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Assisted Reproductive Technology Success Rates

National Summary and Fertility Clinic Reports

Centers for Disease Control and Prevention
Coordinating Center for Health Promotion
National Center for Chronic Disease Prevention and Health Promotion
Division of Reproductive Health
Atlanta, Georgia

American Society for Reproductive Medicine
Society for Assisted Reproductive Technology
Birmingham, Alabama

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Centers for Disease Control and Prevention

Coordinating Center for Health Promotion

Kathleen E. Toomey, MD, MPH, Director

National Center for Chronic Disease
Prevention and Health Promotion

Janet Collins, PhD, Director

Division of Reproductive Health

John R. Lehnherr, Acting Director
Kelly Brumbaugh, MPH, CHES

Women's Health and Fertility Branch

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Victoria C. Wright, MPH

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Surveillance Branch

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Michael Chen, PhD
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Gary Jeng, PhD

Technical Information and Editorial
Services Branch

Christine Fralish, MLIS, Chief

American Society for Reproductive Medicine

Robert Rebar, MD, Executive Director

Society for Assisted Reproductive Technology

William Gibbons, MD, President
Joyce G. Zeitz

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Dhong-Jin Kim, Quantell, Inc.
Kristi Seed, Science Applications International Corporation

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Preface

For many people who want to start a family, the dream of having a child is not easily realized; about 12% of women of childbearing age in the United States have received an infertility service. Assisted reproductive technology (ART) has been used in the United States since 1981 to help women become pregnant, most commonly through the transfer of fertilized human eggs into a woman's uterus. However, for many people, deciding whether to undergo this expensive and time-consuming treatment can be difficult.

The goal of this report is to help potential ART users make informed decisions about ART by providing some of the information needed to answer the following questions:

- What are my chances of having a child by using ART?
- Where can I go to get this treatment?

The Society for Assisted Reproductive Technology (SART), an organization of ART providers affiliated with the American Society for Reproductive Medicine (ASRM), has been collecting data and publishing annual reports of pregnancy success rates for fertility clinics in the United States and Canada since 1989. In 1992, the U.S. Congress passed the Fertility Clinic Success Rate and Certification Act. This law requires the Centers for Disease Control and Prevention (CDC) to publish pregnancy success rates for ART in fertility clinics in the United States. Since 1995, CDC has worked in consultation with SART and ASRM to report ART success rates.

The 2004 report of pregnancy success rates is the tenth to be issued under the law. This report is based on the latest available data on the type, number, and outcome of ART cycles performed in U.S. clinics.

The 2004 ART report has four major sections:

- ***Commonly asked questions about the U.S. ART clinic reporting system.*** This section provides background information on infertility and ART and an explanation of the data collection, analysis, and publication processes.
- ***A national report.*** The national report section presents overall success rates and shows how they are affected by certain patient and treatment characteristics. Because the national report summarizes data from all 411 fertility clinics that reported, it can give people considering ART a good idea of the average chance of having a child by using ART.
- ***Fertility clinic tables.*** Success also is related to the expertise of a particular clinic's staff and the quality of its laboratory. The fertility clinic table section displays ART results and success rates for individual U.S. fertility clinics in 2004.

- ***Appendixes:***

Appendix A contains technical notes on the interpretation of 95% confidence intervals and findings from the data validation visits to selected fertility clinics.

Appendix B (Glossary) provides definitions for technical and medical terms used throughout the report.

Appendix C includes the names and addresses of all reporting clinics along with a list of clinics known to be in operation in 2004 that did not report their success rate data to CDC as required by law.

Appendix D includes the names and addresses of national consumer organizations that offer support to people experiencing infertility.

Success rates can be reported in a variety of ways, and the statistical aspects of these rates can be difficult to interpret. As a result, presenting information about ART success rates is a complex task. This report is intended for the general public, and the emphasis is on presenting the information in an easily understandable form. CDC hopes that this report is informative and helpful to people considering an ART procedure. We welcome any suggestions for improving the report and making it easier to use.

Commonly Asked Questions About the U.S. ART Clinic Reporting System

Background Information, Data Collection Methods, Content and Design of the Report, and Additional Information About ART in the United States

1. How many people in the United States have infertility problems?

The latest data on infertility available to the Centers for Disease Control and Prevention (CDC) are from the 2002 National Survey of Family Growth.

- Of the approximately 62 million women of reproductive age in 2002, about 1.2 million, or 2%, had had an infertility-related medical appointment within the previous year and an additional 10% had received infertility services at some time in their lives. (Infertility services include medical tests to diagnose infertility, medical advice and treatments to help a woman become pregnant, and services other than routine prenatal care to prevent miscarriage.)
- Additionally, 7% of married couples in which the woman was of reproductive age (2.1 million couples) reported that they had not used contraception for 12 months and the woman had not become pregnant.

2. What is assisted reproductive technology (ART)?

Although various definitions have been used for ART, the definition used in this report is based on the 1992 law that requires CDC to publish this report. According to this definition, ART includes all fertility treatments in which both eggs and sperm are handled. In general, ART procedures involve surgically removing eggs from a woman's ovaries, combining them with sperm in the laboratory, and returning them to the woman's body or donating them to another woman. They do NOT include treatments in which only sperm are handled (i.e., intrauterine—or artificial—insemination) or procedures in which a woman takes drugs only to stimulate egg production without the intention of having eggs retrieved.

The types of ART include the following:

- **IVF (*in vitro fertilization*)**. Involves extracting a woman's eggs, fertilizing the eggs in the laboratory, and then transferring the resulting embryos into the woman's uterus through the cervix. For some IVF procedures, fertilization involves a specialized technique known as intracytoplasmic sperm injection (ICSI). In ICSI a single sperm is injected directly into the woman's egg.
- **GIFT (*gamete intrafallopian transfer*)**. Involves using a fiber-optic instrument called a laparoscope to guide the transfer of unfertilized eggs and sperm (gametes) into the woman's fallopian tubes through small incisions in her abdomen.
- **ZIFT (*zygote intrafallopian transfer*)**. Involves fertilizing a woman's eggs in the laboratory and then using a laparoscope to guide the transfer of the fertilized eggs (zygotes) into her fallopian tubes.

In addition, ART often is categorized according to whether the procedure used a woman's own eggs (nondonor) or eggs from another woman (donor) and according to whether the embryos used were newly fertilized (fresh) or previously fertilized, frozen, and then thawed (frozen). Because an ART procedure includes several steps, it is typically referred to as a cycle of treatment. (See **What is an ART cycle?** below.)

3. What is the 1992 Fertility Clinic Success Rate and Certification Act?

This law (Fertility Clinic Success Rate and Certification Act of 1992 [FCSRCA], Section 2 [a] of P.L. 102-493 [42 U.S.C. 263 (a) -1]), which the U.S. Congress passed in 1992, requires all clinics performing ART in the United States to annually report their success rate data to CDC. CDC uses the data to publish an annual report detailing the ART success rates for each of these clinics.

4. How do U.S. ART clinics report data to CDC about their success rates?

CDC contracts with a statistical survey research organization, Westat, to obtain the data published in the ART success rates report. Westat maintains a list of all ART clinics known to be in operation and tracks clinic reorganizations and closings. This list includes clinics and individual providers that are members of the Society for Assisted Reproductive Technology (SART) as well as clinics and providers that are not SART members. Westat actively follows up reports of ART physicians or clinics not on its list to update the list as needed. Westat maintains a Web-based data collection system called the National ART Surveillance System (NASS) that all ART clinics use. Clinics either electronically enter or import data into NASS for each ART procedure they start in a given reporting year. The data collected include information on the client's medical history (such as infertility diagnoses), clinical information pertaining to the ART procedure, and information on resulting pregnancies and births.

See below (**Why is the report of 2004 success rates being published in 2006?**) for a complete description of the reporting process.

5. What is an ART cycle?

Because ART consists of several steps over an interval of approximately 2 weeks, an ART procedure is more appropriately considered a **cycle** of treatment rather than a procedure at a single point in time. The start of an ART cycle is considered to be when a woman begins taking drugs to stimulate egg production or starts ovarian monitoring with the intent of having embryos transferred. (See Figure 5, page 17, for a full description of the steps in an ART cycle.) For the purposes of this report, data on **all cycles that were started**, even those that were discontinued before all steps were undertaken, are submitted to CDC through NASS and are counted in the clinic's success rates.

6. Why is the report of 2004 success rates being published in 2006?

Before success rates based on live births can be calculated, every ART pregnancy must be followed up to determine whether a birth occurred. Therefore, the earliest that clinics can report complete annual data is late in the year after ART treatment was initiated (about 9 months past year-end, when all the births have occurred). Accordingly, the results of all

the cycles initiated in 2004 were not known until October 2005. After ART outcomes were known, the following steps had to be completed before the report could be published:

- Clinics entered their data into NASS and verified the data's accuracy before sending the data to Westat.
- Westat compiled a national data set from the data submitted by individual clinics.
- CDC data analysts did comprehensive checks of the numbers reported for every clinic.
- Clinic tables, national figures, and accompanying text for both the printed and Internet versions of the report were compiled and laid out.
- CDC and Westat reviewed the report.
- Necessary changes were incorporated and proofread.
- The report was submitted to the Government Printing Office to begin the printing and production process.

These steps are time-consuming but essential for ensuring that the report provides the public with correct information and does not misrepresent any clinic's success rates.

7. What quality control steps are used to ensure data accuracy?

To have their success rates published in this annual report, clinics have to submit their data in time for analysis and the clinics' medical directors have to verify by signature that the tabulated success rates are accurate. Then, Westat conducts an in-house review and contacts the clinics if corrections are necessary. After the data have been verified, a quality control process called validation begins. This year, 28 of 411 reporting clinics were selected for site visits. Two members of the Westat Validation Team visited these clinics and reviewed medical record data for a sample of the clinic's ART cycles. For each cycle, the validation team abstracted information from the patient's medical record. The abstracted information was then reviewed on site at Westat and compared with the data submitted for the report. CDC staff members participated as observers in some of the visits. For each clinic, the sample of cycles validated included all cycles that were reported to have ended in a live birth and a random sample of up to 50 additional cycles. In almost all cases, data on pregnancies and births in the medical records were consistent with reported data. Validation primarily helps ensure that clinics are being careful to submit accurate data. It also serves to identify any systematic problems that could cause data collection to be inconsistent or incomplete.

The data validation process does not include any assessment of clinical practice or overall record keeping. See Appendix A, Technical Notes, for a more detailed presentation of findings from the validation visits.

8. Which clinics are represented in this report?

The data in both the national report and the individual fertility clinic reports come from 411 fertility clinics that provided and verified information about the outcomes of the ART cycles started in their clinics in 2004.

Although we believe that almost all clinics that provided ART services in the United States throughout 2004 are represented in this report, data for a few clinics or practitioners are

not included because they either were not in operation throughout 2004 or did not report as required. Clinics and practitioners known to have been in operation throughout 2004 that did not report and verify their data are listed in this report as nonreporters, as required by law (see Appendix C, Nonreporting ART Clinics for 2004, by State, on pages 543–545). We will continue to make every effort to include in future reports all clinics and practitioners providing ART services.

9. Does this report include all ART cycles performed by the reporting clinics?

This report includes data for the 127,977 cycles performed by the 411 clinics that reported their data as required. A small number of ART cycles are not included in either the national data or the individual fertility clinic tables. These were cycles in which a new treatment procedure was being evaluated. Only 239 ART cycles fell into this category in 2004.

10. How are the success rates determined?

Three measures of success are presented in this report: **(1) pregnancy**, **(2) birth of one or more living infants** (the delivery of multiple infants is counted as one live birth), and **(3) birth of a singleton live-born infant**. The pregnancies reported here were diagnosed using an ultrasound procedure. All live-birth deliveries were reported to the ART physician by either the patient or her obstetric provider. Because this report is geared toward patients, the focus is on live birth rates. Singleton live births are presented as a separate measure of success because they have a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death. Pregnancy, live birth rates, and singleton live birth rates were calculated based on all cycles started. As noted throughout the report, success rates were additionally calculated at various steps of the ART cycle to provide a complete picture of the chances for success as the cycle progresses.

11. If a woman has had more than one ART treatment cycle, how is the success rate calculated?

As required by law, this report presents ART success rates in terms of cycles started each year rather than in terms of women. (A cycle starts when a woman begins taking fertility drugs or having her ovaries monitored for follicle production.) Therefore, women who had more than one ART cycle started in 2004 are represented in multiple cycles. Success rates cannot be calculated on a “per woman” basis because women’s names are not reported to Westat and CDC.

12. What factors that influence success rates are presented in this report?

The national report presents a more in-depth picture of ART than can be shown for each individual clinic. Success rates are presented in the context of various patient and treatment characteristics that may influence success. These characteristics include age, infertility diagnosis, history of previous births, previous miscarriages, previous ART cycles, number of embryos transferred, type of ART procedure, use of techniques such as ICSI, and clinic size.

13. Why doesn't the report contain specific medical information about ART?

This report describes a woman's average chances of success using ART. Although the report provides some information about factors such as age and infertility diagnosis, individual couples face many unique medical situations. This population-based registry of ART procedures cannot capture detailed information about specific medical conditions associated with infertility. A physician in clinical practice should be consulted for the individual evaluation that will help a woman or couple understand their specific medical situation and their chances of success using ART.

14. Does CDC have any information on the age, race, income, and education levels of women who donate eggs?

CDC does not collect information on egg donors beyond what is presented in this report. Success rates for cycles using donor eggs or using embryos derived from donor eggs are presented separately based on the ART patient's age.

15. Are there any medical guidelines for ART performed in the United States?

ASRM and SART issue guidelines dealing with specific ART practice issues, such as the number of embryos to be transferred in an ART procedure. Further information can be obtained from ASRM or SART (both at telephone 205-978-5000 or Web sites www.asrm.org and www.sart.org).

16. What is CDC doing to ensure that the report is helpful to the public?

We continually review comments from patients and providers on issues to consider for future reports. In 1999 CDC held focus groups of people who were either considering or undergoing ART in four cities in different areas of the country. The groups generally were satisfied with both the format and content of the report. They suggested specific ways to improve the report and additional information to include. Many of these changes have been incorporated into the annual report.

17. Where can I get additional information on U.S. fertility clinics?

For further information on specific clinics, contact the clinic directly. In addition, SART can provide general information on its member clinics (telephone 205-978-5000, extension 109).

18. What's new in the 2004 report?

Overall, the content and format of this report are similar to those used in previous years. The following changes have been made:

- Section 1 of the report (Overview) includes added information on the ages of women who used ART in 2004 and the types of ART procedures used by woman's age.
- Section 5 of the report (ART Trends, 1996–2004) includes the addition of trends in number of embryos transferred and trends in live births per transfer by number of embryos transferred.

2004 National Report



INTRODUCTION TO THE 2004 NATIONAL REPORT

Data provided by U.S. clinics 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 live-born infant. Pooling the data from all reporting clinics provides an overall national picture that could not be obtained by examining data from an individual clinic.

A woman's chances of having a pregnancy and a live birth by using ART are influenced by many factors, some of which (e.g., the woman's age, the cause of infertility) are outside a clinic's control. Because the national data set includes information on many of these factors,

it can give potential ART users an idea of their average chances of success. Average chances, however, do not necessarily apply to a particular individual or couple. People considering ART should consult their physician to discuss all the factors that apply in their particular case.

The data for this national report come from the 411 fertility clinics in operation in 2004 that provided and verified data on the outcomes of all ART cycles started in their clinics. The 127,977 ART cycles performed at these reporting clinics in 2004 resulted in 36,760 live births (deliveries of one or more living infants) and 49,458 infants.

The national report consists of graphs and charts that use 2004 data to answer specific questions related to ART success rates. These figures are organized according to the type of ART procedure used. Some ART procedures use a woman's own eggs, and others use donated eggs or embryos. (Although sperm used to create an embryo also may be either from a woman's partner or from a sperm donor, information in this report is presented according to the source of the egg.) In some procedures, the embryos that develop are transferred back to the woman (fresh embryo transfer); in others, the embryos are frozen (cryopreserved) for transfer at a later date. This report includes data on frozen embryos that were thawed and transferred in 2004.

The national report has five sections:

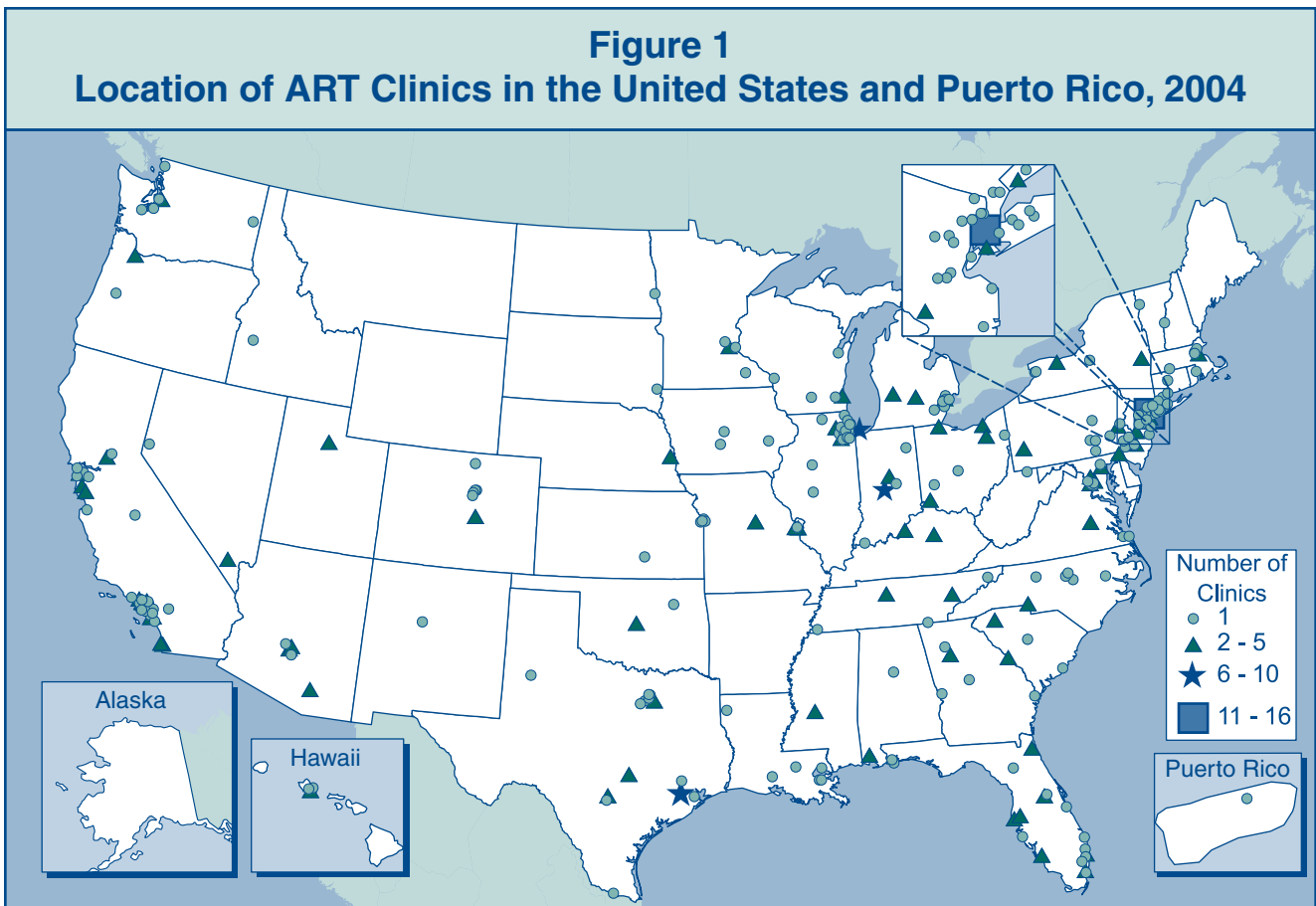
- Section 1 (Figures 1 through 4) presents information from all ART procedures reported.
- Section 2 (Figures 5 through 37) presents information on the ART cycles that used only fresh embryos from nondonor eggs or, in a few cases, a mixture of fresh and frozen embryos from nondonor eggs (94,242 cycles resulting in 76,533 transfers).
- Section 3 (Figures 38 and 39) presents information on the ART cycles that used only frozen embryos from nondonor eggs (18,560 cycles resulting in 16,795 transfers).
- Section 4 (Figures 40 through 44) presents information on the ART cycles that used only donated eggs or embryos (15,175 cycles resulting in 13,722 transfers).
- Section 5 (Figures 45 through 56) presents trends in the number of ART procedures and success rates from 1996 through 2004.

The 2004 national summary table, which is based on data from all clinics included in this report, is on page 81, immediately preceding the individual clinic tables. An explanation of how to read these tables is on pages 75–80.

SECTION 1: OVERVIEW

Where are U.S. ART clinics located, how many ART cycles did they perform in 2004, and how many infants were born?

