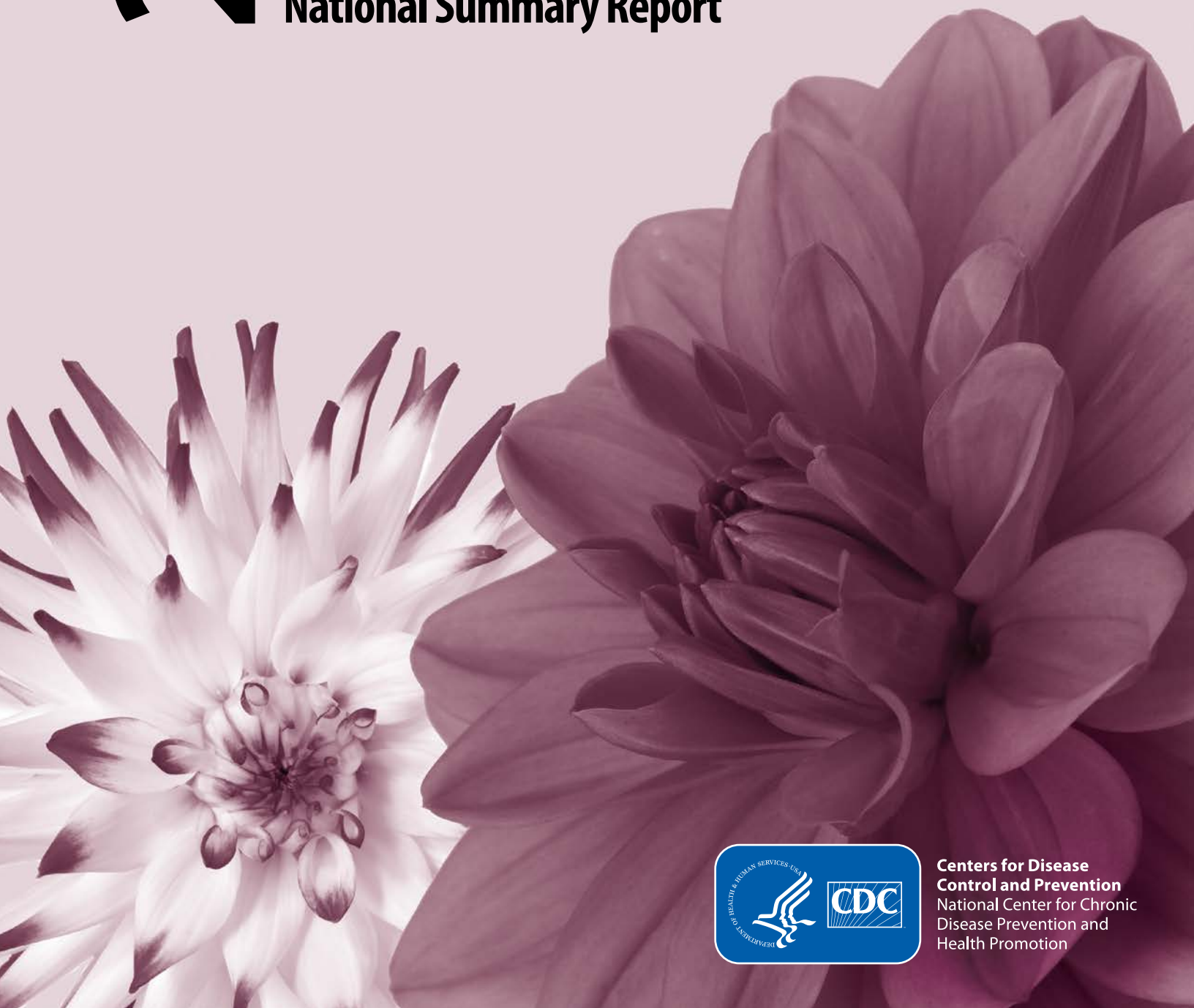


Assisted Reproductive Technology

National Summary Report



**Centers for Disease
Control and Prevention**
National Center for Chronic
Disease Prevention and
Health Promotion

Acknowledgments

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Updates to this report will be posted on the CDC
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www.cdc.gov/art/reports/

For additional information, send an email to
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INTRODUCTION TO THE 2018 NATIONAL REPORT

Data from clinics in the United States that use assisted reproductive technology (ART) to treat infertility are a rich source of information about the factors that contribute to a successful ART treatment—the delivery of a healthy infant. Pooling the data from all reporting clinics provides a national picture that could not be obtained by examining data from an individual clinic.

This *National Summary Report* is a companion document to the 2018 Assisted Reproductive Technology Fertility Clinic Success Rates Report. It provides graphs and charts that summarize information about the use of ART and its outcomes in 2018.

The data in this report are from the 456 US fertility clinics in operation in 2018 that provided and verified data on the outcomes of all ART cycles started in their clinics. ART cycles include any process in which (1) an ART procedure is performed, (2) a woman has undergone ovarian stimulation or monitoring with the intent of having an ART procedure, or (3) frozen embryos have been thawed with the intent of transferring them to a woman. For example, an ART cycle could include an embryo transfer from a previously frozen embryo. Another cycle could include stimulation, egg retrieval, and embryo transfer.

Of the 306,197 new ART cycles reported in 2018, a total of 203,119 (66%) were started with the intent to transfer at least one embryo. Among these 203,119 cycles, there were 163,889 embryo transfers. These embryo transfers resulted in 89,688 pregnancies, 73,831 live-birth deliveries (delivery of one or more living infants), and 81,478 infants. The other 103,078 cycles (34%) were banking cycles, where eggs or embryos were cryopreserved (frozen) and stored for potential future use.

The 306,197 new ART cycles started in 2018 do not include 8 research cycles that were designed to evaluate a new treatment procedure.

A patient's chances of having a pregnancy and live-birth delivery when using ART are influenced by many factors. Some of these factors are patient-related, such as the patient's age or the cause of infertility. Others are clinic-related, such as a clinic's patient selection practices. The national data include information on many of these factors, which can give potential ART users an idea of the average chances of success.

Average chances, however, do not necessarily apply to a particular individual or couple. To help patients estimate their chance of having a baby through in vitro fertilization (IVF), the most common type of ART, the Centers for Disease Control and Prevention (CDC) developed the IVF Success Estimator. This online tool uses information about the experiences of women and couples with similar characteristics to estimate a person's chance of having a baby. These estimates are based on the available data and may not be representative of an individual patient's specific experience.

The IVF Success Estimator does not provide medical advice, diagnosis, or treatment. Couples should talk with their doctor about their specific treatment plan and potential for success.

National Summary Figures

The figures in this report provide information about patients who use ART, their reasons, and the types of procedures performed. They also provide data on pregnancy and infant outcomes and 10-year trends of the types of procedures performed and pregnancy outcomes. The figures include ART cycles that used fresh or frozen embryos from a female patient's own eggs (nondonor eggs) or eggs from another woman (donor eggs).

The figures in this report are based only on ART cycles performed in 2018 and cannot be used to calculate cumulative success rates.

Figure 1 shows the distribution of the 306,197 ART cycles started in 2018 in the United States, by patient age group. The largest percentage of ART cycles performed was among patients younger than age 35. This age group represented 37.2% of all cycles, compared to 22.7% among those aged 35–37, 19.6% among those aged 38–40, 9.4% among those aged 41–42, and 11.1% among those older than age 42. The average age of patients using ART services in 2018 was 36.3 years. Research cycles are excluded.

