12.2	100.0	43.3	90.8	36.6
Indiana	15.7	2.8	9.2	1.4	61.6	8.8	57.4	9.7	100.0	22.2	93.8	29.2
Iowa	13.6	1.7	9.6	1.4	61.1	10.9	62.3	11.4	††	††	61.7	23.4
Kansas	19.1	§§	9.3	1.4	69.6	11.4	58.0	11	††	††	64.7	29.4
Kentucky	16.0	3.5	11.0	1.9	66.0	7.6	61.2	11.9	††	††	96.1	53.2
Louisiana	16.7	§§	13.4	2.3	72.8	12.3	66.7	15.2	††	††	96.2	34.6
Maine	§§	§§	7.9	1.3	80.0	30.0	49.6	13	††,§§	††	NA	NA
Maryland¶¶	15.6	3.4	10.4	1.8	59.5	11.2	55	11.4	100.0	42.9	92.6	33.0
Massachusetts	11.2	1.5	8.1	1.3	58.8	8.3	53.6	9.3	92.7	41.5	93.5	44.6
Michigan	15.1	3.3	10.1	1.8	62.2	10.4	56	12.7	100.0	48.3	89.4	35.9
Minnesota	10.6	1.1	8.5	1.3	59.4	9.6	53	8.5	††	††	92.8	39.8
Mississippi	16.7	§§	15.5	2.5	69.2	13.2	64.4	14.3	††,§§	††	NA	NA
Missouri	15.2	2.0	9.9	1.6	64.0	11.0	58.3	10.4	100.0	44.4	87.5	41.7
Montana	17.1	§§	9.3	1.5	67.4	§§	65.2	8.6	††,§§	††	NA	NA
Nebraska	15.6	§§	9.2	1.2	69.0	7.1	62.0	10.2	††	††	47.2	NA
Nevada	13.0	2.4	11.3	1.5	56.9	4.6	61.1	11.8	††	††	52.0	NA
New Hampshire	12.5	§§	7.4	1.1	56.3	8.3	53.7	7.8	††	††,§§	NA	NA
New Jersey	12.8	2.4	9.2	1.5	60.2	12.3	52.9	11.0	100.0	36.7	89.2	43.1
New Mexico	13.8	§§	10.2	1.3	62.0	12.0	58.5	9.7	††	††,§§	NA	NA
New York	12.5	2.3	9.0	1.4	57.3	9.8	52.1	9.8	100.0	30.4	91.0	42.6
North Carolina	13.3	2.5	10.4	2.0	62.8	13.4	55.4	12.5	††	††,§§	90.7	25.4
North Dakota	25.4	§§	8.3	1.3	62.1	§§	66.5	16.5	††,§§	††	NA	NA

See table footnotes on next page.

TABLE 8. (*Continued*) Percentages* of preterm infants among infants born with the use of assisted reproductive technology and all U.S. infants, by plurality, by female patient's reporting areas of residence,† at time of treatment — United States and Puerto Rico, 2012§

Patient's reporting area of residence	ART singletons		All singletons¶		ART twins**		All twins¶		ART triplets (plus)**		All triplets (plus)¶	
	<37 weeks (PTB) (%)	<32 weeks (VPTB) (%)	<37 weeks (PTB) (%)	<32 weeks (VPTB) (%)	<37 weeks (PTB) (%)	<32 weeks (VPTB) (%)	<37 weeks (PTB) (%)	<32 weeks (VPTB) (%)	<37 weeks (PTB) (%)	<32 weeks (VPTB) (%)	<37 weeks (PTB) (%)	<32 weeks (VPTB) (%)
Ohio	12.7	2.4	10.3	1.9	58.8	11.2	58.6	13.7	100.0	50.0	96.8	44.8
Oklahoma	10.4	§§	11.3	1.7	71.4	16.1	64.0	12.0	100.0	§§	89.0	43.8
Oregon	10.0	§§	7.6	0.9	59.3	13.1	52.3	10.4	††,§§	††	36.4	NA
Pennsylvania¶¶	13.0	2.5	9.0	1.6	56.8	9.3	57.0	12.3	100.0	58.8	93.2	50.9
Puerto Rico	14.0	0.0	15.8	2.3	76.5	§§	67.2	12.7	††	††	91.2	61.8
Rhode Island	16.1	§§	9.2	1.8	57.3	14.5	57.5	13.1	††	††	NA	††
South Carolina	11.6	§§	12.0	2.1	52.1	10.8	60.8	12.2	††	††,§§	64.9	29.8
South Dakota	13.8	§§	9.2	1.5	73.3	40.0	61.5	9.8	NC	NC	NA	NA
Tennessee	18.9	3.1	10.8	1.7	70.4	14.8	59	12.9	100.0	§§	81.5	29.6
Texas	15.2	2.5	10.8	1.6	67.7	11.3	60.2	11.7	100.0	53.8	93.0	47.7
Utah	15.0	2.0	8.5	1.1	64.3	11.3	57.6	8.3	100.0	40.0	88.4	23.3
Vermont	20.5	§§	7.3	1.0	58.8	23.5	59.8	0	††,§§	††	NA	NA
Virginia	13.1	1.8	9.6	1.7	59.9	6.0	54.9	11.2	††	††,§§	85.7	27.8
Washington	11.8	1.8	8.4	1.2	62.3	10.5	56.3	9.2	100.0	42.9	82.3	32.3
West Virginia	9.4	0.0	10.9	1.7	80.0	§§	61.2	10.3	NC	NC	38.7	NA
Wisconsin	13.7	2.5	8.7	1.3	62.6	14.0	57.1	11.1	††	††	81.4	27.1
Wyoming	§§	§§	9.5	1.3	††	††,§§	57.4	10.8	NC	NC	NA	NA
Total	**13.2**	**2.2**	**9.9**	**1.6**	**61.0**	**10.5**	**56.8**	**11.1**	**97.7**	**40.5**	**92.6**	**40.0**

Abbreviations: ART = assisted reproductive technologies; PTB = preterm birth; VPTB = very preterm birth; NA = not available; NC = not calculated.

* Data do not include records with missing gestational age.

† In cases of missing residency data (approximately 2%), the patient's residence was assigned as the location in which the ART procedure was performed.

§ ART totals include infants conceived from ART procedures performed in 2011 and born in 2012, and infants conceived from ART procedures performed in 2012 and born in 2012. Total ART births exclude nonresidents.

¶ Source: U.S. natality File, CDC, National Center for Health Statistics. U.S. totals include nonresidents.

** Includes only the number of infants live-born in a multiple-birth delivery. For example, if three infants were born in a live-birth delivery and one of the three infants was stillborn, the total number of liveborn infants would be two. However, the two infants still would be counted as triplets.

†† Rates derived on the basis of N <20 in the denominator are suppressed because such rates are considered unstable.

§§ To protect confidentiality, cells with values from 1–4 are suppressed, as are data that can be used to derive cell values of 1–4. These values are included in totals.

¶¶ A substantial percentage (4%–13%) of residency information was missing for procedures performed in these four states (California, Hawaii, Maryland, and Pennsylvania).

*** Rate not calculated because N = 0 for the denominator.

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