Although ART clinics are located throughout the United States, generally in or near major cities, the greatest number of clinics is in the eastern United States. Figure 1 shows the locations of the 411 reporting clinics. The fertility clinic section of this report, arranged in alphabetical order by state, city, and clinic name, provides specific information on each of these clinics. The number of clinics, cycles performed, live-birth deliveries, and infants born as a result of ART all have increased steadily since CDC began collecting this information in 1995 (see Section 5, pages 57–68). Because in some cases more than one infant is born during a live-birth delivery (e.g., twins), the total number of infants born is greater than the number of live-birth deliveries. CDC estimates that ART accounts for slightly more than 1% of total U.S. births.



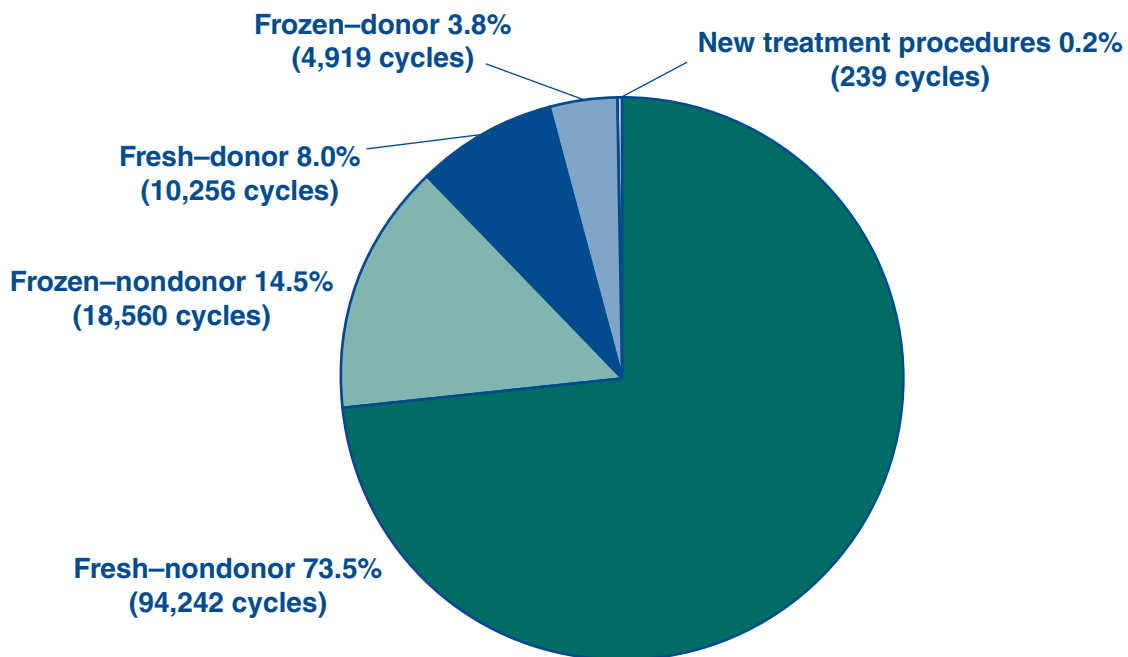
Number of ART clinics in the United States in 2004:	461
Number of U.S. ART clinics that submitted data in 2004:	411
Number of ART cycles reported in 2004:	127,977*
Number of live-birth deliveries resulting from ART cycles started in 2004:	36,760
Number of infants born as a result of ART cycles carried out in 2004:	49,458

*Note: This number does not include 239 cycles in which a new treatment procedure was being evaluated (see Figure 2).

What types of ART cycles were used in the United States in 2004?

For 74% of ART cycles carried out in 2004, fresh nondonor eggs or embryos were used. ART cycles that used frozen nondonor embryos were the next most common type, accounting for approximately 15% of the total. In about 12% of cycles, eggs or embryos were donated by another woman. A very small number of cycles (less than 1% of the ART cycles carried out in 2004) involved the evaluation of a new treatment procedure. The vast majority of these cycles included pre-implantation genetic diagnosis for screening of genetic disorders, and a few involved the retrieval of immature oocytes. The number of cycles in which a new treatment procedure was being evaluated is not included in the total number of cycles reported in Sections 2 through 5 of the national report and in the individual fertility clinic tables. Thus, data presented in subsequent figures in this report and in the individual fertility clinic tables are based on 127,977 ART cycles.

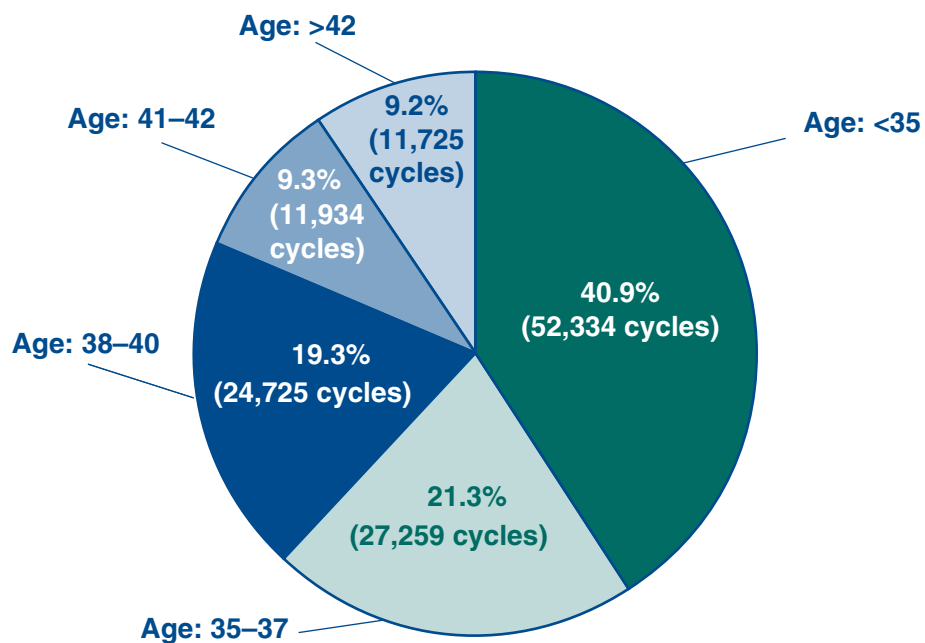
Figure 2
Types of ART Cycles—United States, 2004



How old were the women who used ART in the United States in 2004?

The average age of women using ART services in 2004 was 36. The largest group of women using ART services were women younger than 35, representing 41% of all ART cycles carried out in 2004. Twenty-one percent of ART cycles were carried out among women aged 35–37, 19% among women aged 38–40, 9% among women aged 41–42, and 9% among women older than 42.

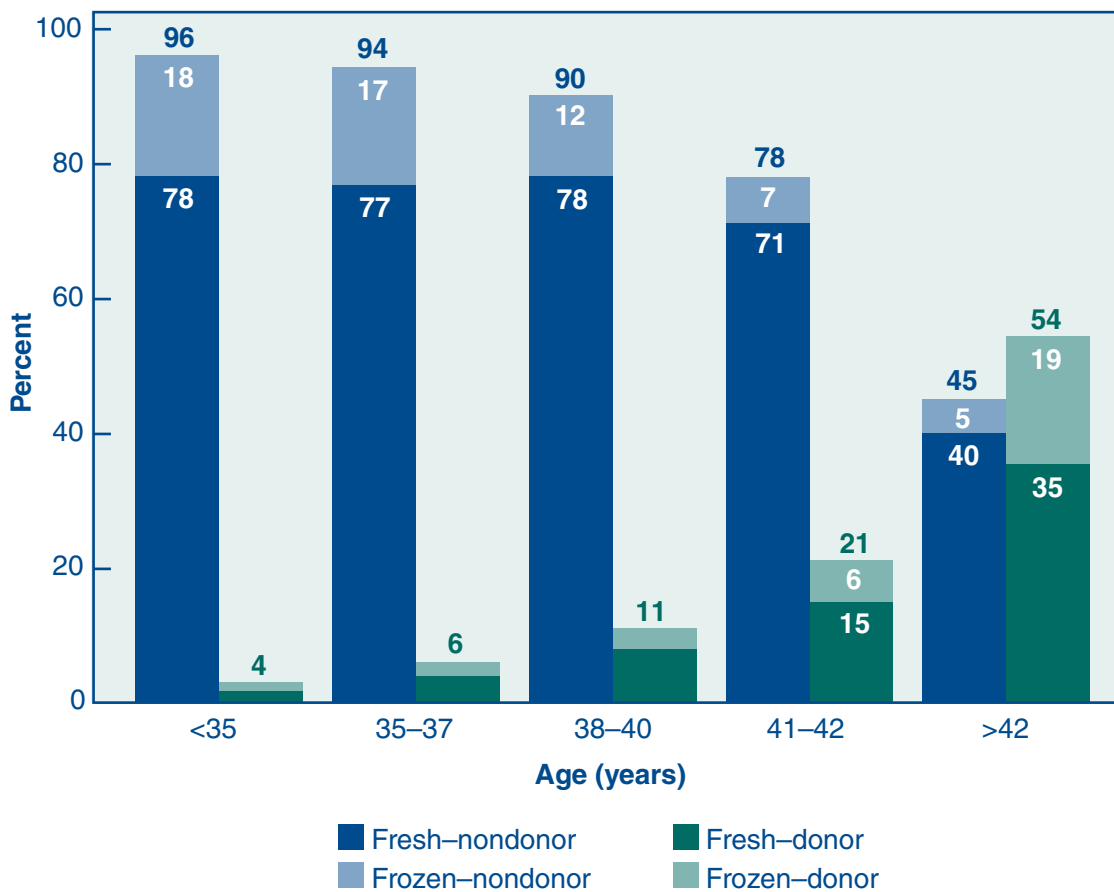
Figure 3
ART Use by Age Group—United States, 2004



Did the types of ART cycles used in the United States in 2004 differ among women of different ages?

Figure 4 shows that, in 2004, the type of ART cycles varied by the woman’s age. The vast majority (96%) of women younger than 35 used their own eggs while only 4% used donor eggs. In contrast, 21% of women aged 41 to 42 and more than half (54%) of women older than 42 used donor eggs. Across all age groups, more ART cycles using fresh eggs or embryos were performed than cycles using frozen embryos.

Figure 4
Types of ART Cycles by Age Group—United States,* 2004



*Totals do not equal 100% due to rounding.

SECTION 2: ART CYCLES USING FRESH NONDONOR EGGS OR EMBRYOS

What are the steps for an ART cycle using fresh nondonor eggs or embryos?

Figure 5 presents the steps for an ART cycle using fresh nondonor eggs or embryos and shows how ART users in 2004 progressed through these stages toward pregnancy and live birth.

An ART **cycle is started** when a woman begins taking medication to stimulate the ovaries to develop eggs or, if no drugs are given, when the woman begins having her ovaries monitored (using ultrasound or blood tests) for natural egg production.

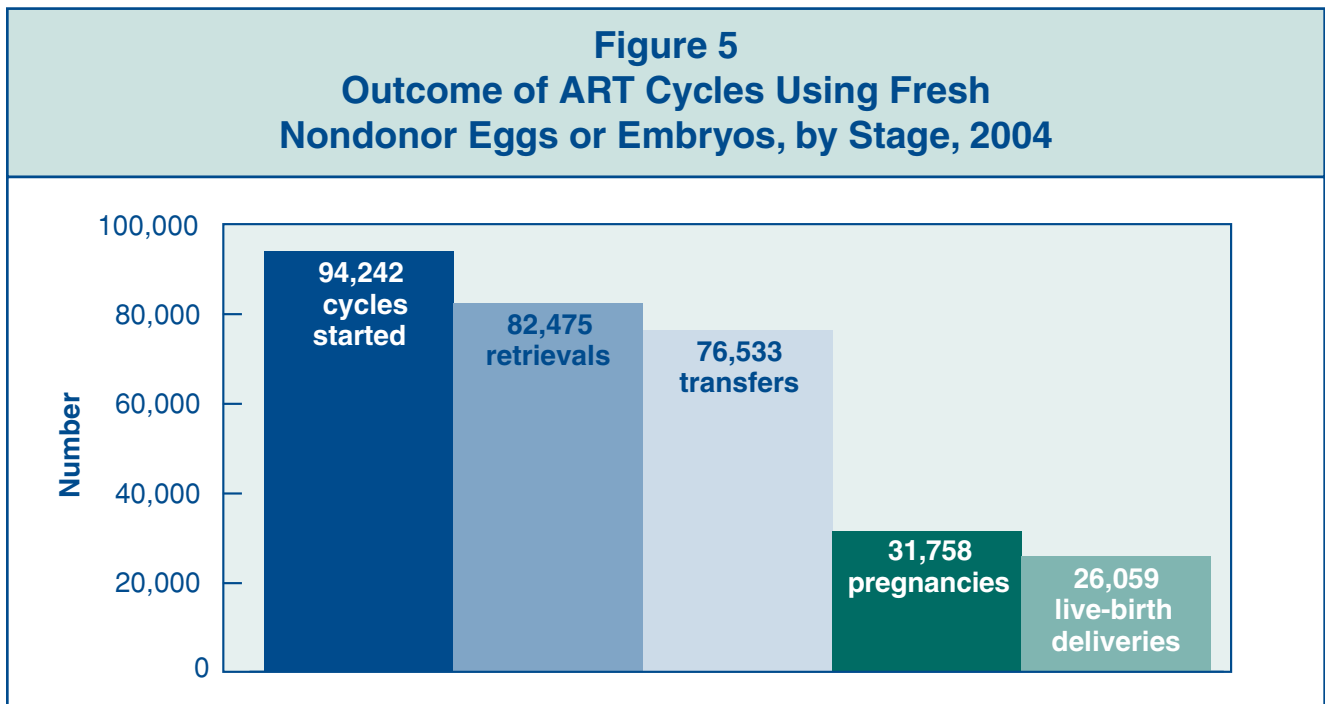
If eggs are produced, the cycle then progresses to **egg retrieval**, a surgical procedure in which eggs are collected from a woman’s ovaries.

Once retrieved, eggs are combined with sperm in the laboratory. If fertilization is successful, one or more of the resulting embryos are selected for **transfer**, most often into a woman’s uterus through the cervix (IVF), but sometimes into the fallopian tubes (e.g., GIFT, ZIFT; see pages 504 and 505 for definitions).

If one or more of the transferred embryos implant within the woman’s uterus, the cycle then may progress to clinical **pregnancy**.

Finally, the pregnancy may progress to a **live birth**, the delivery of one or more live-born infants. (The birth of twins, triplets, or more is counted as one live birth.)

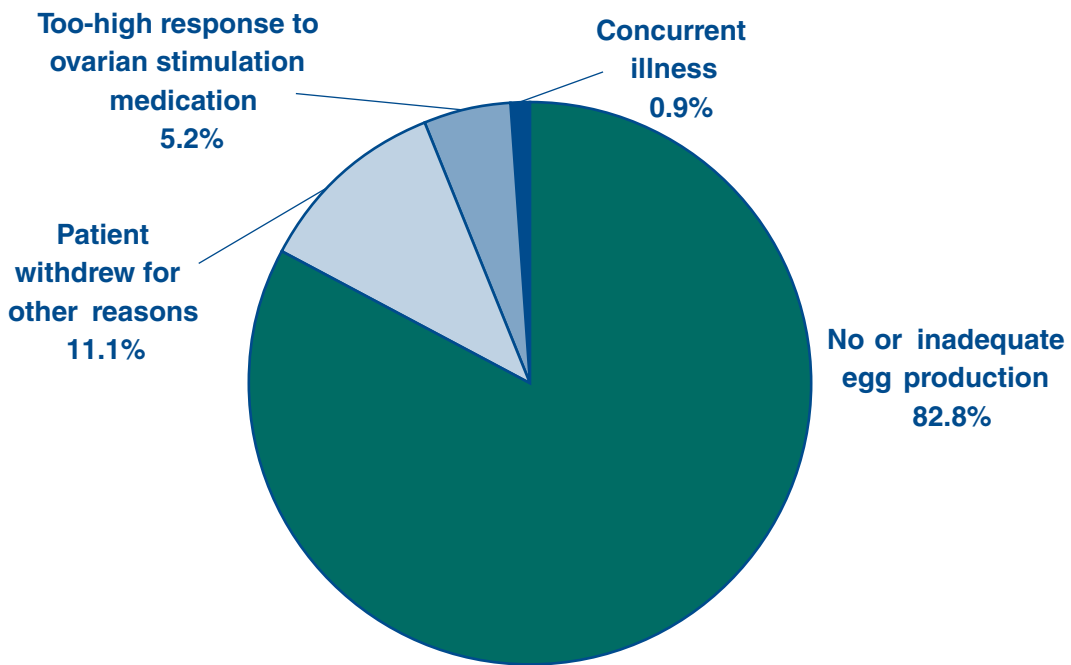
A cycle may be discontinued at any step for specific medical reasons (e.g., no eggs are produced, the embryo transfer was not successful) or by patient choice.



Why are some ART cycles discontinued?

In 2004, 11,767 ART cycles (about 12%) were discontinued before the egg retrieval step (see Figure 5). Figure 6 shows reasons that the cycles were stopped. For approximately 83% of these cycles, there was no or inadequate egg production. Other reasons included too high a response to ovarian stimulation medications (i.e., potential for ovarian hyperstimulation syndrome), concurrent medical illness, or a patient's personal reasons.

Figure 6
Reasons ART Cycles Using Fresh Nondonor Eggs or Embryos Were Discontinued in 2004*



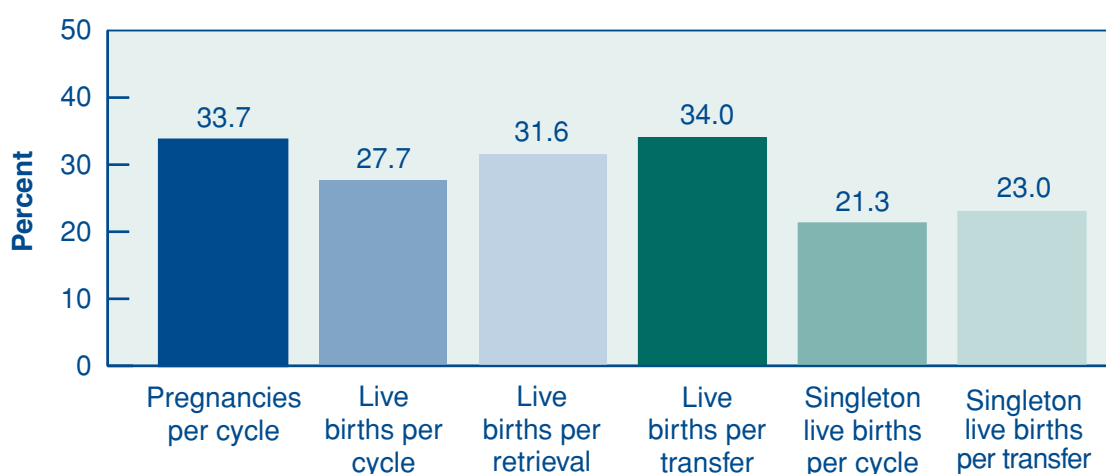
*Based on 11,767 ART cycles.

How is the success of ART measured?

Figure 7 shows ART success rates using six different measures, each providing slightly different information about this complex process. The vast majority of rates have increased slightly each year since CDC began monitoring them in 1995 (see Section 5, pages 57–68).

- **Pregnancy per cycle rate:** the percentage of ART cycles started that produced a pregnancy. This rate is higher than the live birth per cycle rate because some pregnancies end in miscarriage, induced abortion, or stillbirth (see Figure 9, page 21).
- **Live birth per cycle rate:** the percentage of ART cycles started that resulted in a live birth (a delivery of one or more live-born infants). This rate is the one many people are most interested in because it represents the average chances of having a live-born infant by using ART. **Throughout this report, live birth rate means live birth per cycle rate unless otherwise specified.**
- **Live birth per egg retrieval rate:** the percentage of ART cycles in which eggs were retrieved that resulted in a live birth. It is generally higher than the live birth per cycle rate because it excludes cycles that were canceled before eggs were retrieved. In 2004, about 12% of all cycles using fresh nondonor eggs or embryos were canceled for a variety of reasons (see Figure 6).
- **Live birth per transfer rate:** includes only those ART cycles in which an embryo or egg and sperm were transferred back to the woman. This rate is the highest of these six measures of ART success.
- **Singleton live birth per cycle rate:** the percentage of ART cycles started that resulted in a singleton live birth. Overall, singleton live births have a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death.
- **Singleton live birth per transfer rate:** the percentage of ART cycles that resulted in a singleton live birth among ART cycles in which an embryo or egg and sperm were transferred back to the woman.