Figure 1
ART Use by Age Group—United States, 2018

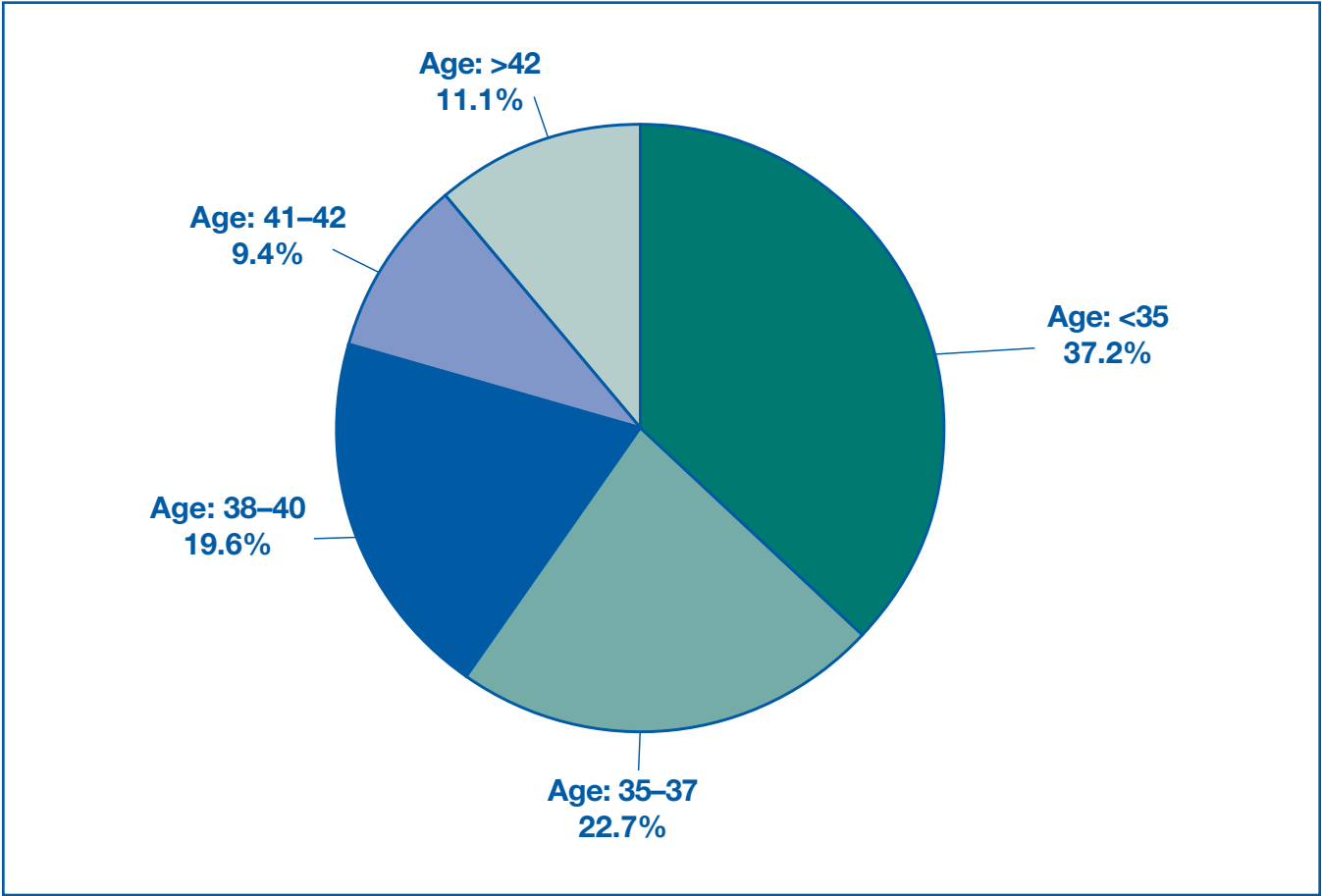


Figure 2 shows the outcomes of the 89,688 clinical pregnancies from ART cycles started in 2018 that used fresh or frozen eggs or embryos from patients using their own eggs or embryos or using donor eggs or embryos. Research and banking cycles are excluded.

A clinical pregnancy is a pregnancy that is confirmed by ultrasound. About 82% of clinical pregnancies from ART cycles started in 2018 resulted in a live-birth delivery. Of these pregnancies, 74.0% resulted in the birth of a single infant, while 8.4% resulted in the birth of multiple infants. Clinical pregnancies that did not result in a live birth included miscarriage (15.8%) and stillbirth (0.5%). For 1.4% of pregnancies, the outcome was reported as other or unknown.

Both miscarriage and stillbirth describe pregnancy loss, but they are categorized according to when the loss occurs. Miscarriage (also called spontaneous abortion) is a pregnancy ending in the spontaneous loss of the embryo or fetus before 20 weeks of gestation. Stillbirth, or fetal death, is pregnancy loss at 20 weeks or more of gestation.

Figure 2
Outcomes of Clinical Pregnancies Resulting From ART—United States, 2018

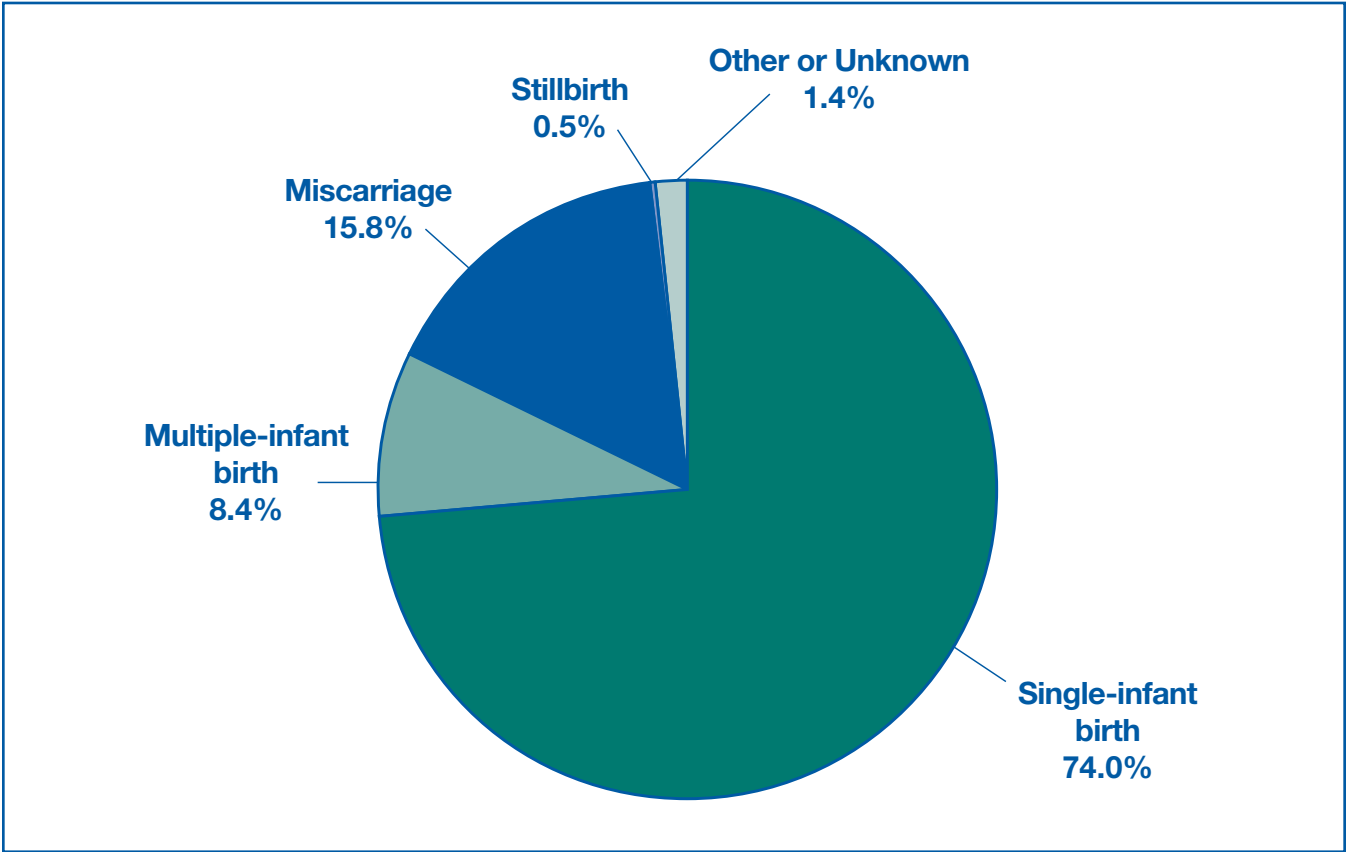


Figure 3 shows the percentage of embryo transfers started in 2018 that resulted in live-birth delivery of one or more live infants, by patient age and egg or embryo source. It includes fresh or frozen embryos from patients using their own eggs or embryos or using donor eggs or embryos. Research and banking cycles are excluded. These percentages are noncumulative and are based only on embryo transfers performed in 2018.

The percentage of embryo transfers that used patient eggs or embryos and resulted in live-birth delivery generally decreased as the age of the woman increased (range: 10.5%–51.7%) because the likelihood of a fertilized egg implanting is related to the age of the woman who produced the egg. In contrast, 47.9% (range: 45.1%–53.6%) of embryo transfers using donor eggs or embryos resulted in live-birth delivery for women of all ages because egg donors are typically in their 20s or early 30s and do not have infertility.

Figure 3
Percentage of Embryo Transfers That Resulted in Live-Birth Delivery, by Patient Age and Egg or Embryo Source—United States, 2018