Figure 7
Success Rates for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Different Measures, 2004

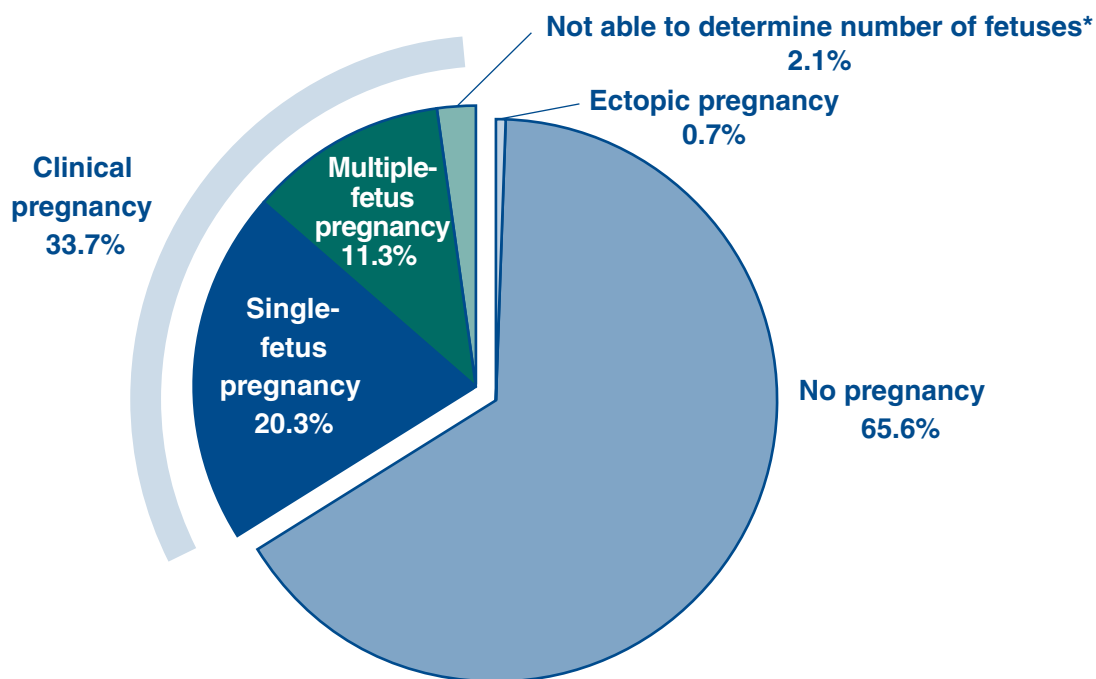


What percentage of ART cycles results in a pregnancy?

Figure 8 shows the results of ART cycles in 2004 that used fresh nondonor eggs or embryos. Most of these cycles (66%) did not produce a pregnancy; a very small proportion (0.7%) resulted in an ectopic pregnancy (the embryo implanted outside the uterus), and slightly less than 34% resulted in clinical pregnancy. Clinical pregnancies can be further subdivided as follows:

- 20.3% resulted in a single-fetus pregnancy.
- 11.3% resulted in a multiple-fetus pregnancy.
- 2.1% ended in miscarriage before the number of fetuses could be accurately determined.

Figure 8
Results of ART Cycles Using Fresh Nondonor Eggs or Embryos, 2004

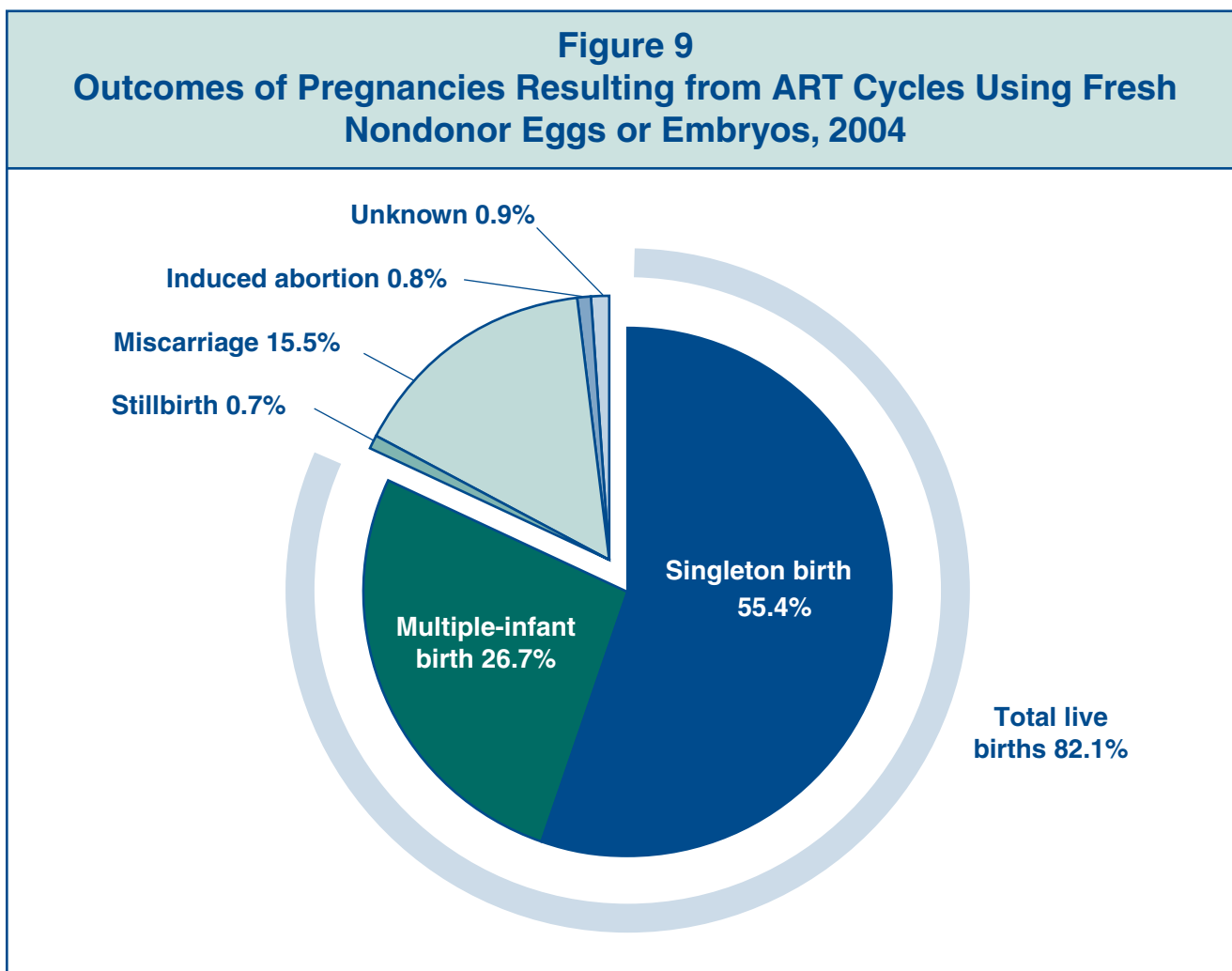


*Number of fetuses not known because the pregnancy ended in an early miscarriage.

What percentage of pregnancies results in a live birth?

Figure 9 shows the outcomes of pregnancies resulting from ART cycles in 2004 (see Figure 8). Approximately 82% of the pregnancies resulted in a live birth (55% in a singleton birth and 27% in a multiple-infant birth). Seventeen percent of pregnancies resulted in an adverse outcome (miscarriage, induced abortion, or stillbirth). For 0.9% of pregnancies, the outcome was not reported.

Although the birth of more than one infant is counted as one live birth, multiple-infant births are presented here as a separate category because they often are associated with problems for both mothers and infants. Infant deaths and birth defects are not included as adverse outcomes because the available information for these outcomes is incomplete.



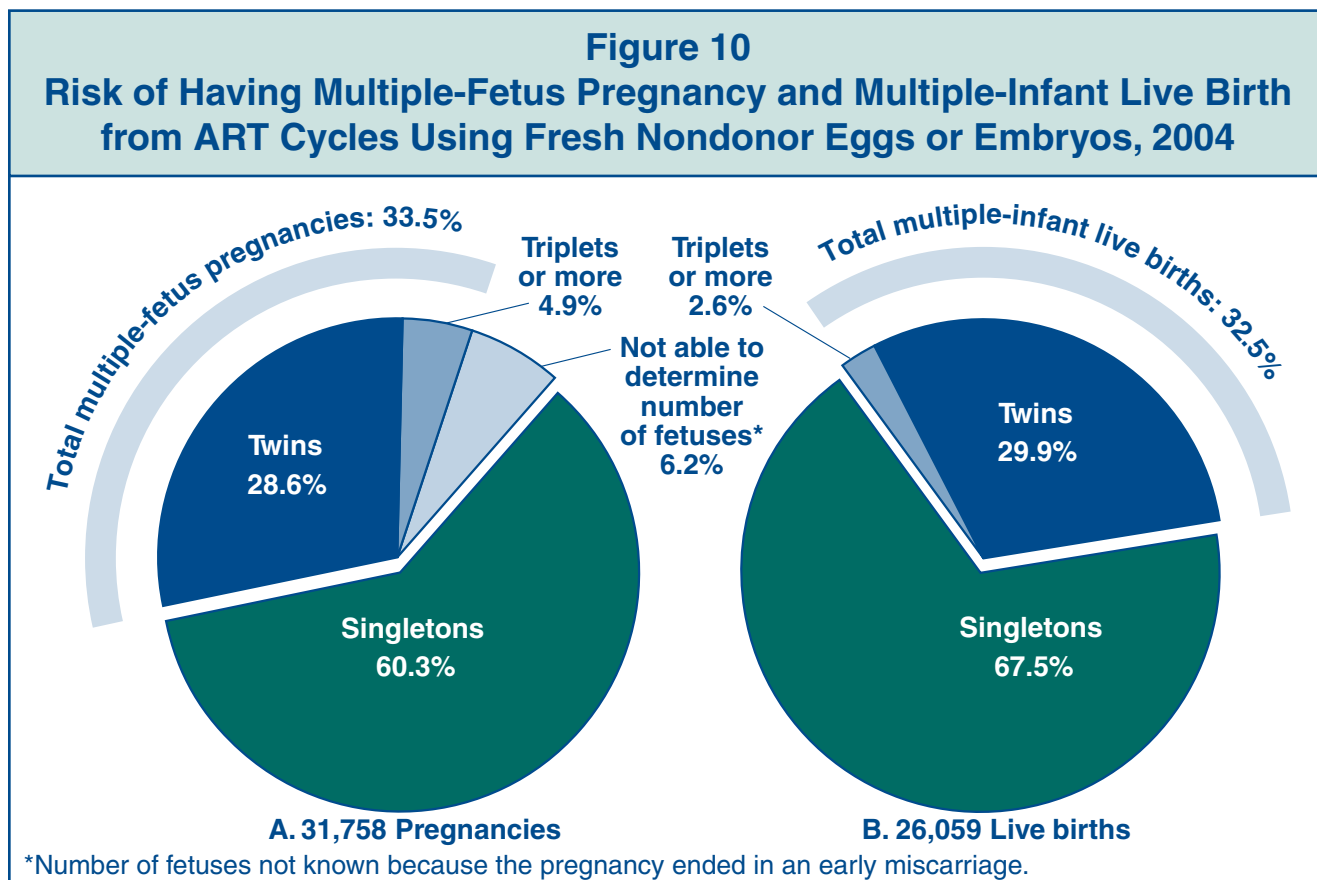
Using ART, what is the risk of having a multiple-fetus pregnancy or multiple-infant live birth?

Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability or death.

Part A of Figure 10 shows that among the 31,758 pregnancies that resulted from ART cycles using fresh nondonor eggs or embryos, 60% were singleton pregnancies, 29% were twins, and about 5% were triplets or more. Six percent of pregnancies ended in miscarriage in which the number of fetuses could not be accurately determined. Therefore, the percentage of pregnancies with more than one fetus might have been higher than what was reported (about 34%).

In 2004, 5,393 pregnancies resulting from ART cycles ended in either miscarriage, stillbirth, or induced abortion, and 299 pregnancy outcomes were not reported. The remaining 26,059 pregnancies resulted in live births. Part B of Figure 10 shows that approximately 33% of these live births produced more than one infant (30% twins and approximately 3% triplets or more). This compares with a multiple-infant birth rate of slightly more than 3% in the general U.S. population.

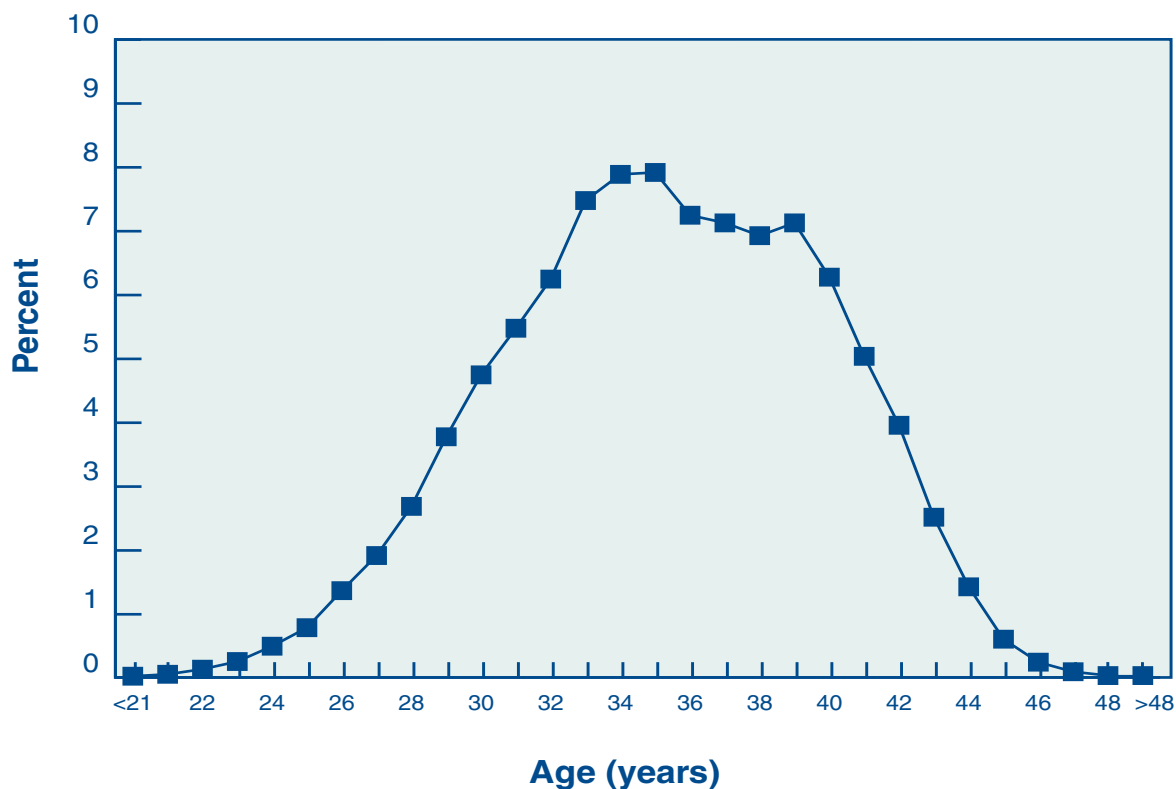
Although the total rates for multiples were similar between pregnancies and live births, there were more triplet (or more) pregnancies than births. Triplet (or more) pregnancies may be reduced to twins or singletons by the time of birth. This can happen naturally (e.g., fetal death), or a woman and her doctor may decide to reduce the number of fetuses using a procedure called multifetal pregnancy reduction. Information on medical multifetal pregnancy reductions is incomplete and therefore is not provided here.



What are the ages of women who use ART?

Figure 11 presents ART cycles using fresh nondonor eggs or embryos according to the age of the woman who had the procedure. About 12% of these cycles were among women younger than age 30, 68% were among women aged 30–39, and 20% were among women aged 40 and older.

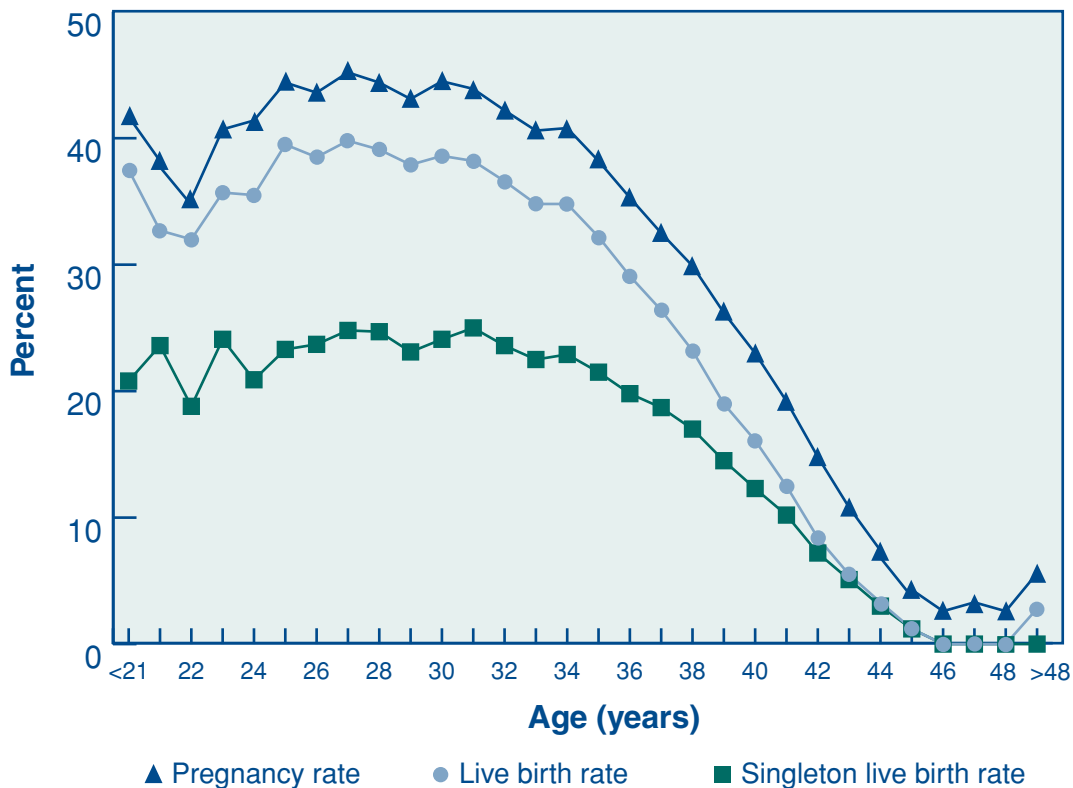
Figure 11
Age Distribution of Women Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos, 2004



Do ART success rates differ among women of different ages?

A woman's age is the most important factor affecting the chances of a live birth when her own eggs are used. Figure 12 shows the pregnancy rates, live birth rates, and singleton live birth rates for women of different ages who had ART procedures using fresh nondonor eggs or embryos in 2004. Live birth rates and singleton live birth rates are different because of the high percentage of multiple-birth deliveries counted among the total live births. The percentage of multiple births is particularly high among women younger than 35 (see Figure 31). Among women in their 20s, pregnancy rates, live birth rates, and singleton live birth rates were relatively stable; however, success rates declined steadily from the mid-30s onward as fertility declined with age. For additional detail on success rates among women aged 40 years or older, see Figure 13.

Figure 12
Pregnancy Rates, Live Birth Rates, and Singleton Live Birth Rates for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Age of Woman,* 2004

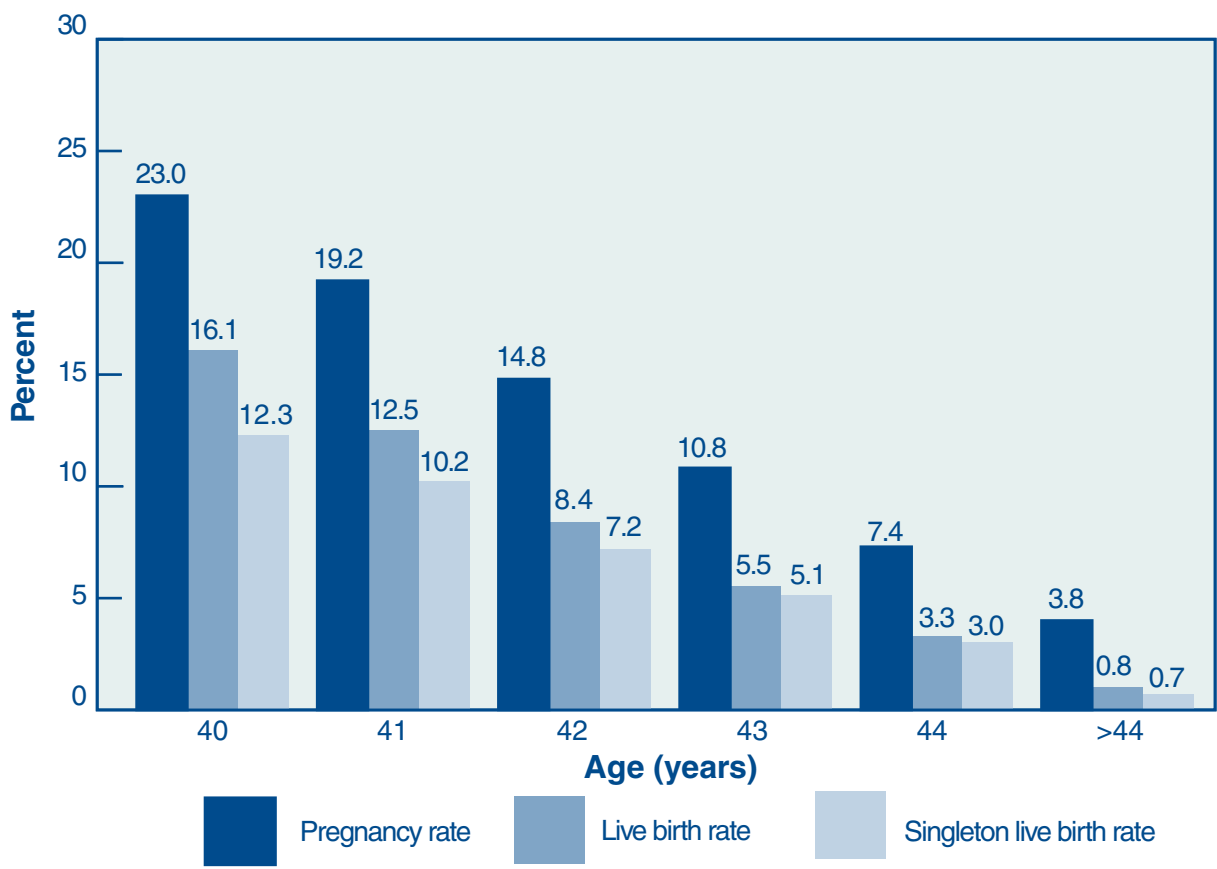


*For consistency, all rates are based on cycles started.

How do ART success rates differ for women who are 40 or older?

Success rates decline with each year of age and are particularly low for women 40 or older. Figure 13 shows pregnancy rates, live birth rates, and singleton live birth rates for women 40 or older who used fresh nondonor eggs or embryos. The average chance for pregnancy was 23% for women age 40; the live birth rate for this age was about 16%, and the singleton live birth rate was 12%. All rates dropped steadily with each 1-year increase in age. For women older than 44, the live birth rates and singleton live birth rates were both a little less than 1%. Women 40 or older generally have much higher success rates using donor eggs (see Figure 41, page 53).

Figure 13
Pregnancy Rates, Live Birth Rates, and Singleton Live Birth Rates for ART Cycles Using Fresh Nondonor Eggs or Embryos Among Women Aged 40 or Older,* 2004



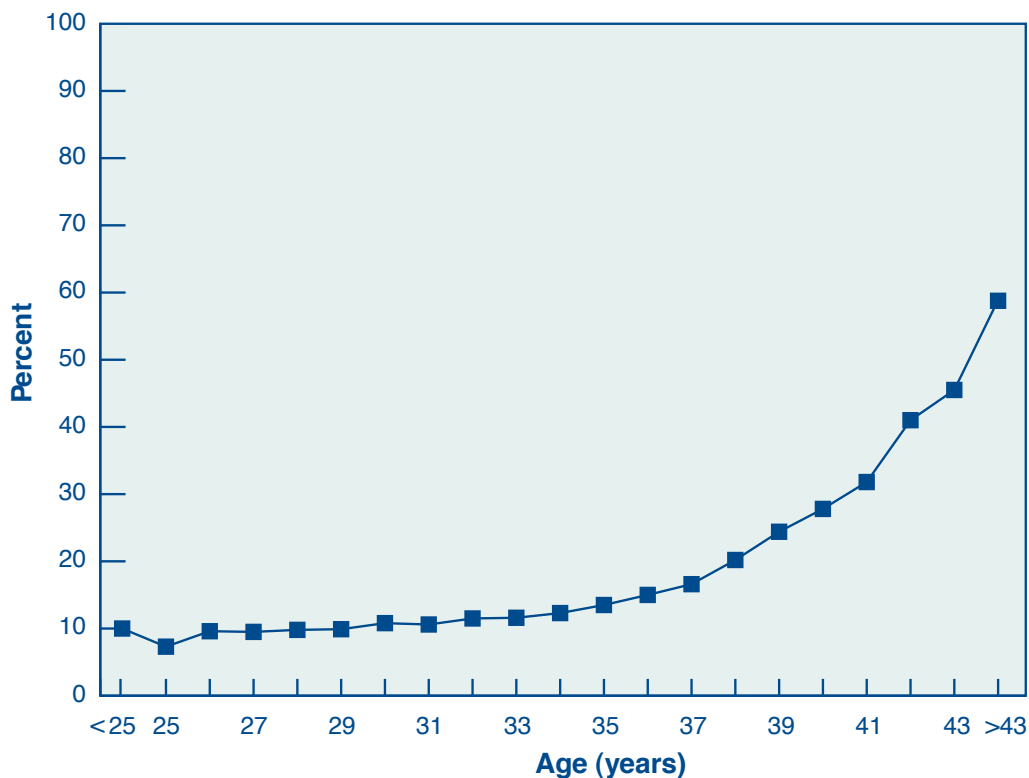
*For consistency, all rates are based on cycles started.

How do miscarriage rates for ART patients vary among women of different ages?

A woman's age not only affects the chance for pregnancy when her own eggs are used, but also affects her risk for miscarriage. Figure 14 shows miscarriage rates for women of different ages who became pregnant using ART procedures in 2004. Miscarriage rates were below 12% among women younger than 34. The rates began to increase among women in their mid- to late 30s and continued to increase with age, reaching 28% at age 40 and 59% among women older than 43.

The miscarriage rates observed among women undergoing ART procedures using fresh nondonor eggs or embryos appear to be similar to those reported in various studies of other pregnant women in the United States.

Figure 14
Miscarriage Rates Among Women Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos, by Age of Woman, 2004



How does a woman’s age affect her chances of progressing through the various stages of ART?

In 2004, a total of 94,242 cycles using fresh nondonor eggs or embryos were started:

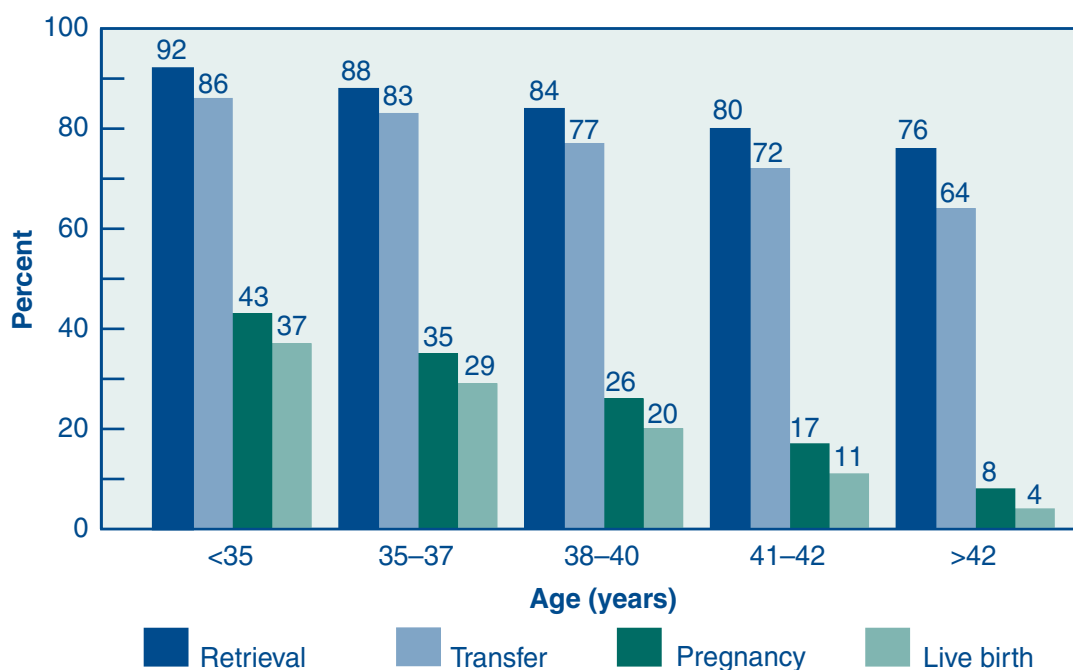
- 40,853 in women younger than 35
- 21,019 in women 35–37
- 19,174 in women 38–40
- 8,487 in women 41–42
- 4,709 in women older than 42

Figure 15 shows that a woman’s chance of progressing from the beginning of ART to pregnancy and live birth (using her own eggs) decreases at every stage of ART as her age increases.

- As women get older, the likelihood of a successful response to ovarian stimulation and progression to **egg retrieval** decreases.
- As women get older, cycles that have progressed to egg retrieval are slightly less likely to reach **transfer**.
- The percentage of cycles that progress from transfer to **pregnancy** also decreases as women get older.
- As women get older, cycles that have progressed to pregnancy are less likely to result in a **live birth** because the risk for miscarriage is greater (see Figure 14).

Overall, 37% of cycles started in 2004 among women younger than 35 resulted in live births. This percentage decreased to 29% among women 35–37 years of age, 20% among women 38–40, 11% among women 41–42, and 4% among women older than 42. As noted in Figures 12 and 13, the proportion of cycles that resulted in singleton live births is even lower for each age group.

Figure 15
Outcomes of ART Cycles Using Fresh Nondonor Eggs or Embryos, by Stage and Age Group, 2004

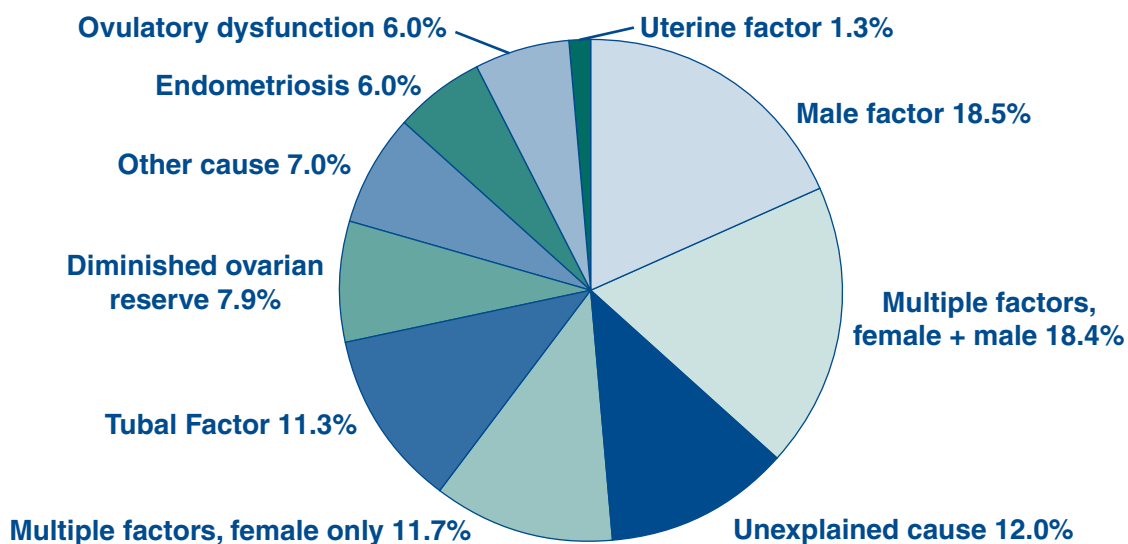


What are the causes of infertility among couples who use ART?

Figure 16 shows the infertility diagnoses reported among couples who had an ART procedure using fresh nondonor eggs or embryos in 2004. Diagnoses range from one infertility factor in one partner to multiple factors in either one or both partners. However, diagnostic procedures may vary from one clinic to another, so the categorization may also vary.

- **Tubal factor** means that the woman’s fallopian tubes are blocked or damaged, making it difficult for the egg to be fertilized or for an embryo to travel to the uterus.
- **Ovulatory dysfunction** means that the ovaries are not producing eggs normally. Such dysfunctions include polycystic ovary syndrome and multiple ovarian cysts.
- **Diminished ovarian reserve** means that the ability of the ovary to produce eggs is reduced. Reasons include congenital, medical, or surgical causes or advanced age.
- **Endometriosis** involves the presence of tissue similar to the uterine lining in abnormal locations. This condition can affect both fertilization of the egg and embryo implantation.
- **Uterine factor** means a structural or functional disorder of the uterus that results in reduced fertility.
- **Male factor** refers to a low sperm count or problems with sperm function that make it difficult for a sperm to fertilize an egg under normal conditions.
- **Other causes** of infertility include immunological problems, chromosomal abnormalities, cancer chemotherapy, and serious illnesses.
- **Unexplained cause** means that no cause of infertility was found in either the woman or the man.
- **Multiple factors, female only**, means that more than one female cause was diagnosed.
- **Multiple factors, female and male**, means that one or more female causes and male factor infertility were diagnosed.

Figure 16
Diagnoses Among Couples Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos,* 2004

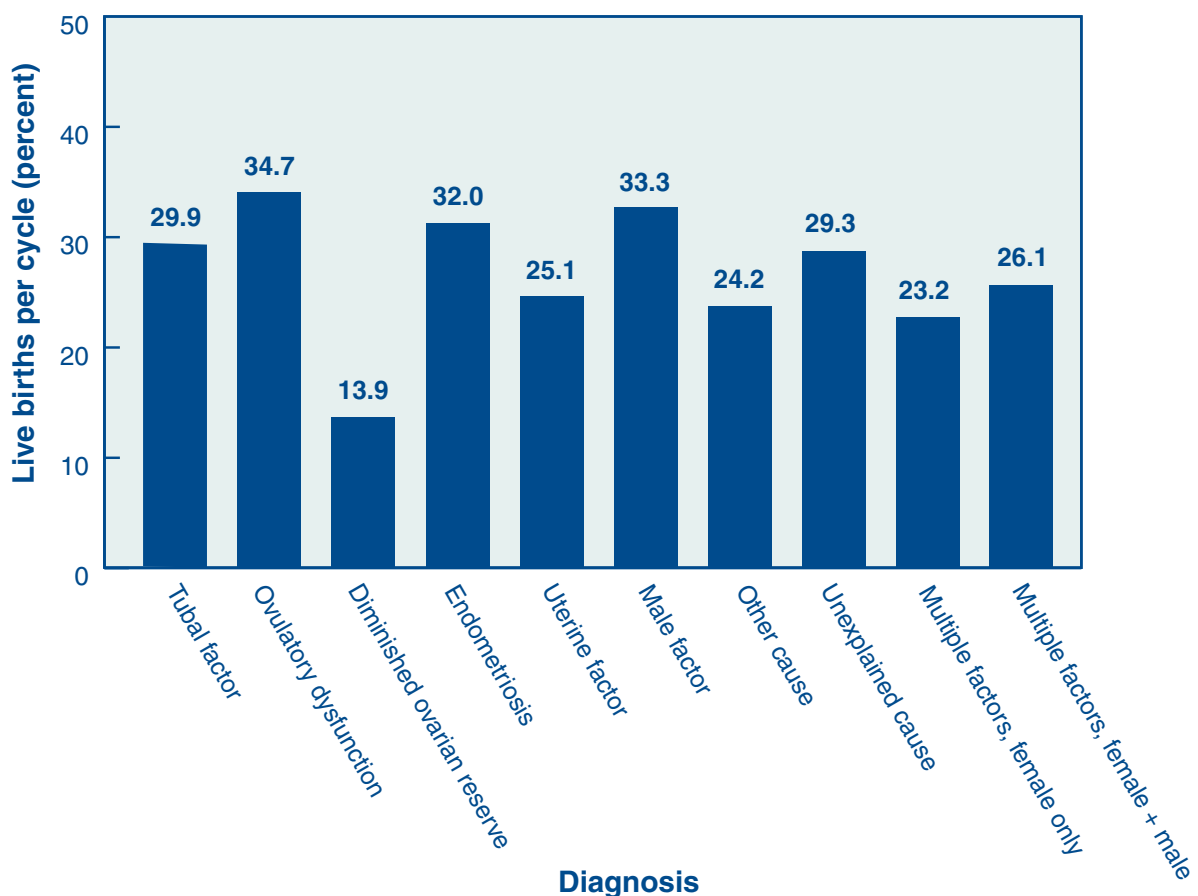


*Total does not equal 100% due to rounding.

Does the cause of infertility affect the chances of success using ART?

Figure 17 shows the percentage of live births per ART cycle according to the causes of infertility. (See Figure 16 or the Glossary in Appendix B for an explanation of the diagnoses.) Although the national average success rate was about 28% (see Figure 7), success rates varied somewhat depending on diagnosis; however, the definitions of these diagnoses may vary from clinic to clinic. In general, couples diagnosed with tubal factor, ovulatory dysfunction, endometriosis, male factor, or unexplained infertility had above-average success rates. The lowest success rate was observed for those with diminished ovarian reserve. Additionally, couples with uterine factor, “other” causes, or multiple infertility factors had below-average success rates. Please note, however, that review of select clinical records revealed that reporting of infertility causes may be incomplete. Therefore, differences in success rates by causes of infertility should be interpreted with caution. (See Findings from Validation Visits for 2004 ART Data for additional information.)

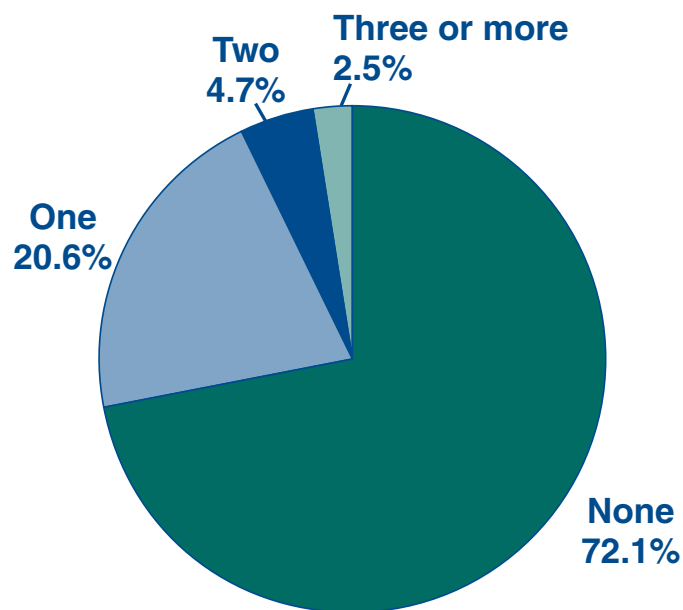
Figure 17
Live Birth Rates Among Women Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos, by Diagnosis, 2004



How many women who use ART have previously given birth?

Figure 18 shows the number of previous births among women who had an ART procedure using fresh nondonor eggs or embryos in 2004. Most of these women (about 72%) had no previous births, although they may have had a pregnancy that resulted in a miscarriage or an induced abortion. About 21% of women using ART in 2004 reported one previous birth, and 7% reported two or more previous births. However, we do not have information about how many of these were ART births and how many were not. These data nonetheless point out that women who have previously had children can still face infertility problems.

Figure 18
Number of Previous Births Among Women Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos,* 2004

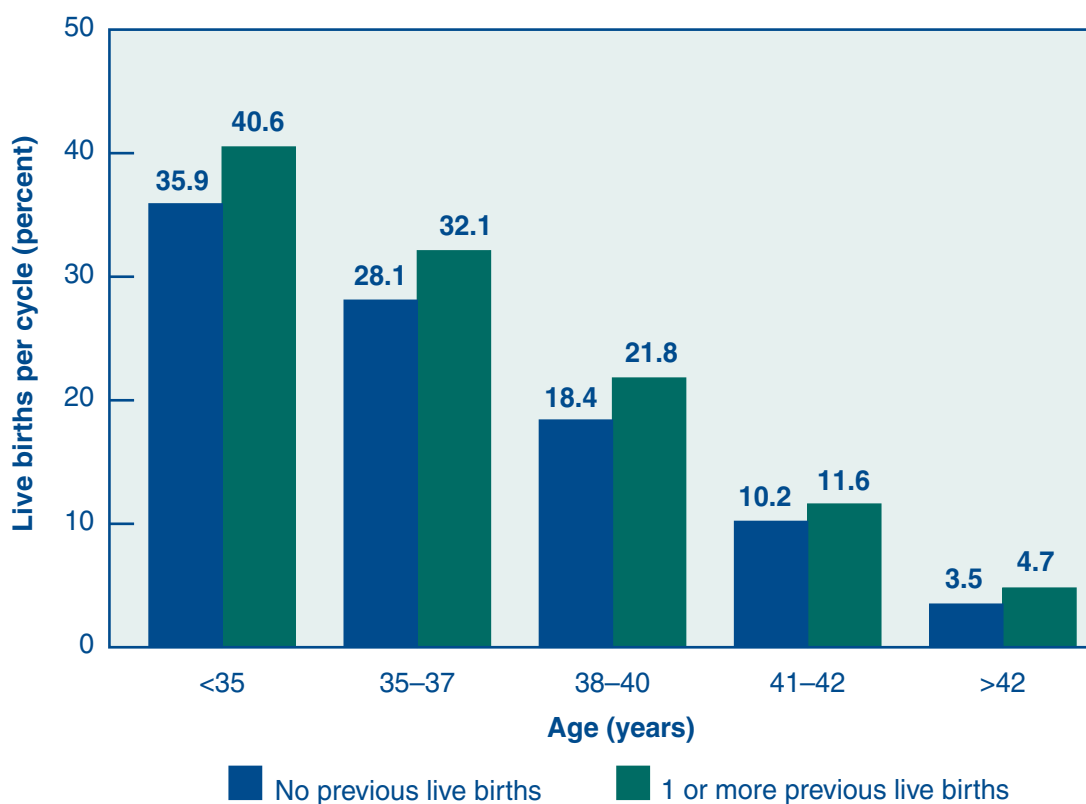


*Total does not equal 100% due to rounding.