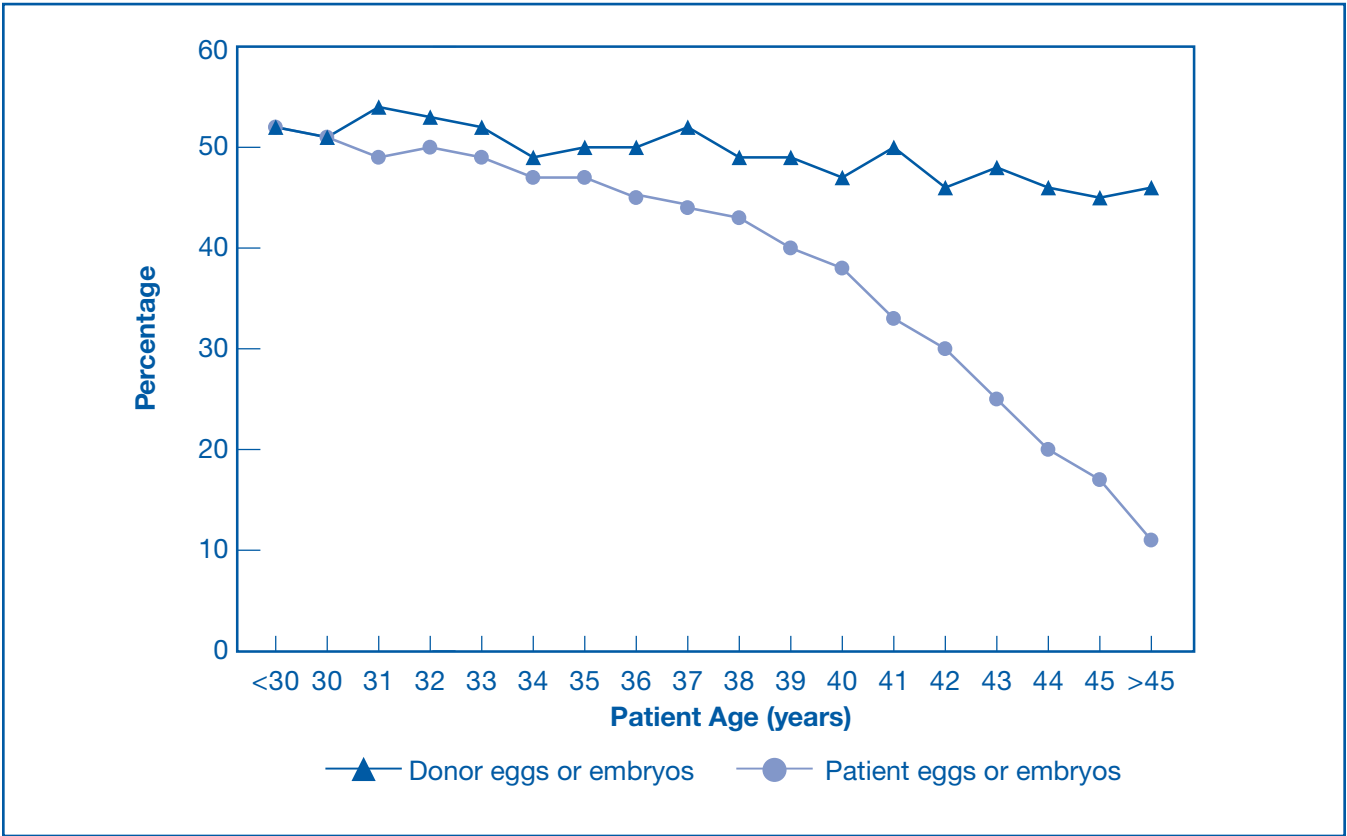


Figure 4 shows the distribution of reported reasons for ART cycles started in 2018. Because more than one reason can be reported per cycle, the total percentage adds to more than 100%. The cycles in this figure include those using fresh or frozen eggs or embryos from patients using their own eggs or embryos or using donor eggs or embryos. Banking cycles are included, but research cycles are excluded.

The most commonly reported reasons were egg or embryo banking (34.1%), diminished ovarian reserve (30.4%), and male factor infertility (27.6%).

Figure 4
Percentage of ART Cycles by Reason for Using ART—United States, 2018

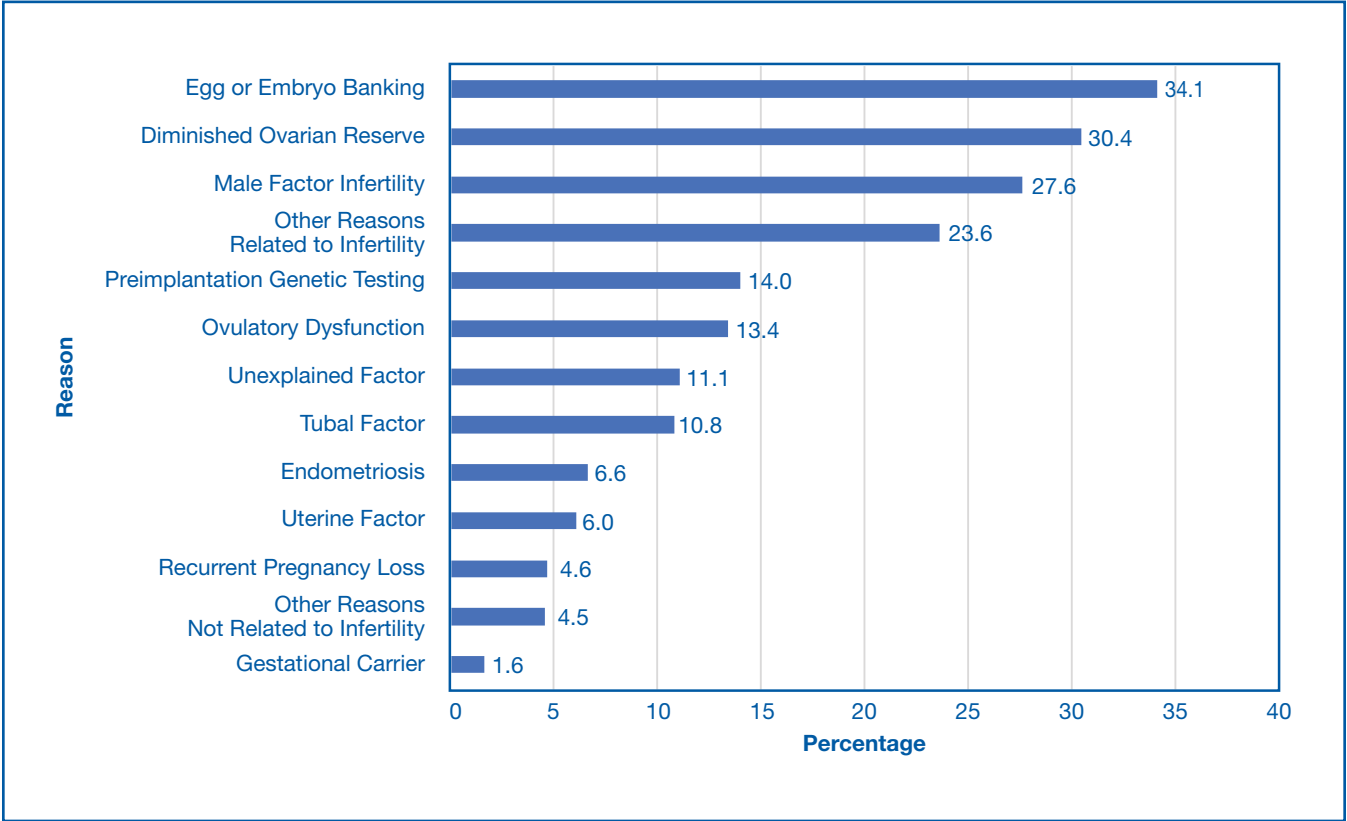


Figure 5 shows the percentage of infants born from ART procedures started in 2018 who were born preterm or with low birth weight. It includes ART cycles using fresh or frozen embryos from patients using their own eggs or embryos or using donor eggs or embryos. Research and banking cycles are excluded.

Preterm infants are born before 37 full weeks of pregnancy. Low birth weight infants are born weighing less than 2,500 grams (about 5 pounds, 8 ounces). Infants born preterm or with low birth weight are at higher risk of death in the first year of life. They also have a higher risk of other poor health outcomes, including vision and hearing problems, intellectual and learning disabilities, and behavioral and emotional problems throughout life.

This figure presents percentages for deliveries that resulted in a single live-born infant separately for single-fetus and multiple-fetus pregnancies. Multiple-fetus pregnancies were more likely to result in infants being born preterm or with low birth weight. For example, 11.8% of single infants from single-fetus pregnancies were preterm, compared to 21.3% of single infants from multiple-fetus pregnancies. Percentages of preterm and low birth weight infants increased as plurality (the number of infants born in one delivery) increased. Among triplets, 99.3% were preterm and 97.8% had low birth weight.

Figure 5
Percentage of Infants Conceived With ART Who Were Preterm or With Low Birth Weight, by Plurality—United States, 2018

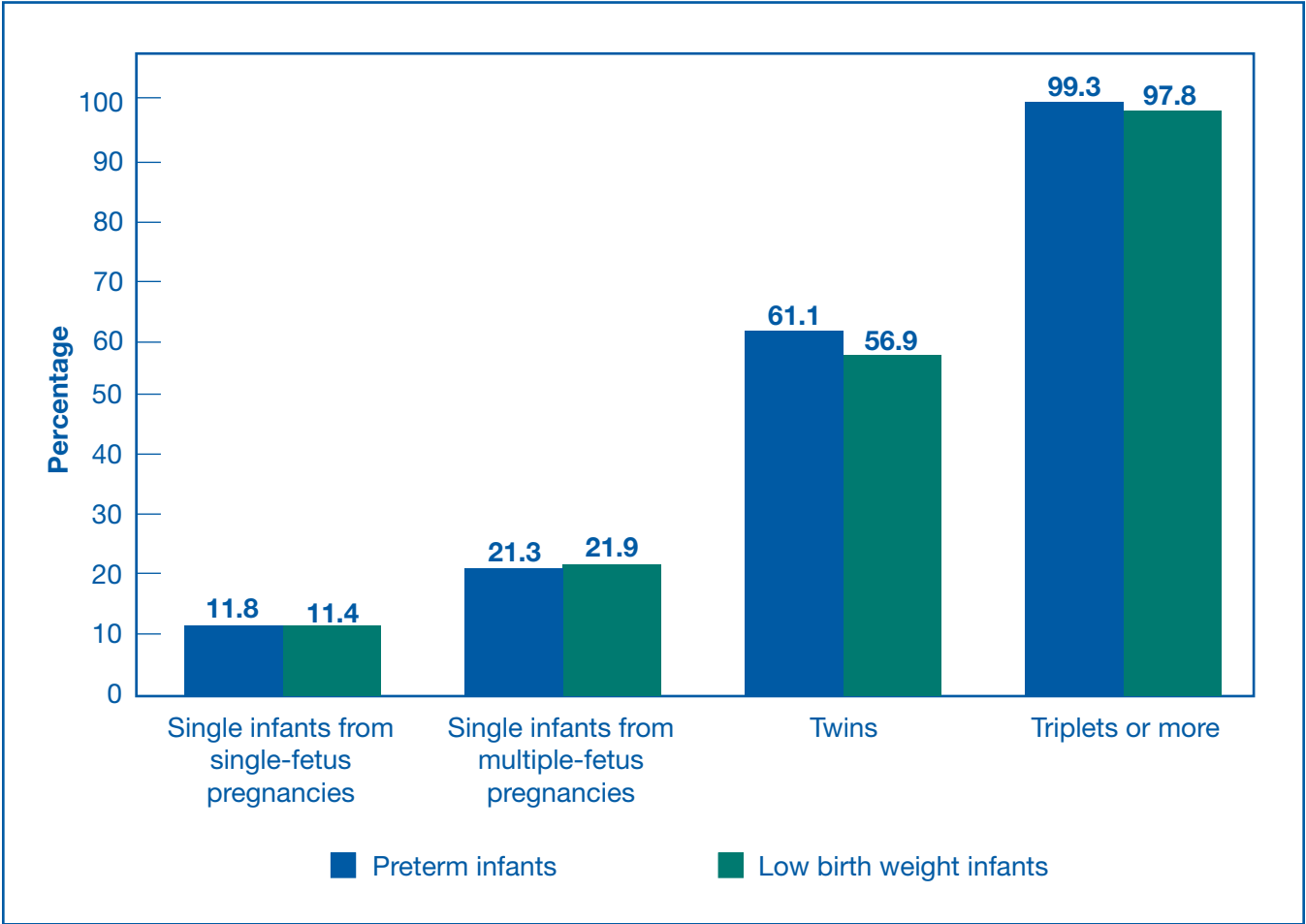


Figure 6 shows the number of ART cycles, embryo transfers, and banking cycles performed and the number of live-birth deliveries that resulted from ART cycles started from 2009 through 2018. It includes fresh or frozen embryos from patients using their own eggs or embryos or using donor eggs or embryos. Research cycles are excluded.