Do women who have previously given birth have higher ART success rates?

Figure 19 shows the relationship between the success of an ART cycle and the history of previous births. Previous live-born infants were conceived naturally in some cases and through ART in others. In all age groups, women who had a previous live birth were more likely to have a successful ART procedure.

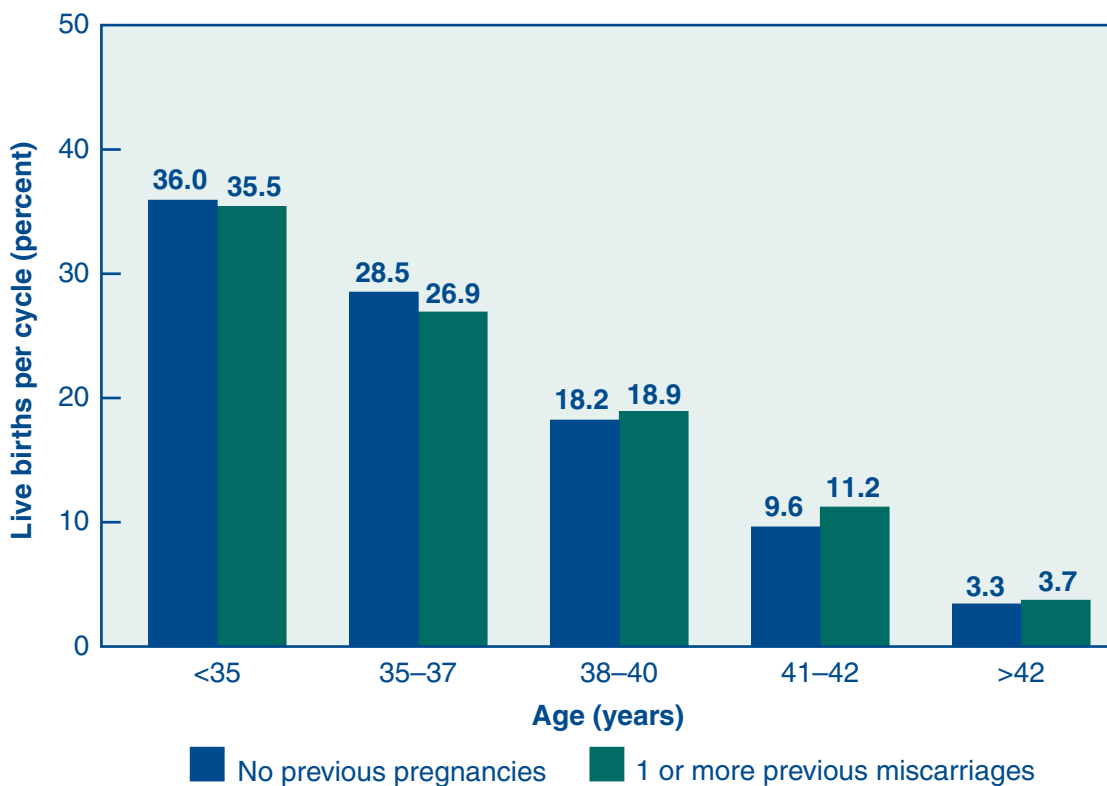
Figure 19
Live Birth Rates for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Woman's Age and Number of Previous Live Births, 2004



Is there a difference in ART success rates between women with previous miscarriages and women who have never been pregnant?

In 2004, 67,983 ART cycles were performed among women who had not previously given birth. However, about 27% of those cycles were reported by women with one or more previous pregnancies that had ended in miscarriage. We do not have information on whether the previous pregnancies were the result of ART or were conceived naturally. Figure 20 shows the relationship between the success of an ART cycle and the history of previous miscarriage. In all age groups women who had a previous miscarriage had live birth rates that were comparable to the live birth rates among women who had never been pregnant. Thus, a history of unsuccessful pregnancy does not appear to be associated with reduced chances for success during ART.

Figure 20
Live Birth Rates for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Woman's Age and History of Miscarriage, Among Women with No Previous Births,* 2004

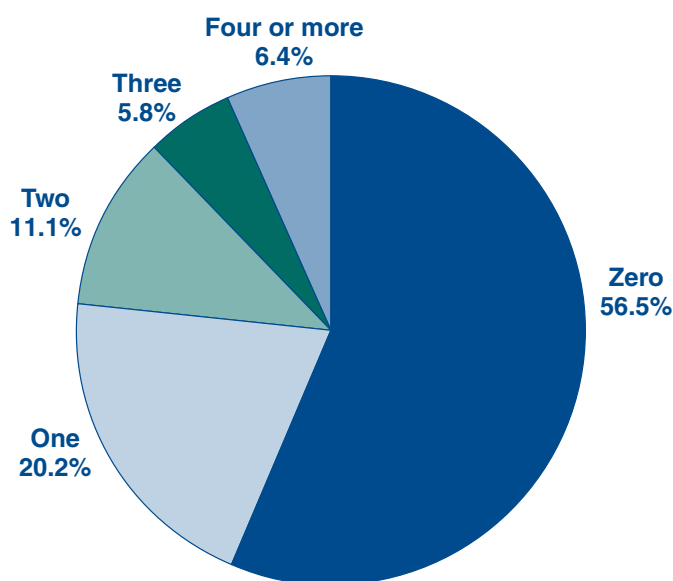


*Women reporting only previous ectopic pregnancies or pregnancies that ended in induced abortion were not included in the above statistics.

How many current ART users have undergone previous ART cycles?

Figure 21 presents ART cycles that used fresh nondonor eggs or embryos in 2004 according to whether previous ART cycles had been performed. For about 44%, one or more previous cycles were reported. (This percentage includes previous cycles using either fresh or frozen embryos.) This finding illustrates that it is not uncommon for a couple to undergo multiple ART cycles. We do not have information on when previous cycles were performed, nor do we have information on the outcomes of those previous cycles.

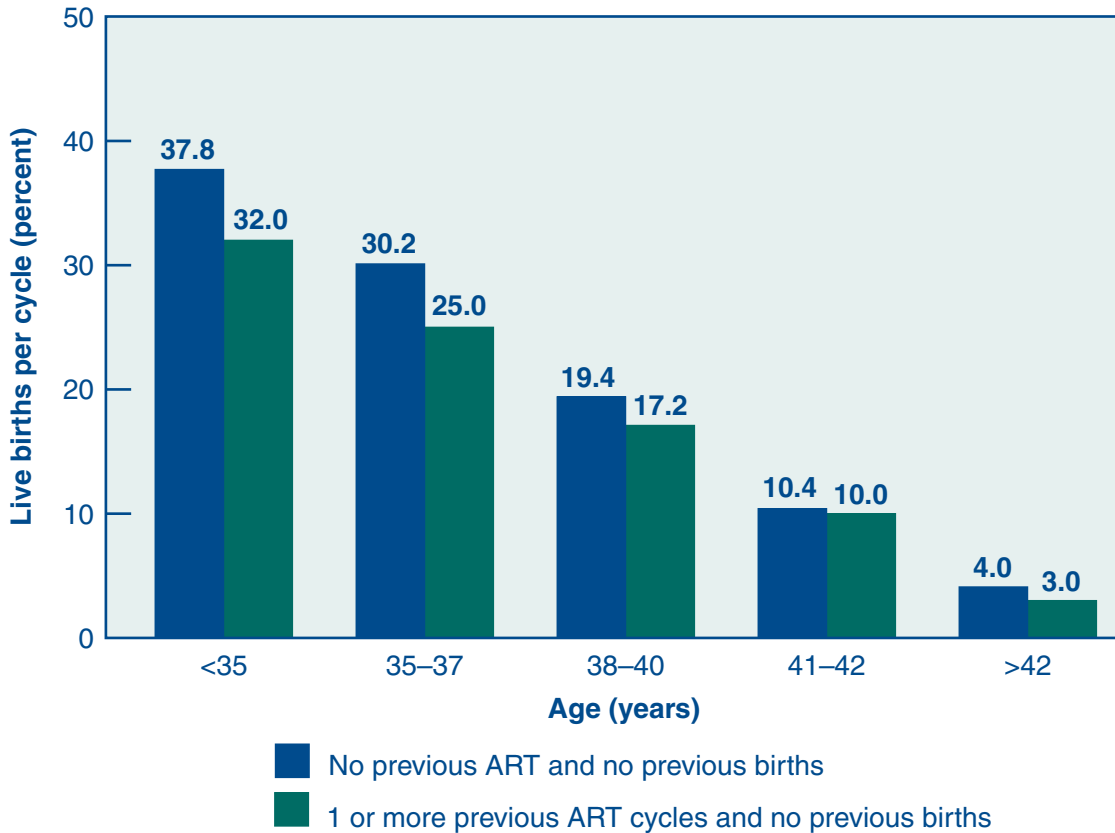
Figure 21
Number of Previous ART Cycles Among Women Undergoing ART in 2004 with Fresh Nondonor Eggs or Embryos



Are success rates different for women using ART for the first time and women who previously used ART but did not give birth?

Figure 22 shows the relationship between the success of ART cycles performed in 2004 using fresh nondonor eggs or embryos and a history of previous ART cycles among women with no previous births. In all age groups, success rates were lower for women who had previously undergone an unsuccessful ART cycle.

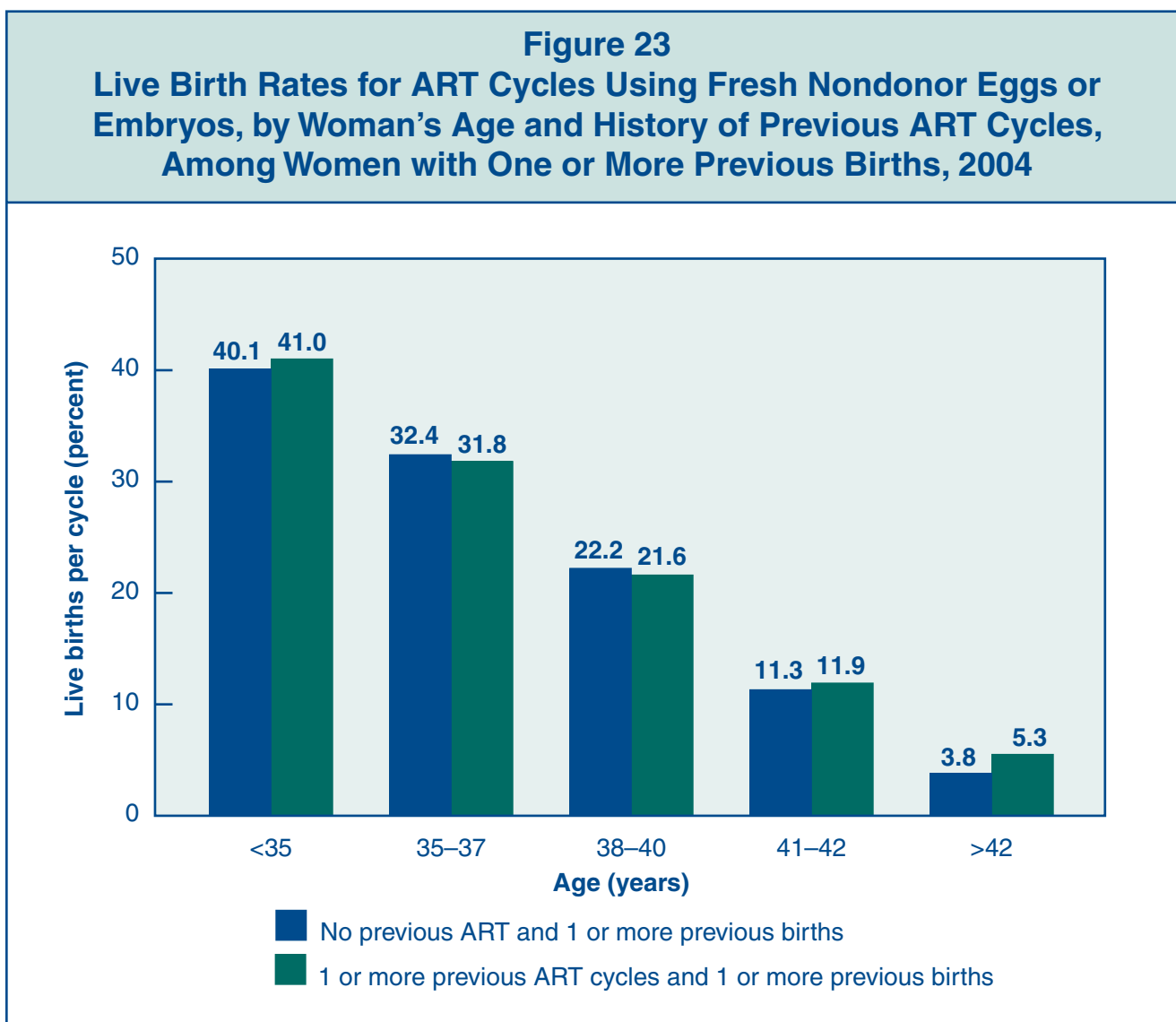
Figure 22
Live Birth Rates for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Woman's Age and History of Previous ART Cycles, Among Women with No Previous Births, 2004



What are the success rates for women who have had *both* previous ART and previous births?

Figure 23 shows the relationship between the success of ART cycles performed in 2004 using fresh nondonor eggs or embryos and a history of both previous ART cycles and previous births. We do not have information on whether the previous births were the result of ART or were conceived naturally. However, among women with previous births, success rates were comparable if they had undergone previous ART cycles.

Taken together, Figures 22 and 23 show that having undergone previous ART cycles may be related to the success of the current ART cycle. However, it is important to consider the outcomes of previous cycles and whether the woman has given birth in the past.



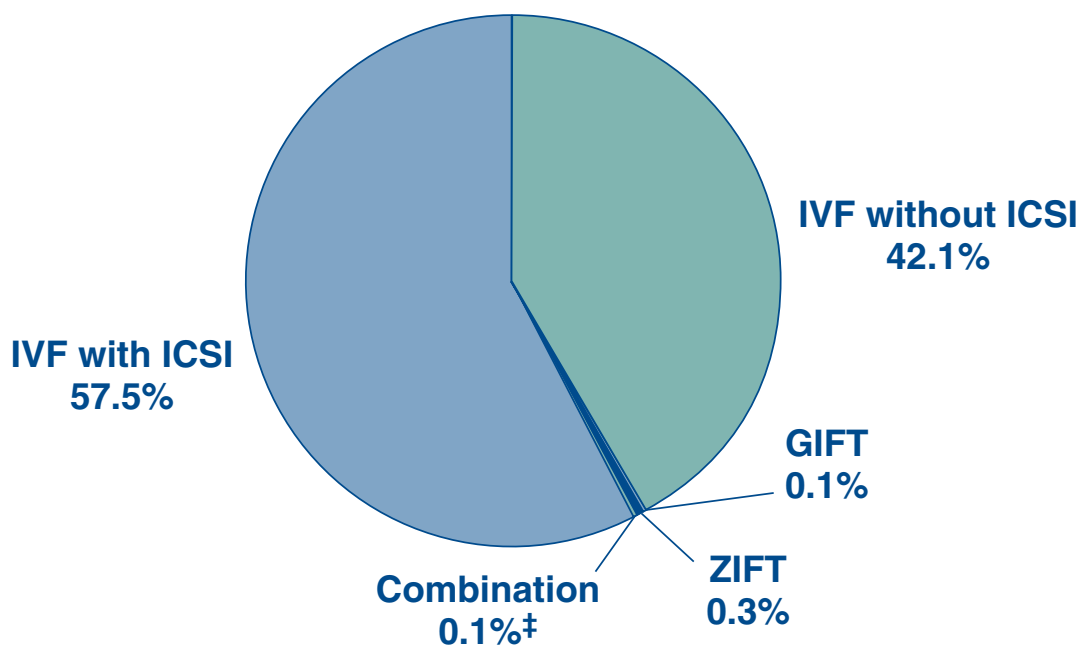
What were the specific types of ART performed among women who used fresh nondonor eggs or embryos in 2004?

For about 42% of ART procedures that used fresh nondonor eggs or embryos in 2004, standard IVF (in vitro fertilization) techniques were used: eggs and sperm were combined in the laboratory, the resulting embryos were cultured for 2 or more days, and one or more embryos were then transferred into the woman's uterus through the cervix.

For more than half (58%) of ART procedures, fertilization was accomplished using intracytoplasmic sperm injection (ICSI). This technique involves injecting a single sperm directly into an egg; the embryos are then cultured and transferred as in standard IVF.

For a small proportion of ART procedures, unfertilized eggs and sperm (gametes) or early embryos (zygotes) were transferred into the woman's fallopian tubes. These procedures are known as gamete and zygote intrafallopian transfer (GIFT and ZIFT). Some women with tubal infertility are not suitable candidates for GIFT and ZIFT. GIFT and ZIFT are more invasive procedures than IVF because they involve inserting a laparoscope into a woman's abdomen to transfer the embryos or gametes into the fallopian tubes. In contrast, IVF involves transferring embryos or gametes into a woman's uterus through the cervix without surgery.

Figure 24
Types of ART Procedures Using Fresh Nondonor Eggs or Embryos,*† 2004



* Cycles that were canceled before egg retrieval were classified as IVF, GIFT, or ZIFT based on the intended ART method.

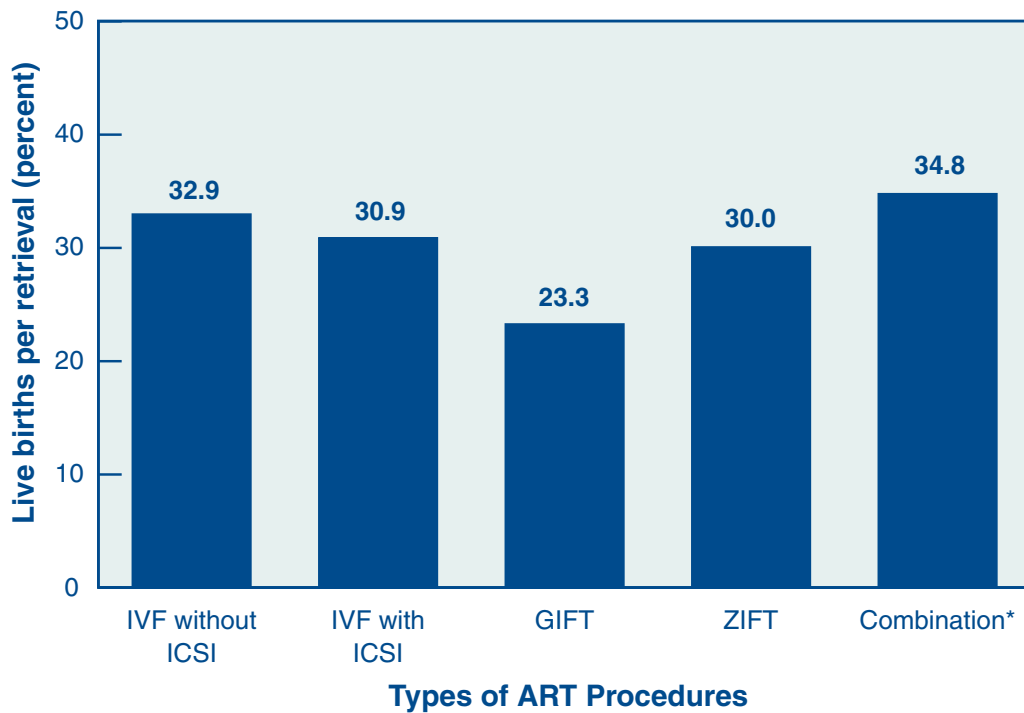
† Total does not equal 100% due to rounding.

‡ Combination of IVF with or without ICSI and either GIFT or ZIFT.

What are the success rates for different types of ART procedures?

Figure 25 shows the percentage of egg retrievals that resulted in a live birth for each type of ART procedure started in 2004. Success rates for the two predominant types of ART, IVF without ICSI and IVF with ICSI, were similar. The success rates for cycles that used GIFT were much lower than for cycles that used other ART procedures. See Figures 26–28 for further details on IVF procedures that used ICSI.

Figure 25
Live Births per Retrieval for Different Types of ART Procedures Using Fresh Nondonor Eggs or Embryos, 2004

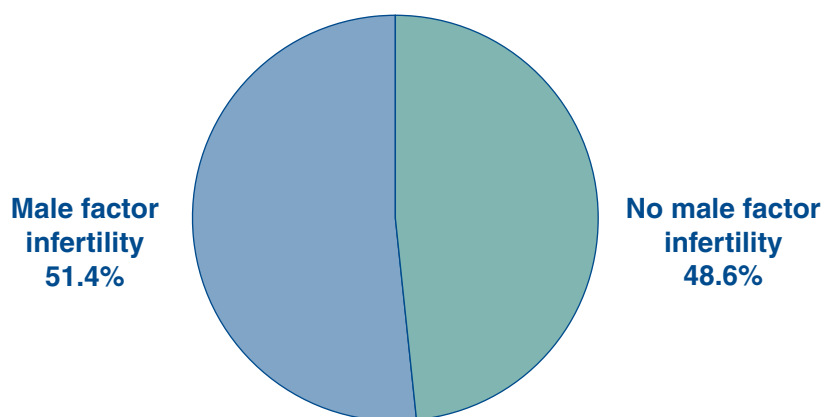


* Combination of IVF with or without ICSI and either GIFT or ZIFT.

Is ICSI used only for couples diagnosed with male factor infertility?

ICSI was developed to overcome problems with fertilization that sometimes occur in couples diagnosed with male factor infertility. In 2004, 54,203 ICSI cycles were performed. Although the majority of couples using ICSI had a diagnosis of male factor infertility, a sizable portion of ICSI cycles (about 49%) were performed for couples without a diagnosis of male factor infertility. However, please note that diagnostic procedures may vary from one clinic to another, so the categorization of causes of infertility may also vary.

Figure 26
Use of ICSI* in Fresh–Nondonor Cycles Among Couples with and Without Diagnoses of Male Factor Infertility,† 2004



* Intracytoplasmic sperm injection.

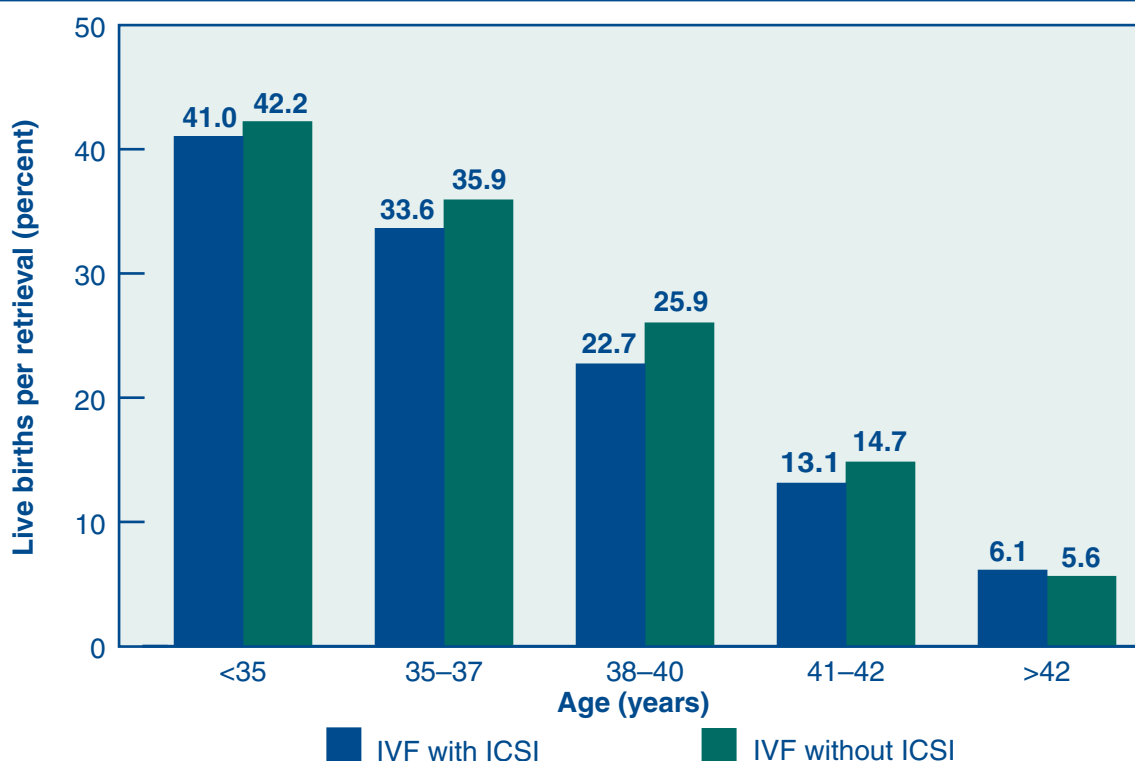
† Based on 54,203 cycles that used IVF with ICSI.

What are the success rates for couples with male factor infertility when ICSI is used?

ICSI was developed to overcome problems with fertilization that sometimes occur in couples diagnosed with male factor infertility. In 2004, about 80% of couples diagnosed with male factor infertility used IVF with ICSI. Figure 27 presents the success rates for these ICSI procedures among couples diagnosed with male factor infertility. For comparison, these rates are presented alongside the success rates for ART cycles that used standard IVF without ICSI. This standard IVF comparison group includes couples with all diagnoses except male factor. Because ICSI can be performed only when at least one egg has been retrieved, the live birth per retrieval rates are presented.

In every age group, success rates for the IVF with ICSI group were similar to the success rates for the groups that used standard IVF without ICSI. These results show that when ICSI was used for couples diagnosed with male factor infertility, their success rates were close to those achieved by couples who were not diagnosed with male factor infertility. Please note, however, that review of select clinical records revealed that reporting of infertility causes may be incomplete. Therefore, differences in success rates by causes of infertility should be interpreted with caution. (See Findings from Validation Visits for 2004 ART Data for additional information.)

Figure 27
Live Births per Retrieval for ART Cycles Using Fresh Nondonor Eggs or Embryos Among Couples Diagnosed with Male Factor Infertility Who Used IVF with ICSI,* Compared with Couples Not Diagnosed with Male Factor Infertility Who Used IVF Without ICSI, by Woman’s Age,† 2004



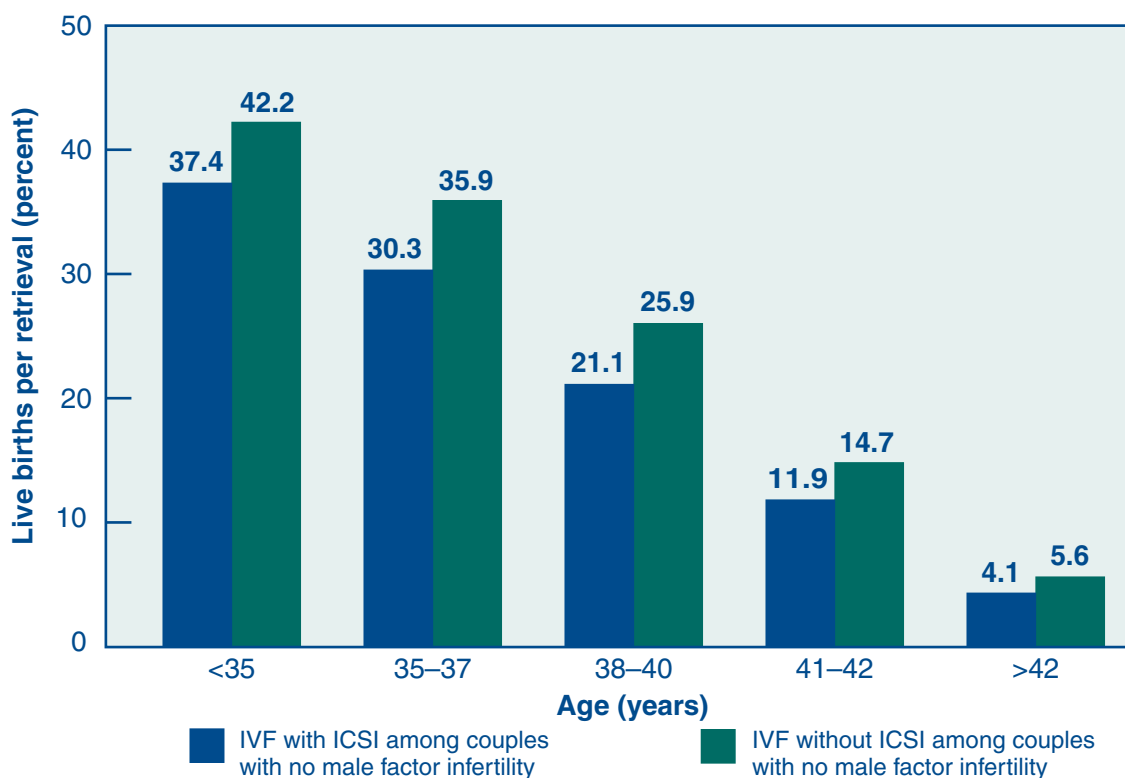
* Intracytoplasmic sperm injection.

† Cycles using donor sperm and cycles using GIFT and ZIFT are excluded. The comparison group of IVF without ICSI includes couples with all diagnoses except male factor infertility.

What are the success rates for couples without a diagnosis of male factor infertility when ICSI is used?

As shown in Figure 26, a large number of ICSI procedures are now performed even when couples are not diagnosed with male factor infertility. Figure 28 presents success rates per retrieval for those cycles compared with ART cycles among couples who used IVF without ICSI. For every age group, the ICSI procedures were less successful. Please note, however, that review of select clinical records revealed that reporting of infertility causes may be incomplete. Therefore, differences in success rates by causes of infertility should be interpreted with caution. (See Findings from Validation Visits for 2004 ART Data for additional information.) Additionally, information was not available to completely determine whether this finding was directly related to the ICSI procedure or whether the patients who used ICSI were somehow different from those who use IVF alone. However, separate evaluation of various groups of patients with an indication of being difficult to treat revealed a pattern of results consistent with those presented below. These difficult-to-treat groups included couples with previous failed ART cycles, couples diagnosed with diminished ovarian reserve, and couples with a low number of eggs retrieved (fewer than five). Within each of these groups, ART cycles that used IVF with ICSI had lower success rates compared with cycles that used IVF without ICSI.

Figure 28
Live Births per Retrieval for ART Cycles Using Fresh Nondonor Eggs or Embryos Among Couples Not Diagnosed with Male Factor Infertility, by Use of ICSI* and Woman's Age,[†] 2004



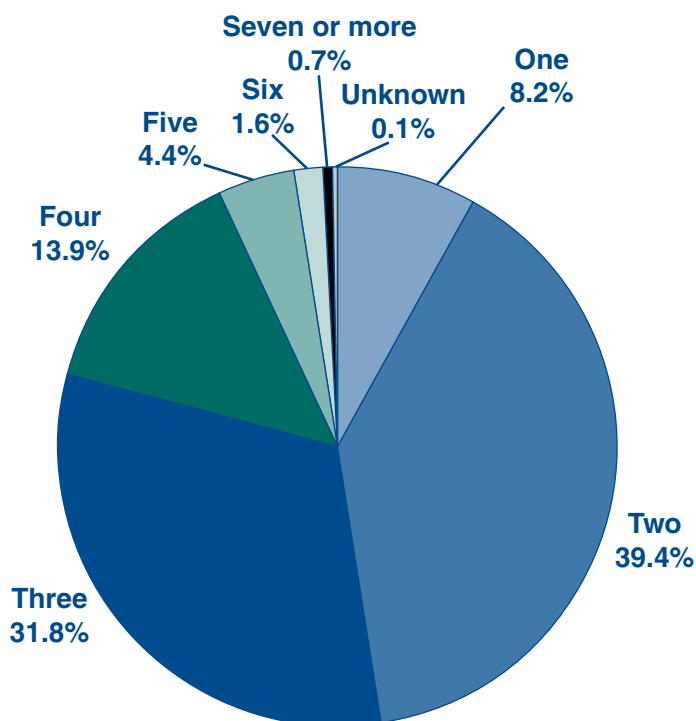
* Intracytoplasmic sperm injection.

[†] Cycles using donor sperm and cycles using GIFT or ZIFT are excluded.

How many embryos are transferred in an ART procedure?

Figure 29 shows that approximately 52% of ART cycles that used fresh nondonor eggs or embryos and progressed to the embryo transfer stage in 2004 involved the transfer of three or more embryos, about 21% of cycles involved the transfer of four or more, and approximately 7% of cycles involved the transfer of five or more embryos.

Figure 29
Number of Embryos Transferred During ART Cycles
Using Fresh Nondonor Eggs or Embryos,* 2004



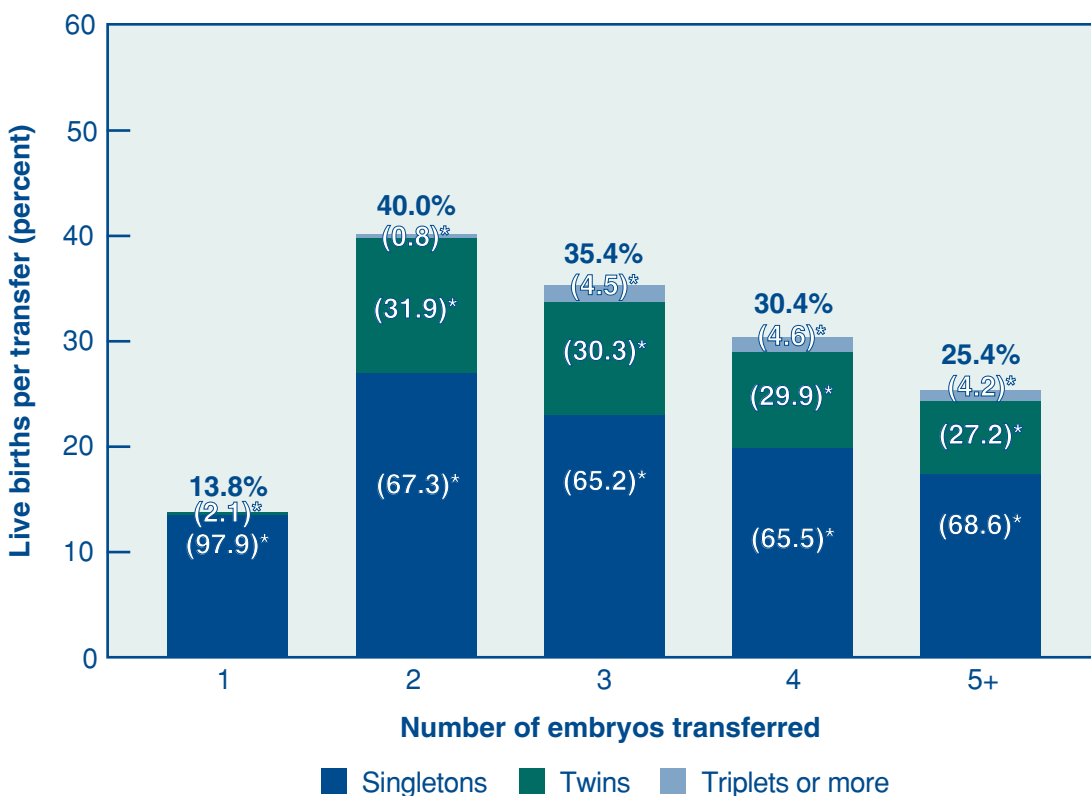
* Total does not equal 100% due to rounding.

In general, is an ART cycle more likely to be successful if more embryos are transferred?

Figure 30 shows the relationship between the number of embryos transferred during an ART procedure in 2004 and the number of infants born alive as a result of that procedure. The success rate increased when two or more embryos were transferred; however, transferring multiple embryos also poses a risk of having a multiple-infant birth. Multiple-infant births cause concern because of the additional health risks they create for both mothers and infants. Also, pregnancies with multiple fetuses can be associated with the possibility of multifetal reduction. Multifetal reduction can happen naturally (e.g., fetal death), or a woman may decide to reduce the number of fetuses using a procedure called multifetal pregnancy reduction. Information on medical multifetal pregnancy reductions is incomplete and therefore not provided here.

The relationships between number of embryos transferred, success rates, and multiple-infant births are complicated by several factors, such as the woman’s age and embryo quality. See Figure 31 for more details on women most at risk for multiple births.

Figure 30
Live Births per Transfer and Percentages of Multiple-Infant Births
for ART Cycles Using Fresh Nondonor Eggs or Embryos,
by Number of Embryos Transferred, 2004



* Percentages of live births that were singleton, twins, and triplets or more are in parentheses.
 Note: In rare cases a single embryo may divide and thus produce twins. For this reason, a small percentage of twins resulted from a single embryo transfer, and a small percentage of triplets resulted when two embryos were transferred.

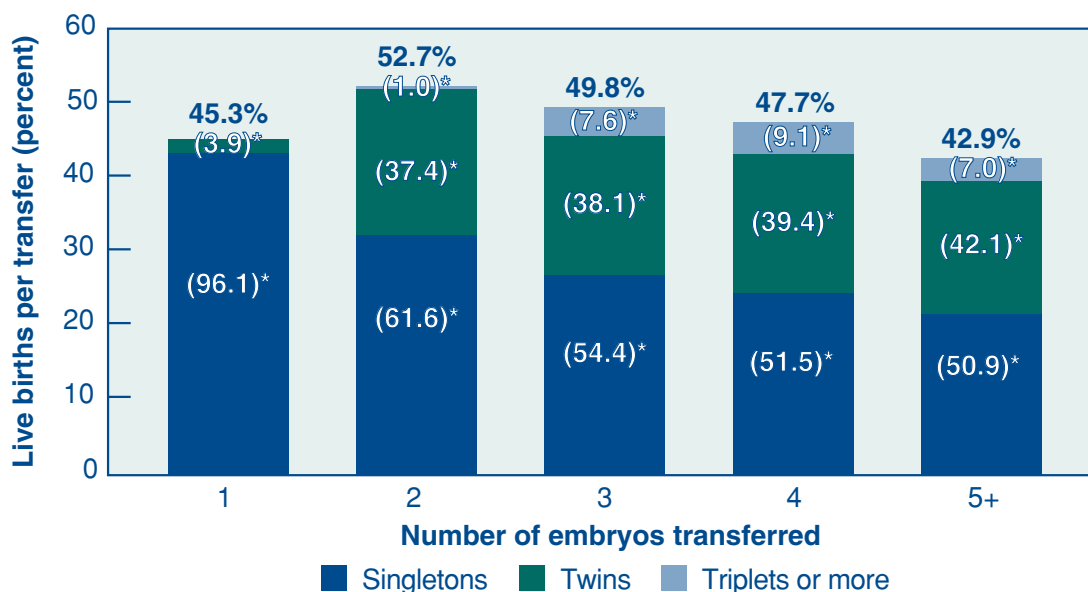
Are live birth rates affected by the number of embryos transferred for women who have more embryos available than they choose to transfer?

Although, in general, transferring more than one embryo tends to improve the chance for a successful ART procedure (see Figure 30), other factors are also important. Previous research suggests that the number of embryos fertilized and thus available for ART is just as, if not more, important in predicting success as the number of embryos transferred. Additionally, younger women tend to have both higher success rates and higher multiple-infant birth rates. Figure 31 shows the relationship between the number of embryos transferred, success rates, and multiple-infant births for a subset of ART procedures in which the woman was younger than 35 and the couple chose to set aside some embryos for future cycles rather than transfer all available embryos at one time.

For this group, the chance for a live birth using ART was about 45% when only one embryo was transferred. If one measures success as the singleton live birth rate, the highest rate was observed with one embryo transferred.

The proportion of live births that were multiple-infant births was about 38% with two embryos and about 46% with three embryos. Transferring three or more embryos also created an additional risk for higher-order multiple births (i.e., triplets or more).

Figure 31
Live Births per Transfer and Percentages of Multiple-Infant Births for ART Cycles in Women Who Were Younger Than 35, Used Fresh Nondonor Eggs or Embryos, and Set Aside Extra Embryos for Future Use, by Number of Embryos Transferred, 2004

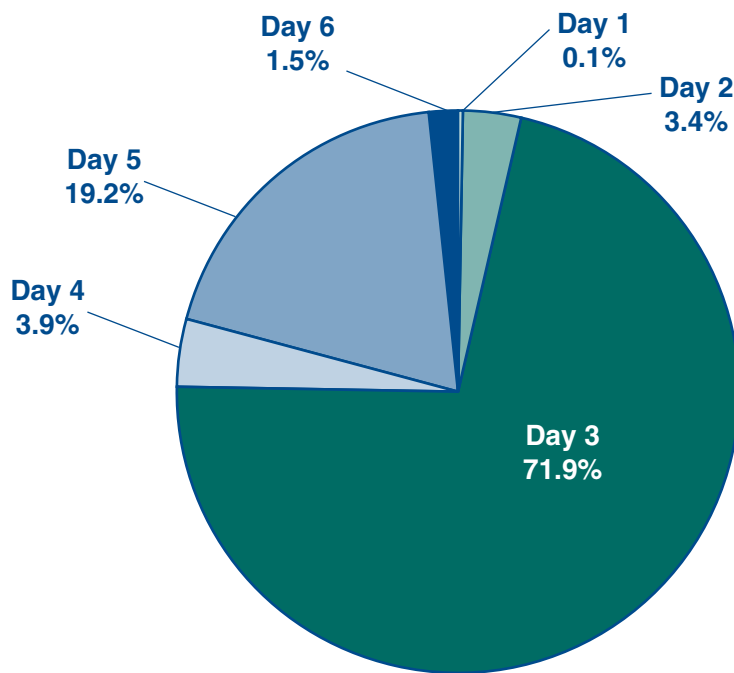


* Percentages of live births that were singleton, twins, and triplets or more are in parentheses.
 Note: In rare cases a single embryo may divide and thus produce twins. For this reason, a small percentage of twins resulted from a single embryo transfer, and a small percentage of triplets resulted when two embryos were transferred.