Over the last decade, the number of ART cycles started has increased 102%, from 151,295 cycles in 2009 to 306,197 in 2018. Banking cycles also increased, from 5,039 in 2009 to 103,078 in 2018. The number of embryo transfers in 2018 (163,889) was about 1.3 times higher than in 2009 (124,401). The number of live-birth deliveries in 2018 (73,831) was about 1.6 times higher than in 2009 (45,894).

Figure 6
Number of ART Cycles, Embryo Transfers, and Banking Cycles That Were Performed and Resulted in Live-Birth Deliveries—United States, 2009–2018

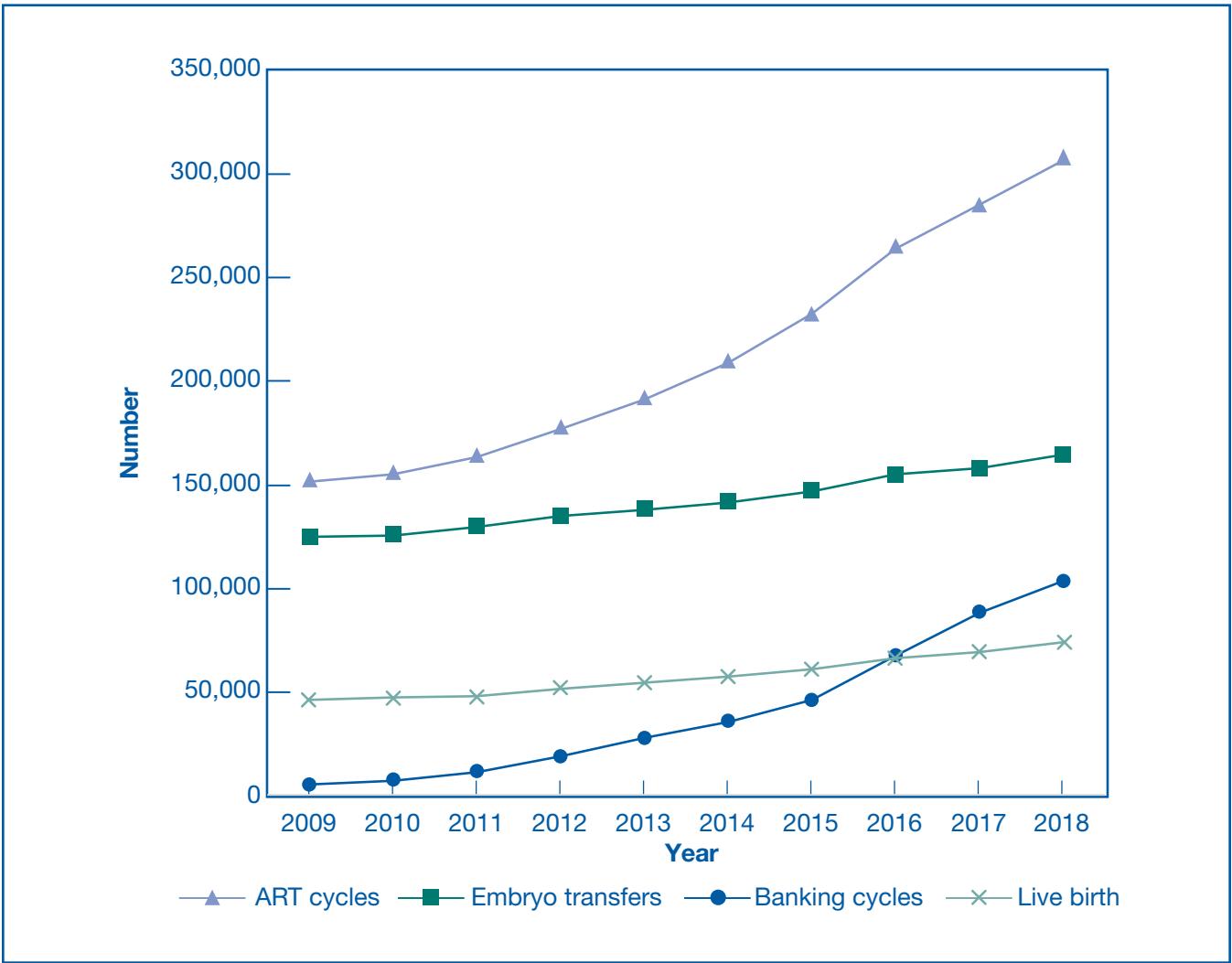


Figure 7 shows the number of ART cycles started, by egg or embryo source and type, from 2009 through 2018. It includes cycles using fresh or frozen embryos from patients using their own eggs or embryos or using donor eggs or embryos. Research and banking cycles are excluded.

The number of cycles performed using donor eggs or embryos (fresh or frozen) increased from 17,697 in 2009 to 27,240 in 2018. The number of cycles performed using embryos from frozen patient eggs or embryos increased from 26,069 in 2009 to 112,924 in 2018. The number of cycles performed using embryos from fresh patient eggs decreased from 102,478 in 2009 to 62,955 in 2018.

Embryos from fresh patient eggs are fresh patient embryos that were transferred without being frozen from fresh eggs. Embryos from fresh donor eggs are fresh donor embryos that were transferred without being frozen from fresh donor eggs.

Embryos from frozen patient eggs or embryos are patient eggs or embryos that were frozen at some point after retrieval of the egg. They include fresh embryos from frozen eggs or frozen embryos. Embryos from frozen donor eggs or embryos are donor eggs or embryos that were frozen at some point after retrieval of the egg. They include fresh embryos from frozen donor eggs, frozen embryos, or from donated embryos.

Figure 7
Number of ART Cycles, by Egg or Embryo Source—United States, 2009–2018

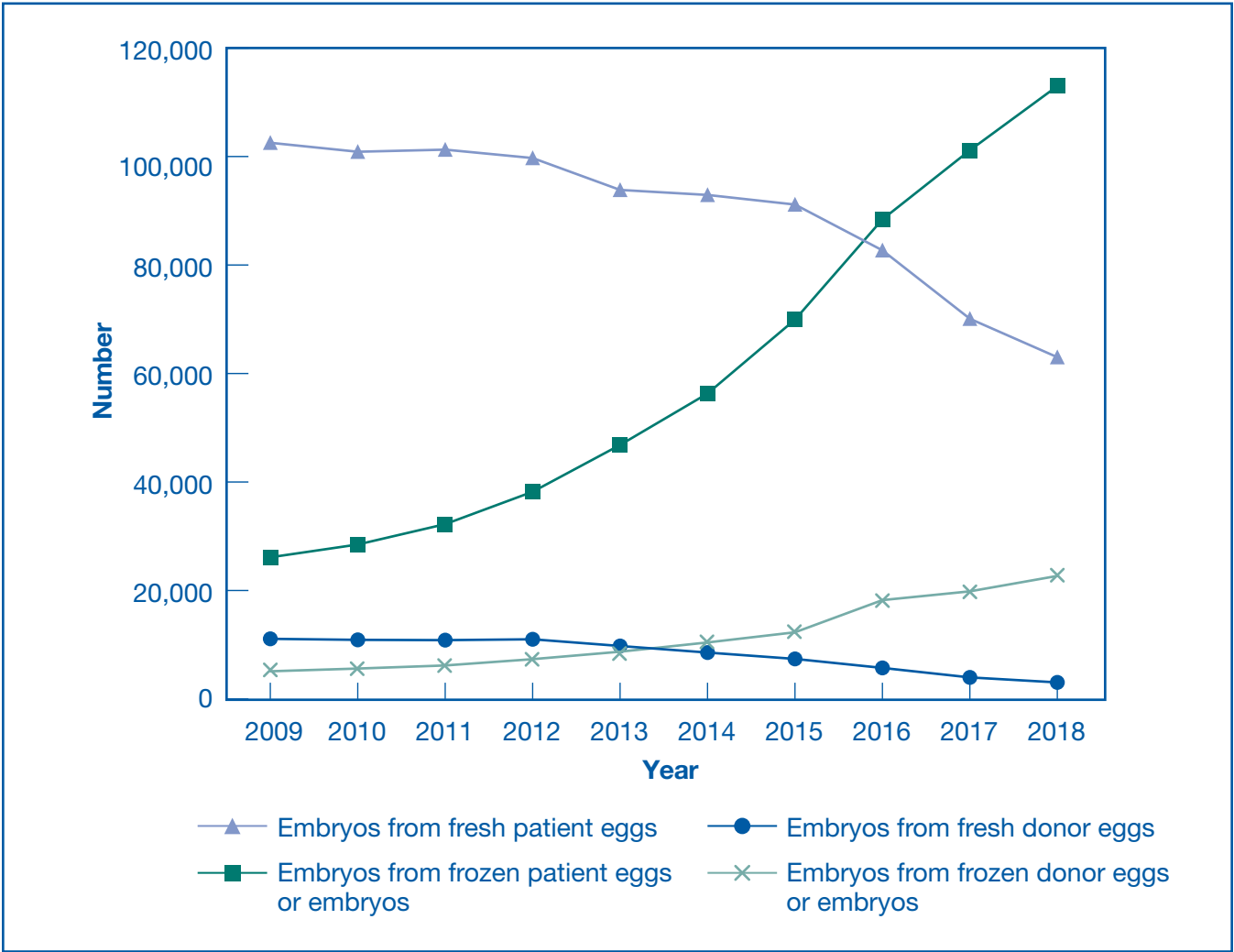


Figure 8 shows the number and percentage of embryo transfers that used a gestational carrier, from 2009 through 2018. It includes cycles using fresh or frozen embryos from patients using their own eggs or embryos or using donor eggs or embryos. Research and banking cycles are excluded. A gestational carrier (also called a gestational surrogate) is a woman who agrees to carry a developing embryo created from another woman’s egg. Over the last decade, the number of embryo transfers for ART cycles that used gestational carriers increased, from 2,566 in 2009 to 7,629 in 2018. The percentage of transfers using a gestational carrier among all ART cycles also increased, from 2.1% of all ART cycles in 2009 to 4.7% in 2018.