How long after egg retrieval does embryo transfer occur?

Once an ART cycle has progressed from egg retrieval to fertilization, the embryo(s) can be transferred into the woman's uterus in the subsequent 1 to 6 days. Figure 32 shows that in 2004 approximately 72% of embryo transfers occurred on day 3. Day 5 embryo transfers were the next most common, accounting for about 19% of ART procedures that progressed to the embryo transfer stage.

Figure 32
Day of Embryo Transfer* Among ART Cycles
Using Fresh Nondonor Eggs or Embryos,† 2004



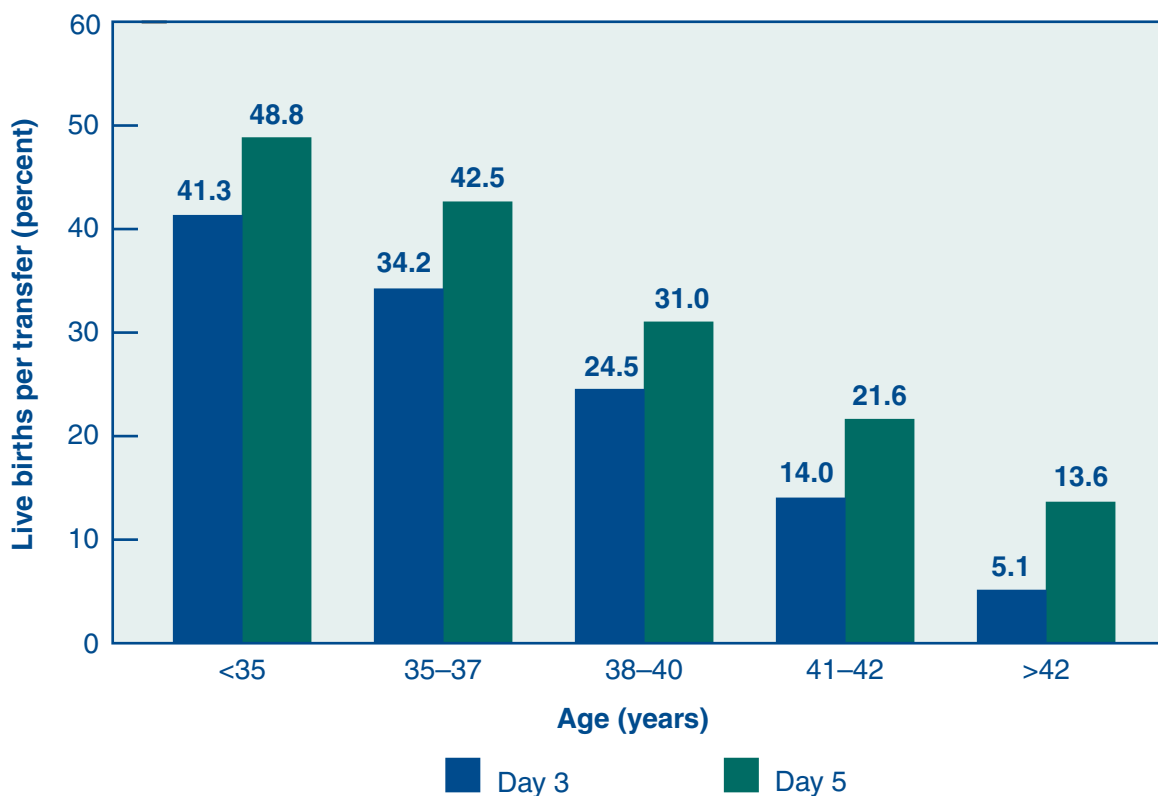
* Number of days following egg retrieval.

† Cycles using GIFT or ZIFT are excluded. Missing or implausible values for day of embryo transfer (i.e., 0 or >6) are not included.

In general, is an ART cycle more likely to be successful if embryos are transferred on day 5?

As shown in Figure 32, in the vast majority of ART procedures, embryos were transferred on day 3 (72%) or day 5 (19%). Figure 33 compares success rates for day 3 embryo transfers with those for day 5 embryo transfers. In all age groups, the success rates were higher for day 5 embryo transfers than for day 3 transfers. However, it should be noted that day 5 embryo transfers may not be the best treatment option for all patients undergoing ART because some embryos may not survive to day 5.

Figure 33
Live Births per Transfer for ART Cycles Using Fresh Nondonor Eggs or Embryos for Day 3 and Day 5 Embryo Transfers, by Woman's Age,* 2004

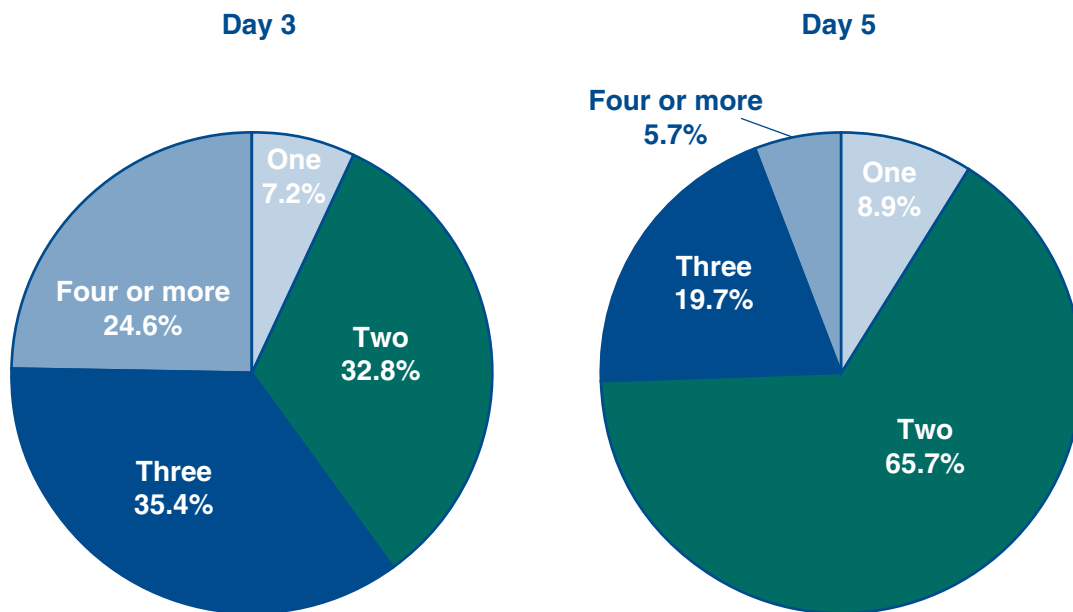


* Cycles using GIFT or ZIFT are excluded. This comparison is limited to transfers on day 3 and day 5. Embryo transfers performed on days 1, 2, 4, and 6 are not included because each of these accounted for a small proportion of procedures.

Does the number of embryos transferred differ for day 3 and day 5 embryo transfers?

Figure 34 shows the number of embryos transferred on day 3 and day 5. Overall, fewer embryos were transferred on day 5 than on day 3. Approximately 60% of day 3 embryo transfers and 25% of day 5 embryo transfers involved the transfer of three or more embryos. The decrease in the number of embryos transferred on day 5, however, did not translate into a lower risk for multiple-infant births. See Figure 35 for more details on the relationship between multiple-infant birth risk and day of embryo transfer.

Figure 34
Number of Embryos Transferred During ART Cycles Using
Fresh Nondonor Eggs or Embryos for Day 3 and Day 5
Embryo Transfers,* 2004



* Cycles using GIFT or ZIFT are excluded. This comparison is limited to transfers on day 3 and day 5. Embryo transfers performed on days 1, 2, 4, and 6 are not included because each of these accounted for a small proportion of procedures.

In general, how does the multiple-birth risk vary by the day of embryo transfer?

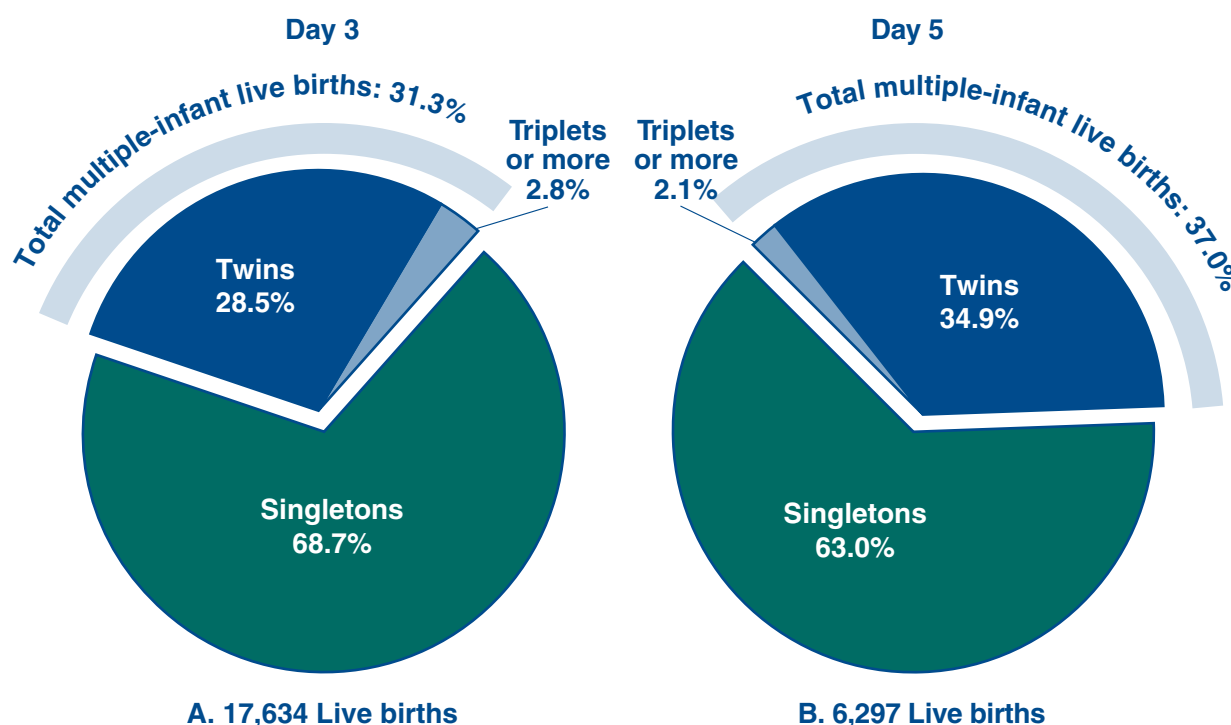
Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability or death.

Part A of Figure 35 shows that among the 17,634 live births that occurred following day 3 embryo transfer, 69% were singletons, 29% were twins, and about 3% were triplets or more. Thus, approximately 31% of these live births produced more than one infant.

In 2004, 6,297 live births occurred following day 5 embryo transfer. Part B of Figure 35 shows that 37% of these live births produced more than one infant (approximately 35% twins and 2% triplets or more).

As shown in Figure 34, fewer embryos were transferred on day 5 than on day 3. While the reduction in the number of embryos transferred on day 5 was associated with a decrease in triplet or more births, it also was associated with an increase in twin births. Thus, the risk of having a multiple-infant birth was higher for day 5 embryo transfers. Multiple-infant birth rates for both day 3 and day 5 embryo transfers are much higher overall than those found in the general U.S. population (about 3%).

Figure 35
Risk of Having Multiple-Infant Live Birth for ART Cycles
Using Fresh Nondonor Eggs or Embryos for Day 3 and Day 5
Embryo Transfers,* 2004

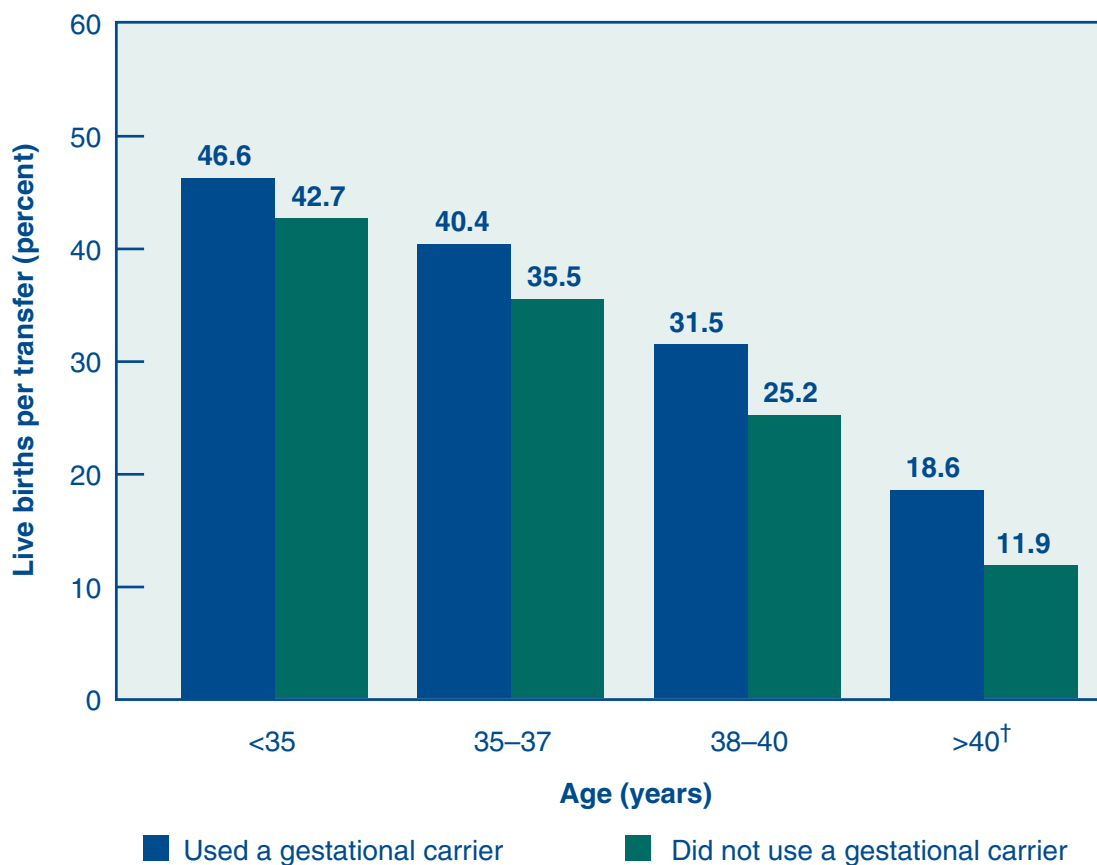


* Cycles using GIFT or ZIFT are excluded. This comparison is limited to transfers on day 3 and day 5. Embryo transfers performed on days 1, 2, 4, and 6 are not included because each of these accounted for a small proportion of procedures.

What are the success rates for women who use gestational carriers?

In some cases a woman has trouble carrying a pregnancy. In such cases the couple may use ART with a gestational carrier, sometimes called a surrogate. A gestational carrier is a woman who agrees to carry the developing embryo for a couple with infertility problems (the intended parents). Gestational carriers were used in 0.8% of ART cycles using fresh nondonor embryos in 2004 (710 cycles). Figure 36 compares success rates per transfer for ART cycles that used a gestational carrier in 2004 with cycles that did not. In all age groups, success rates for ART cycles that used gestational carriers were higher than success rates for those cycles that did not.

Figure 36
Comparison of Live Births per Transfer Between Cycles That Used Gestational Carriers and Those That Did Not (Both Using Fresh Nondonor Embryos), by ART Patient's Age,* 2004



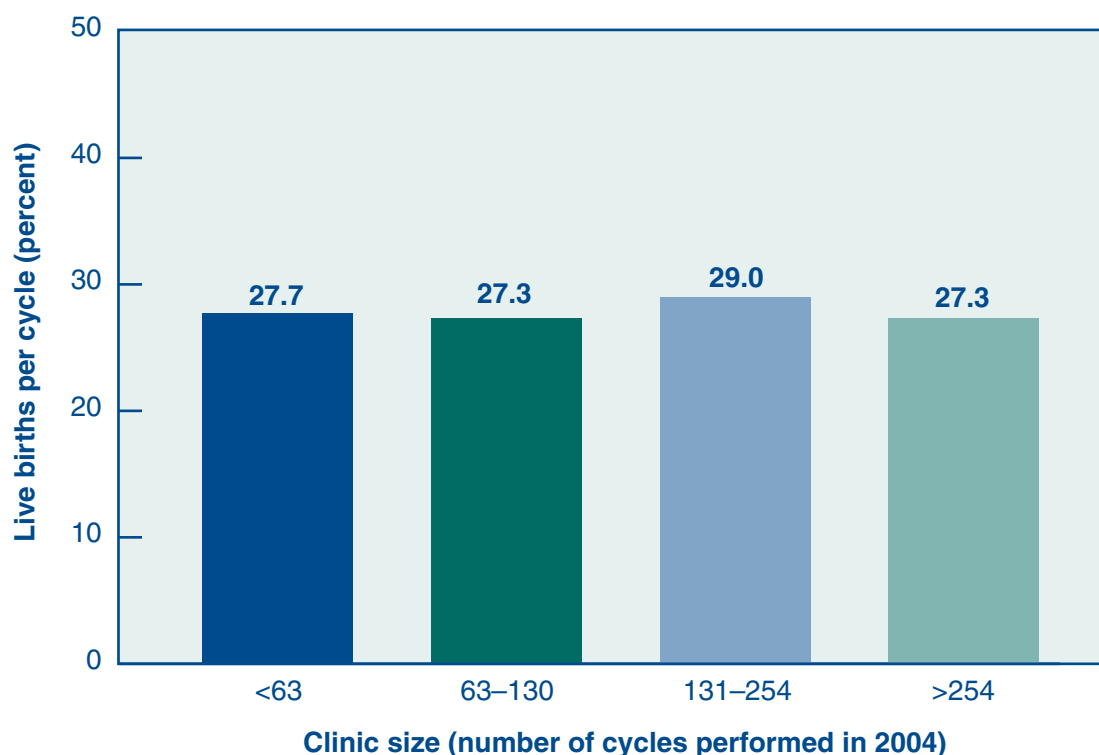
* Age categories reflect the age of the ART patient, not the age of the gestational carrier.

[†] We were unable to further subdivide ages >40 because the number of such cycles is very small.

How is clinic size related to success rates?

The number of ART procedures carried out every year varies among fertility clinics in the United States. In 2004, success rates were similar for all clinics regardless of the number of cycles performed. For Figure 37, clinics were divided equally into four groups (called quartiles) based on the size of the clinic as determined by the number of cycles it carried out. The percentage for each quartile represents the average success rate for clinics in that quartile. For the exact number of cycles and success rates at an individual clinic, refer to the clinic table section of this report.

Figure 37
Live Birth Rates for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Clinic Size, 2004

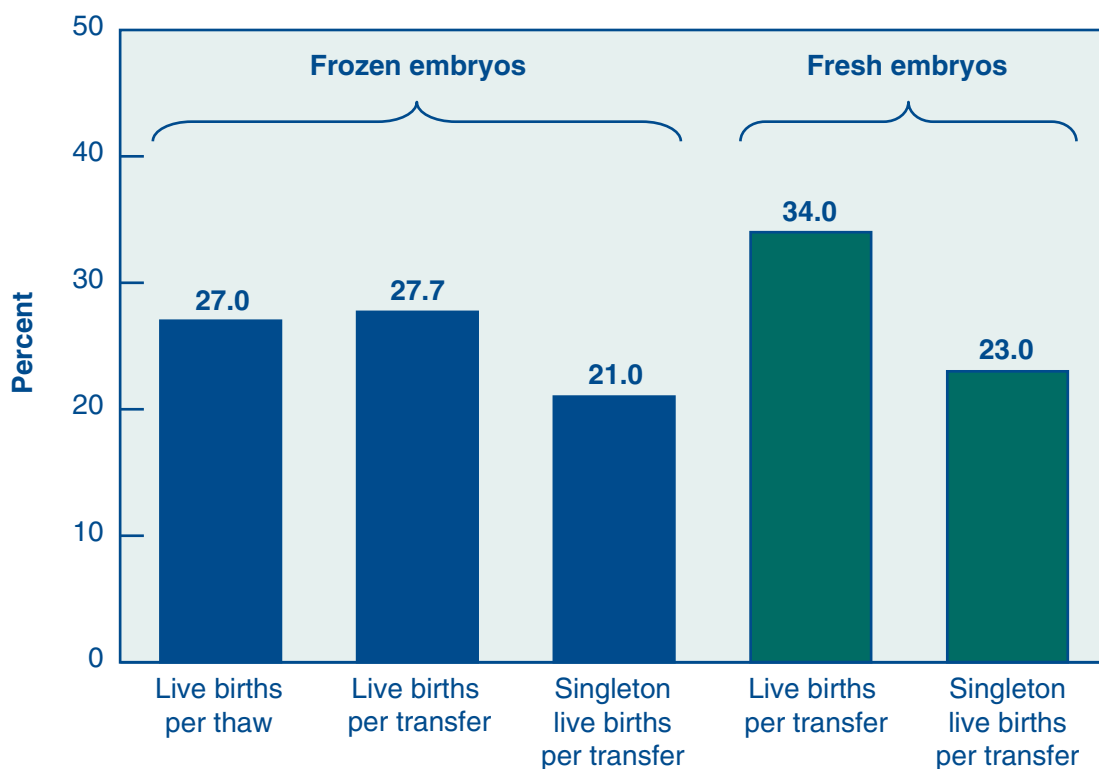


SECTION 3: ART CYCLES USING FROZEN NONDONOR EMBRYOS

What are the success rates for ART cycles using frozen nondonor embryos?