Figure 8
Number and Percentage of Embryo Transfers That Used a Gestational Carrier—United States, 2009–2018

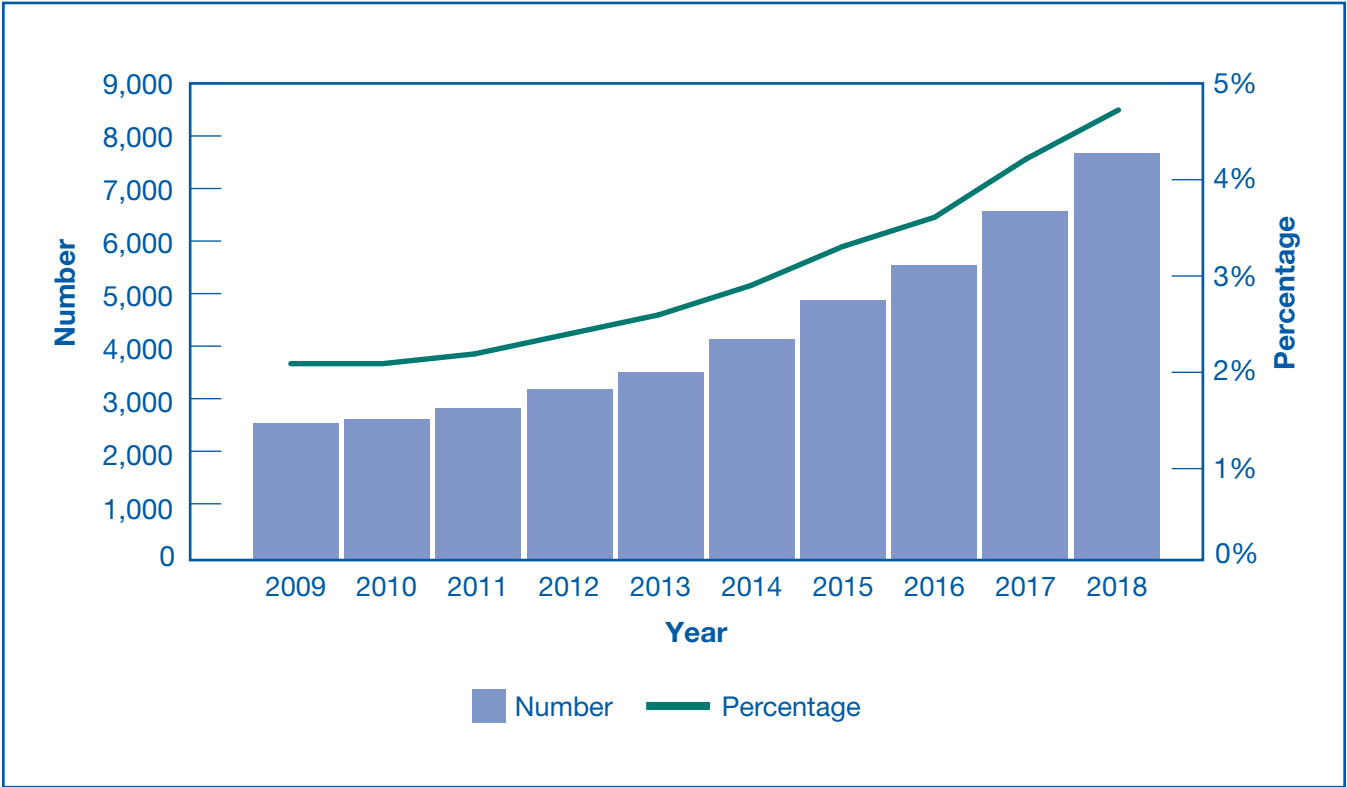


Figure 9 shows the percentage of embryo transfers in which a single embryo was transferred, from 2009 through 2018. It includes cycles using fresh or frozen embryos from patients using their own eggs or embryos or using donor eggs or embryos. Research and banking cycles are excluded.

The percentage of single embryo transfer (SET) procedures is the percentage of all embryo transfers in which only one embryo is transferred to the uterus, regardless of the number of embryos available. The use of SET is a strategy to avoid a multiple-fetus pregnancy and reduce the risk of poor health outcomes, such as prematurity and low birth weight, among infants.

Over the last decade, the percentage of SET among all patients increased dramatically, from 15.5% in 2009 to 71.0% in 2018, and this trend was identified among all age groups.

Figure 9
Percentage of Embryo Transfers in Which a Single Embryo Was Transferred—United States, 2009–2018

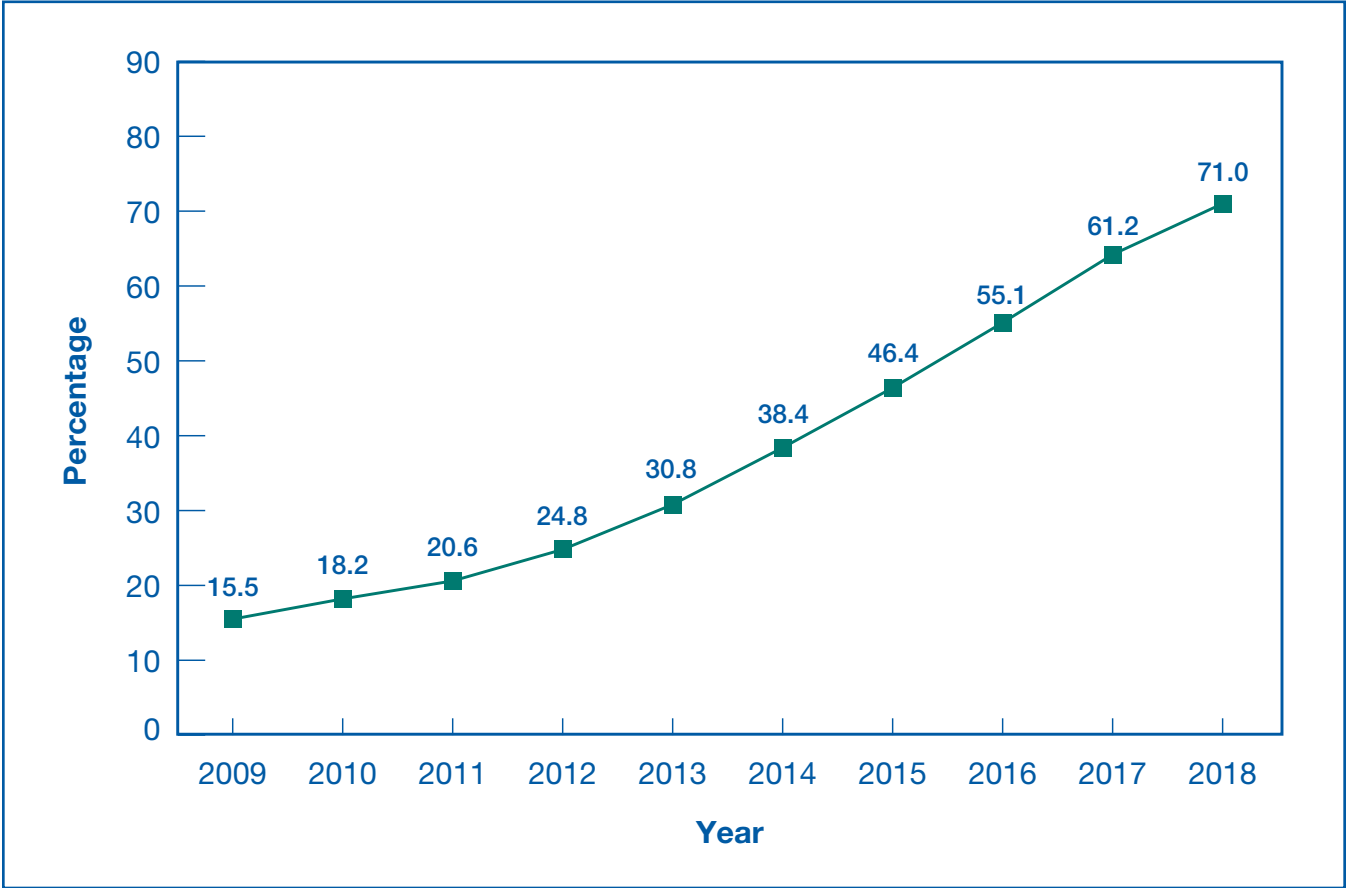


Figure 10 shows the percentage of ART cycles that resulted in live-birth deliveries, by patient age group, from 2009 through 2018. It includes ART cycles using fresh or frozen embryos from patients using their own eggs or embryos or using donor eggs or embryos. Research and banking cycles are excluded. These percentages are noncumulative and are based only on ART cycles performed in 2018.

Over the last decade, the percentage of live-birth deliveries from ART cycles increased among all age groups, from 31.4% in 2009 to 36.3% in 2018. Younger patients had a higher percentage of ART cycles that resulted in live-birth deliveries than older patients. However, it is important to note that a larger proportion of older patients use donor eggs or embryos.

Figure 10
Percentage of ART Cycles That Resulted in Live-Birth Deliveries, by Patient Age Group—United States, 2009–2018

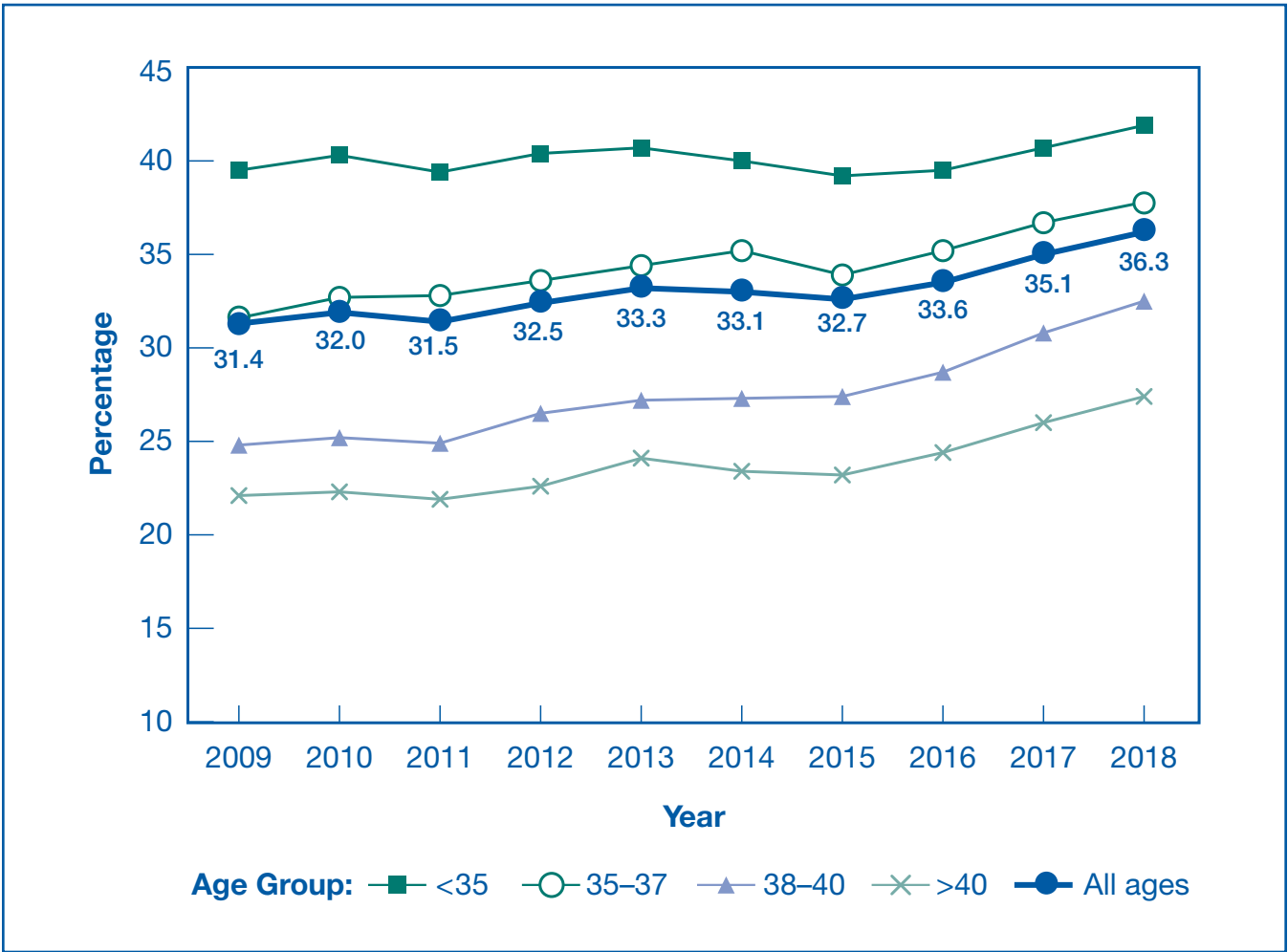


Figure 11 shows the number of infants born from 2009 through 2018 who were conceived using ART. It includes cycles using fresh or frozen embryos from patients using their own eggs or embryos or using donor eggs or embryos. Research and banking cycles are excluded.

The number of infants born who were conceived using ART increased from 60,176 in 2009 to 81,478 in 2018. Because more than one infant can be born during a live-birth delivery (for example, twins), the total number of infants born is higher than the number of live-birth deliveries. From 2009 to 2018, the number of ART cycles performed and the percentage of ART cycles that resulted in live birth increased.

Figure 11
Number of Infants Born Who Were Conceived Using ART—United States, 2009–2018

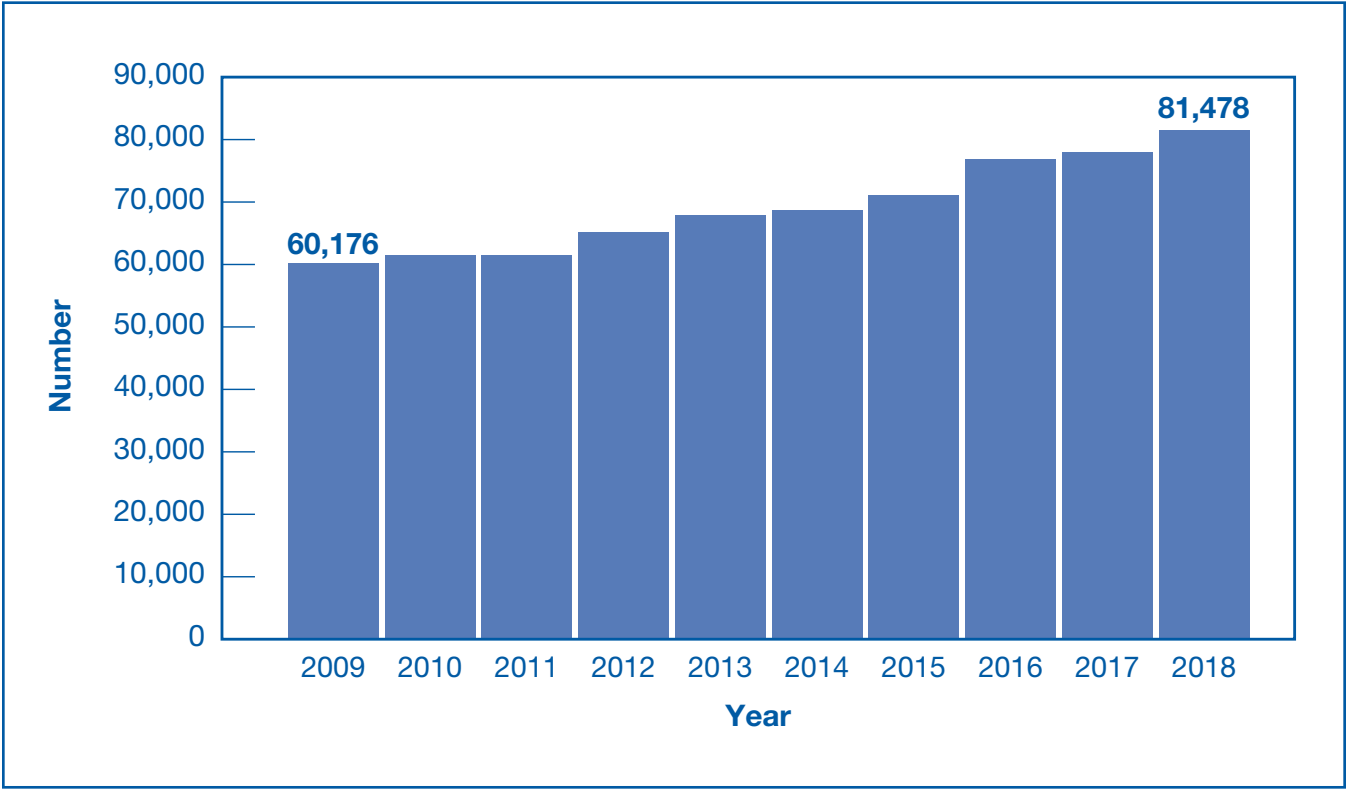


Figure 12 shows the percentage of embryo transfers that resulted in the live-birth delivery of singletons, twins, or triplets or more, from 2009 through 2018. It includes cycles using fresh or frozen embryos from patients using their own eggs or embryos or using donor eggs or embryos. Research and banking cycles are excluded.

Over the last decade, the percentage of embryo transfers that resulted in singleton births increased from 22.0% in 2009 to 32.7% in 2018, while the percentage that resulted in multiple births decreased. The percentage of twins decreased from 8.9% in 2009 to 3.6% in 2018, while the percentage of triplets or more decreased from 0.4% in 2009 to 0.1% in 2018.

The increased use of single embryo transfer (SET) in recent years has likely contributed to this trend. SET is used to avoid multiple-fetus pregnancies and reduce the risk of poor health outcomes, such as prematurity and low birth weight, among infants.

Figure 12
Percentage of Embryo Transfers That Resulted in the Live-Birth Delivery of Singletons, Twins, or Triplets or More—United States, 2009–2018

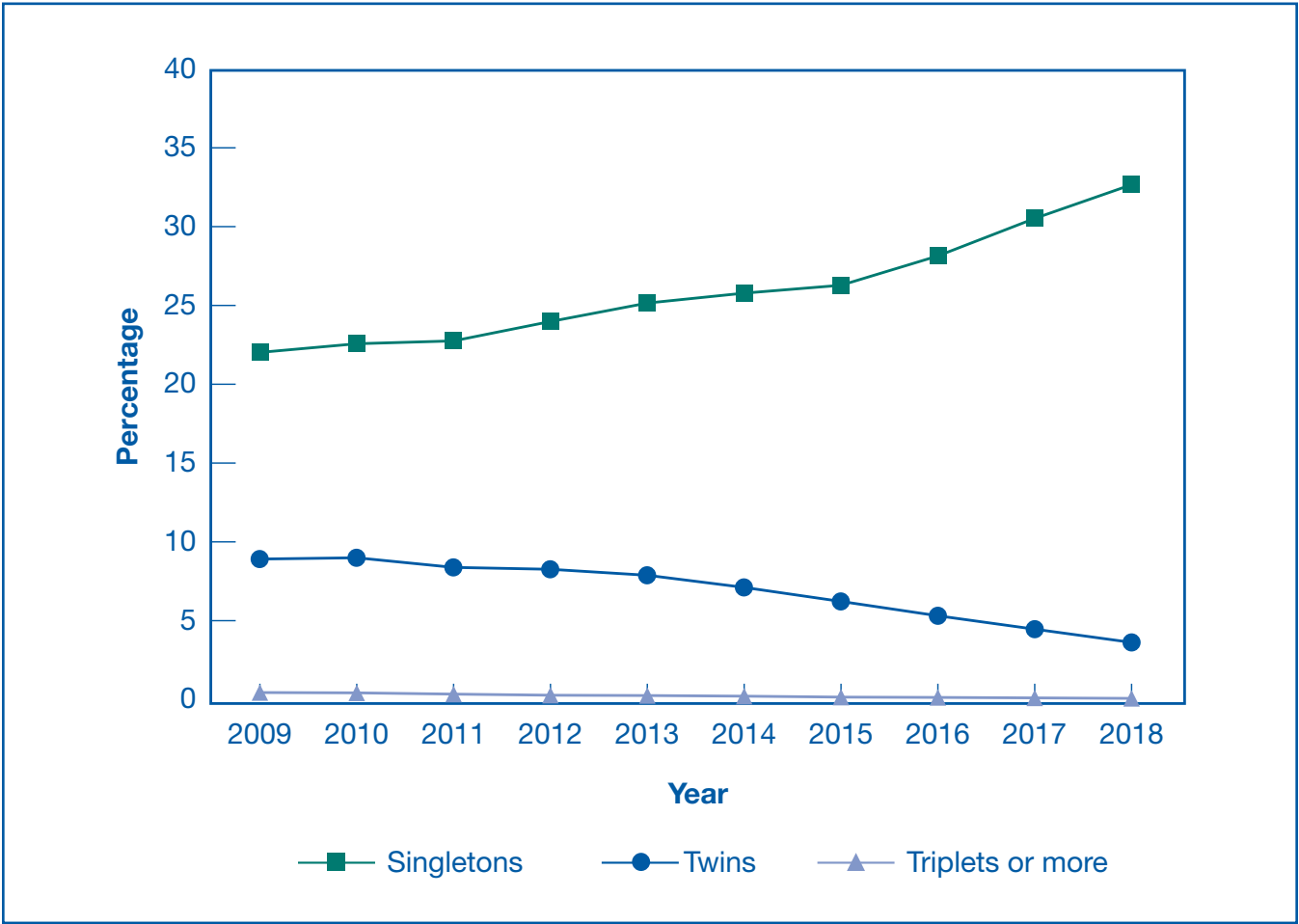
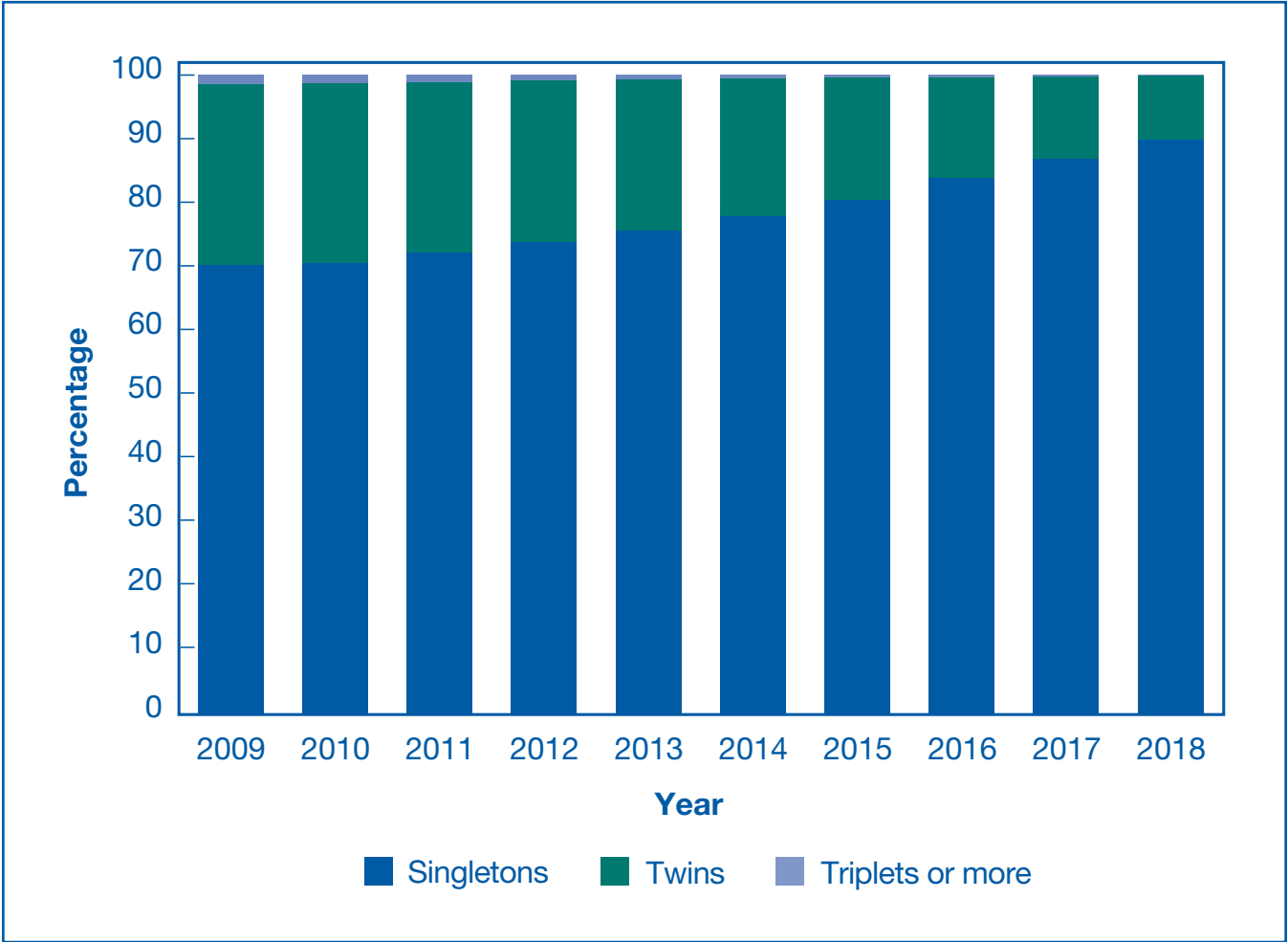


Figure 13 shows the percentage of infants who were conceived using ART that resulted in the live-birth delivery of singletons, twins, or triplets or more, from 2009 through 2018. It includes cycles using fresh or frozen embryos from patients using their own eggs or embryos or using donor eggs or embryos. Research and banking cycles are excluded.

Over the last decade, the percentage of ART-conceived live-birth deliveries that resulted in singletons increased from 70.2% in 2009 to 89.9% in 2018. The percentage that resulted in twins decreased from 28.4% to 9.9%, while the percentage that resulted in triplets or more decreased from 1.4% to 0.2%.

Infants born from multiple gestations, including twins, are at higher risk of poor outcomes—including preterm birth, low birth weight, neurological impairments, or death—than infants born as singletons.

Figure 13
Percentage of ART-Conceived Live-Birth Deliveries That Resulted in Singletons, Twins, or Triplets or More—United States, 2009–2018



Appendix: Accessible Explanations of Figures

Figure 1. This pie chart shows the distribution of ART use in 2018 by 5 patient age groups. Percentages for each age group are as follows: 37.2% were younger than age 35, 22.7% were aged 35 to 37, 19.6% were aged 38 to 40, 9.4% were aged 41 to 42, and 11.1% were older than age 42.

Figure 2. This pie chart shows the outcomes of clinical pregnancies from ART cycles started in 2018. Of these pregnancies, 74.0% resulted in the birth of a single infant, 8.4% resulted in the birth of multiple infants, 15.8% resulted in miscarriage, 0.5% resulted in stillbirth, and 1.4% were reported as other or unknown.

Figure 3. This horizontal line graph shows the percentage of embryo transfers started in 2018 that resulted in live-birth delivery, by patient age and egg or embryo source. The vertical Y-axis presents percentages from 0% to 60% in increments of 10. The horizontal X-axis presents patient age, from younger than 30 to older than 45. The first line shows that the percentage of ART cycles that used donor eggs or embryos decreased with patient age, from 53.6% to 45.1%. The second line shows that the percentage of ART cycles that used patient eggs or embryos decreased with age, from 51.7% to 10.5%.

Figure 4. This horizontal bar graph shows the reported reasons for using ART in 2018. The vertical Y-axis presents 13 reasons for using ART. The horizontal X-axis presents percentages from 0% to 40% in increments of 5. Percentages for each reason were as follows: 34.1% for egg or embryo banking, 30.4% for diminished ovarian reserve, 27.6% for male factor infertility, 23.6% for other reasons related to infertility, 14.0% for preimplantation genetic testing, 13.4% for ovulatory dysfunction, 11.1% for unexplained factor, 10.8% for tubal factor, 6.6% for endometriosis, 6.0% for uterine factor, 4.6% for recurrent pregnancy loss, 4.5% for other reasons not related to infertility, and 1.6% for gestational carrier.

Figure 5. This vertical bar graph shows the percentage of infants born from ART procedures started in 2018 who were born preterm or with low birth weight. The vertical Y-axis presents percentages from 0% to 100% in increments of 10. The horizontal X-axis presents the type of live-birth delivery. Among single infants born from single-fetus pregnancies, 11.8% were preterm and 11.4% were low birth weight. Among single infants born from multiple-fetus pregnancies, 21.3% were preterm and 21.9% were low birth weight. Among twin infants, 61.1% were preterm and 56.9% were low birth weight. Among triplet or more infants, 99.3% were preterm and 97.8% were low birth weight.

Figure 6. This horizontal line graph shows the number of ART cycles, embryo transfers, and banking cycles performed and the number of live-birth deliveries that resulted from ART cycles started from 2009 to 2018. The vertical Y-axis presents numbers from 0 to 350,000 in increments of 50,000. The horizontal X-axis presents the data reporting year, from 2009 to 2018. The number of ART cycles started increased from 151,295 in 2009 to 306,197 in 2018. Embryo transfers increased from 124,401 in 2009 to 163,889 in 2018. Banking cycles increased from 5,039 in 2009 to 103,078 in 2018. Live-birth deliveries increased from 45,894 in 2009 to 73,831 in 2018.

Figure 7. This horizontal line graph shows the number of ART cycles started from 2009 to 2018 by egg or embryo source. The vertical Y-axis presents numbers from 0 to 120,000 in increments of 20,000. The horizontal X-axis presents the data reporting year, from 2009 to 2018. The number of cycles performed using embryos from fresh patient eggs decreased from 102,478 in 2009 to 62,955 in 2018. Cycles performed using embryos from frozen patient eggs or embryos increased from 26,069 in 2009 to 112,924 in 2018. Cycles performed using embryos from fresh donor eggs decreased from 11,038 in 2009 to 3,005 in 2018. Cycles performed using embryos from frozen donor eggs or embryos increased from 6,659 in 2009 to 24,235 in 2018.

Figure 8. This combined vertical bar graph and horizontal line graph shows the number and percentage of embryo transfers that used a gestational carrier from 2009 to 2018. The left vertical Y-axis presents numbers from 0 to 9,000 in increments of 1,000. The right vertical Y-axis presents percentages from 0% to 5% in increments of 1%. The horizontal X-axis presents the data reporting year, from 2009 to 2018. The number of cycles that used a gestational carrier increased from 2,566 in 2009 to 7,629 in 2018. The percentage of cycles that used a gestational carrier also increased, from 2.1% in 2009 to 4.7% in 2018.

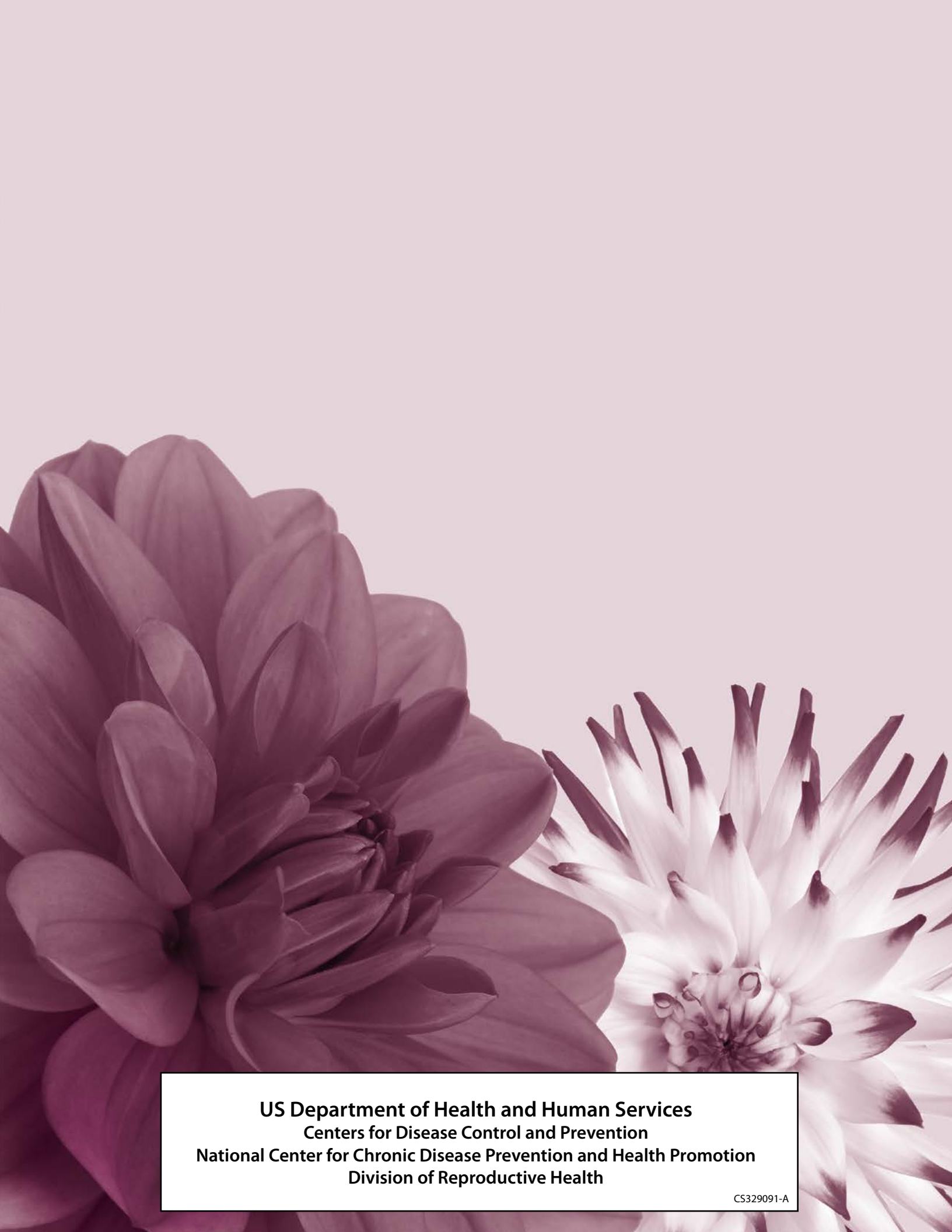
Figure 9. This horizontal line graph shows the percentage of embryo transfers in which a single embryo was transferred from 2009 to 2018. The vertical Y-axis presents percentages from 0% to 90% in increments of 10. The horizontal X-axis presents the data reporting year, from 2009 to 2018. The percentage of embryo transfers that used a single embryo increased from 15.5% in 2009 to 71.0% in 2018.

Figure 10. This horizontal line graph shows the percentage of ART cycles that resulted in live-birth deliveries from 2009 to 2018 by patient age group. The vertical Y-axis presents percentages from 10% to 45% in increments of 5. The horizontal X-axis presents the data reporting year, from 2009 to 2018. The percentage of ART cycles that resulted in live-birth deliveries increased from 31.4% in 2009 to 36.3% in 2018 for all age groups combined. The percentage increased from 39.5% in 2009 to 41.9% in 2018 for patients younger than age 35, from 31.6% in 2009 to 37.8% in 2018 for patients aged 35 to 37, from 24.8% in 2009 to 32.5% in 2018 for patients aged 38 to 40, and from 22.1% in 2009 to 27.4% in 2018 for patients older than age 40.

Figure 11. This vertical bar graph shows the number of infants born from 2009 to 2018 who were conceived using ART. The vertical Y-axis presents numbers from 0 to 90,000 in increments of 10,000. The horizontal X-axis presents the data reporting year, from 2009 to 2018. The number of infants born was 60,176 in 2009, 61,556 in 2010, 61,599 in 2011, 65,151 in 2012, 67,996 in 2013, 68,782 in 2014, 71,152 in 2015, 76,914 in 2016, 78,052 in 2017, and 81,478 in 2018.

Figure 12. This horizontal line graph shows the percentage of embryo transfers that resulted in the live birth of singletons, twins, or triplets or more from 2009 to 2018. The vertical Y-axis presents percentages from 0% to 40% in increments of 5. The horizontal X-axis presents the data reporting year, from 2009 to 2018. The first line shows that the percentage of embryo transfers that resulted in singletons increased from 22.0% in 2009 to 32.7% in 2018. The second line shows that the percentage of embryo transfers that resulted in twins decreased from 8.9% in 2009 to 3.6% in 2018. The third line shows that the percentage of embryo transfers that resulted in triplets or more decreased from 0.4% in 2009 to 0.1% in 2018.

Figure 13. This vertical stacked bar graph shows the percentage of infants conceived using ART cycles that resulted in the live birth of singletons, twins, or triplets or more from 2009 to 2018. The vertical Y-axis presents percentages from 0% to 100% in increments of 10. The horizontal X-axis presents the data reporting year, from 2009 to 2018. The first stack shows that the percentage of infants who were part of a singleton live-birth delivery increased from 70.2% in 2009 to 89.9% in 2018. The second stack shows that the percentage of infants who were part of a twin live-birth delivery decreased from 28.4% in 2009 to 9.9% in 2018. The third stack shows that the percentage of infants who were part of a triplet or more live-birth delivery decreased from 1.4% in 2009 to less than 0.2% in 2018.



**US Department of Health and Human Services
Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion
Division of Reproductive Health**

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