Frozen embryos were used in approximately 14% of all ART cycles performed in 2004 (18,560 cycles). Figure 38 compares the success rates for frozen embryos with the success rates for fresh embryos among women using their own eggs. Because some embryos do not survive the thawing process, the live birth per thaw rate is usually lower than the live birth per transfer rate. In 2004, the success rates for frozen embryos were lower than the success rates for fresh embryos. However, the average number of embryos transferred was similar for cycles using both frozen embryos and fresh embryos (see the national summary table on page 81 for information on the average number of embryos transferred for these cycles). It is important to note that cycles using frozen embryos are both less expensive and less invasive than those using fresh embryos because the woman does not have to go through the fertility drug stimulation and egg retrieval steps again.

Figure 38
Success Rates for ART Cycles Using Frozen Embryos and Fresh Embryos, 2004



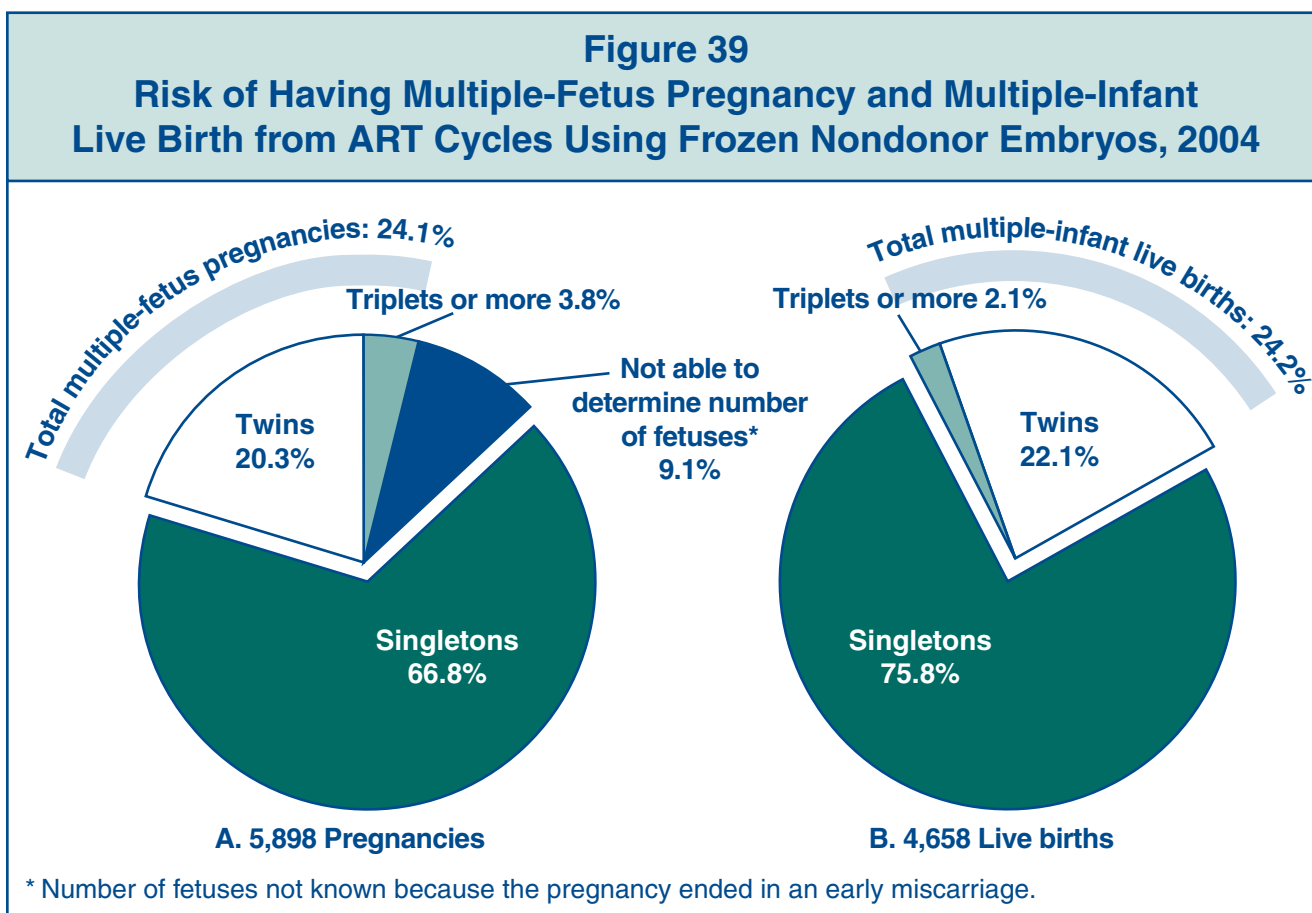
What is the risk of having a multiple-fetus pregnancy or multiple-infant live birth from an ART cycle using frozen nondonor embryos?

Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability or death.

Part A of Figure 39 shows that among the 5,898 pregnancies that resulted from ART cycles using frozen nondonor embryos, about 67% were singleton pregnancies, about 20% were twins, and nearly 4% were triplets or more. Nine percent of pregnancies ended in miscarriage before the number of fetuses could be accurately determined. Therefore, the percentage of pregnancies with more than one fetus might have been higher than what was reported (about 24%).

In 2004, 4,658 pregnancies from ART cycles that used frozen nondonor embryos resulted in live births. Part B of Figure 39 shows that approximately 24% of these live births produced more than one infant (about 22% twins and 2% triplets or more). This compares with a multiple-infant birth rate of slightly more than 3% in the general U.S. population.

Although the total rates for multiples were similar for pregnancies and live births, there were more triplet (or more) pregnancies than births. Triplet (or more) pregnancies may be reduced to twins or singletons by the time of birth. This can happen naturally (e.g., fetal death), or a woman and her doctor may decide to reduce the number of fetuses using a procedure called multifetal pregnancy reduction. Information on medical multifetal pregnancy reductions is incomplete and therefore is not provided here.

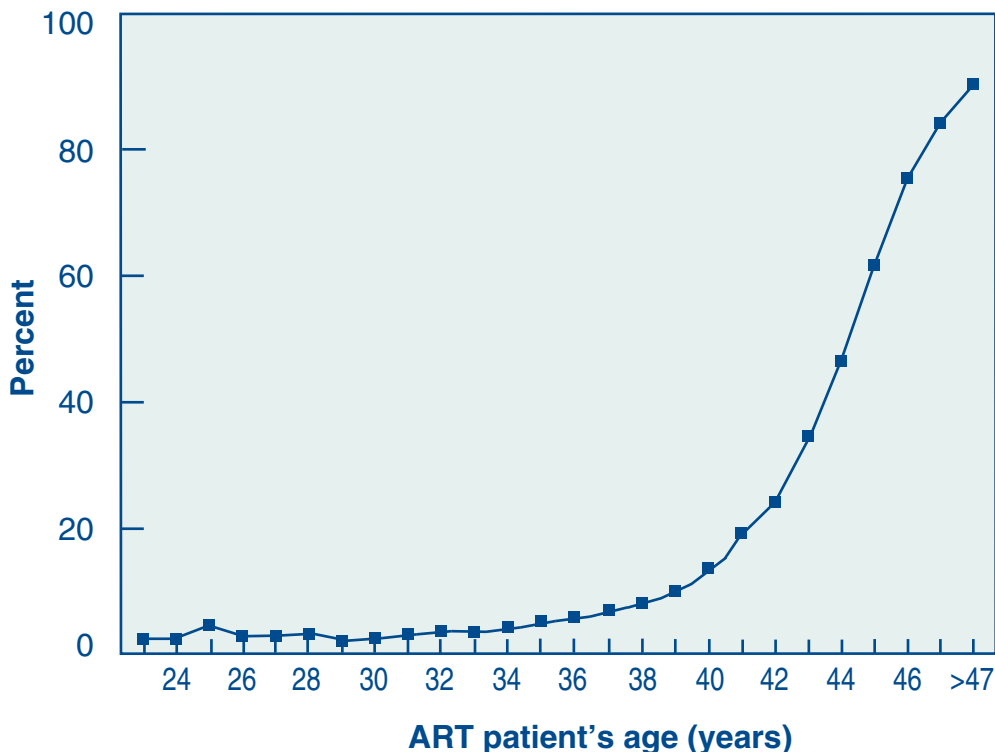


SECTION 4: ART CYCLES USING DONOR EGGS

Are older women undergoing ART more likely to use donor eggs or embryos?

As shown in Figures 12, 13, and 14, eggs produced by women in older age groups form embryos that are less likely to implant and more likely to spontaneously abort if they do implant. As a result, ART using donor eggs is much more common among older women than among younger women. Donor eggs or embryos were used in approximately 12% of all ART cycles carried out in 2004 (15,175 cycles). Figure 40 shows the percentage of ART cycles using donor eggs in 2004 according to the woman's age. Few women younger than age 39 used donor eggs; however, the percentage of cycles carried out with donor eggs increased sharply starting at age 39. Among women older than age 47, about 91% of all ART cycles used donor eggs.

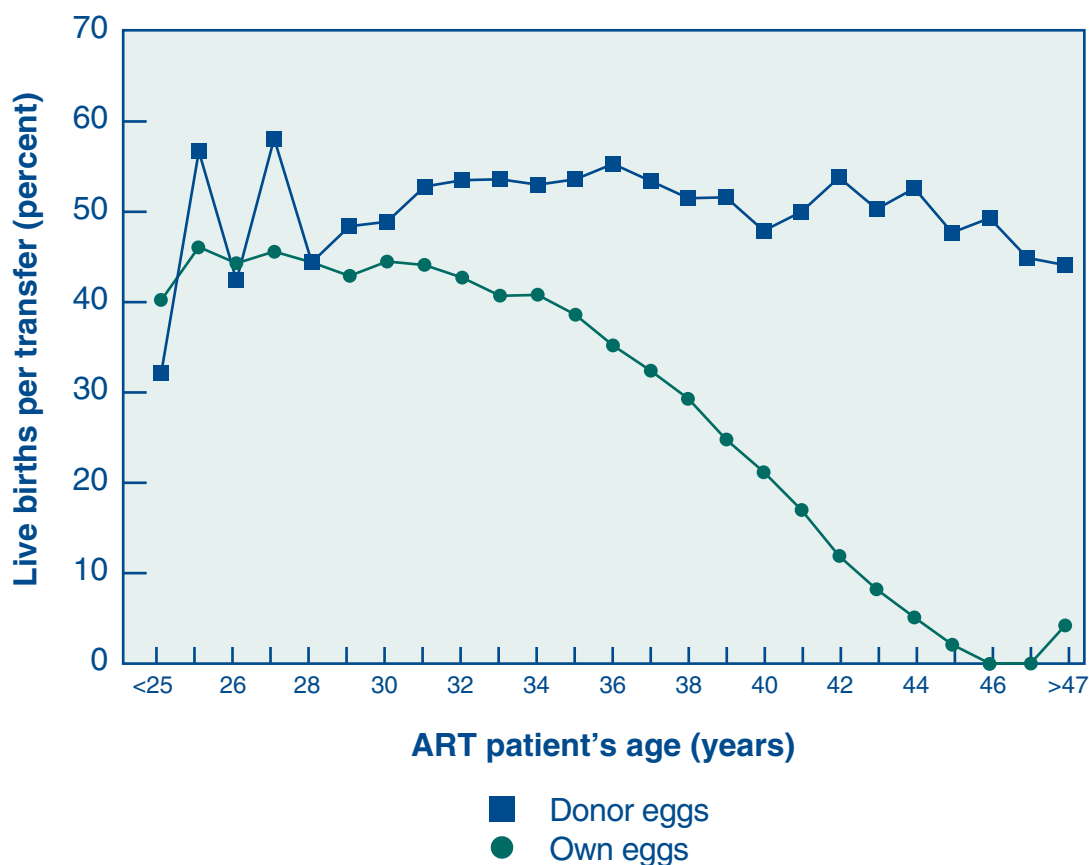
Figure 40
Percentage of ART Cycles Using Donor Eggs,
by ART Patient's Age, 2004



Do success rates differ by age for women who used ART with donor eggs compared with women who used ART with their own eggs?

Figure 41 compares live birth rates for ART cycles using fresh embryos from donor eggs with those for ART cycles using a woman's own eggs among women of different ages. The likelihood of a fertilized egg implanting is related to the age of the woman who produced the egg. Egg donors are typically in their 20s or early 30s. Thus, the live birth per transfer rate for cycles using embryos from donor eggs varies only slightly across all age groups. In contrast, the live birth rates for cycles using embryos from women's own eggs decline steadily as women get older.

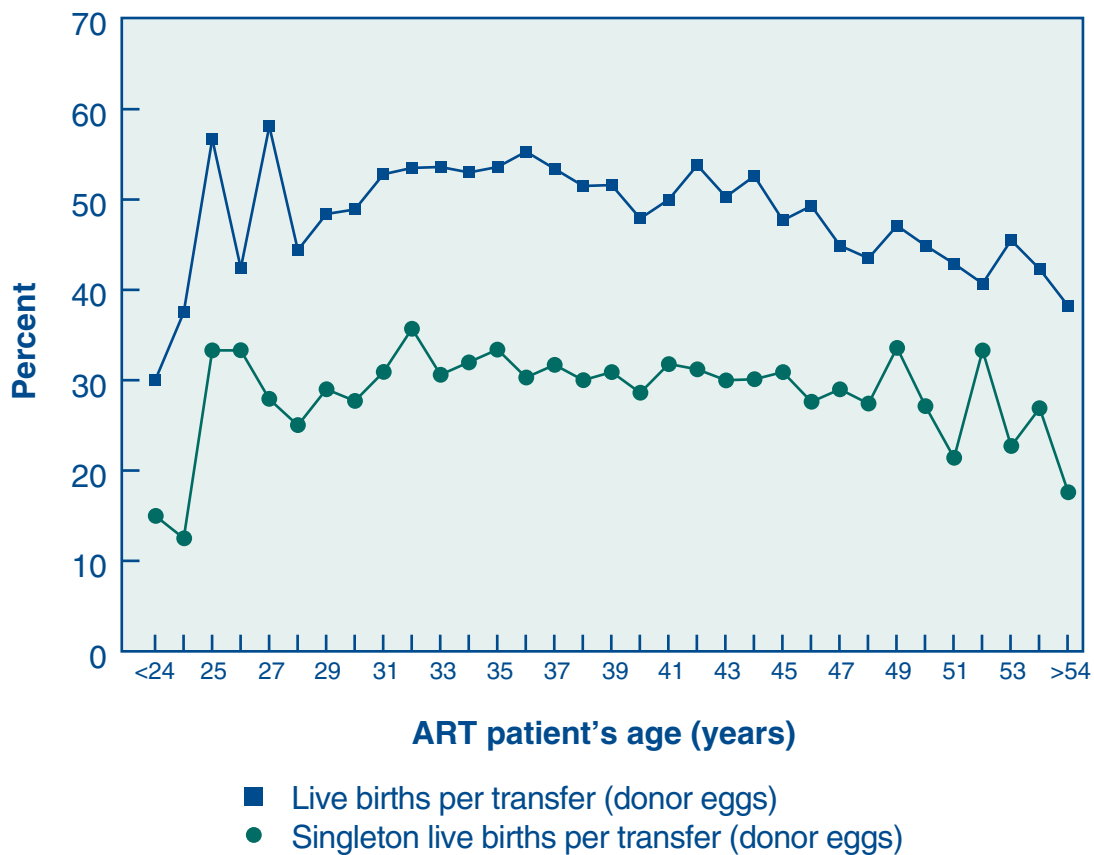
Figure 41
Live Births per Transfer for ART Cycles Using Fresh Embryos from Own and Donor Eggs, by ART Patient's Age, 2004



How successful is ART when donor eggs are used?

Figure 42 shows live birth per transfer rates and singleton live birth per transfer rates for ART cycles using fresh embryos from donor eggs among women of different ages. For all ages, the singleton live birth rates (average 30%) were lower than the total live birth rates (average 51%). Singleton live births are an important measure of success because they have a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death.

Figure 42
Live Births per Transfer and Singleton Live Births per Transfer
for ART Cycles Using Fresh Embryos from Donor Eggs,
by ART Patient's Age, 2004



What is the risk of having a multiple-fetus pregnancy or multiple-infant live birth from an ART cycle using fresh donor eggs?

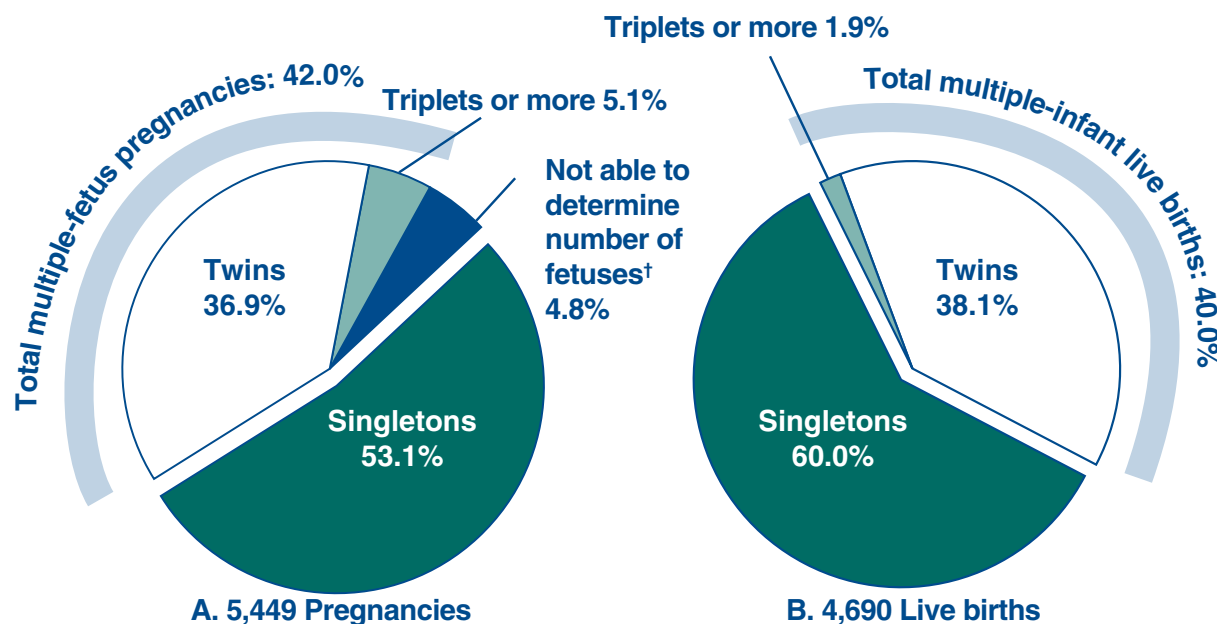
Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability or death.

Part A of Figure 43 shows that among the 5,449 pregnancies that resulted from ART cycles using fresh embryos from donor eggs, about 53% were singleton pregnancies, about 37% were twins, and nearly 5% were triplets or more. About 5% of pregnancies ended in miscarriage before the number of fetuses could be accurately determined. Therefore, the percentage of pregnancies with more than one fetus might have been higher than what was reported (about 42%).

In 2004, 4,690 pregnancies from ART cycles that used fresh embryos from donor eggs resulted in live births. Part B of Figure 43 shows that 40% of these live births produced more than one infant (about 38% twins and about 2% triplets or more). This compares with a multiple-infant birth rate of slightly more than 3% in the general population.

Although the total rates for multiples were similar for pregnancies and live births, there were more triplet (or more) pregnancies than births. Triplet (or more) pregnancies may be reduced to twins or singletons by the time of birth. This can happen naturally (e.g., fetal death), or a woman and her doctor may decide to reduce the number of fetuses using a procedure called multifetal pregnancy reduction. Information on medical multifetal pregnancy reductions is incomplete and therefore is not provided here.

Figure 43
Risk of Having Multiple-Fetus Pregnancy and Multiple-Infant Live Birth from ART Cycles Using Fresh Donor Eggs,* 2004



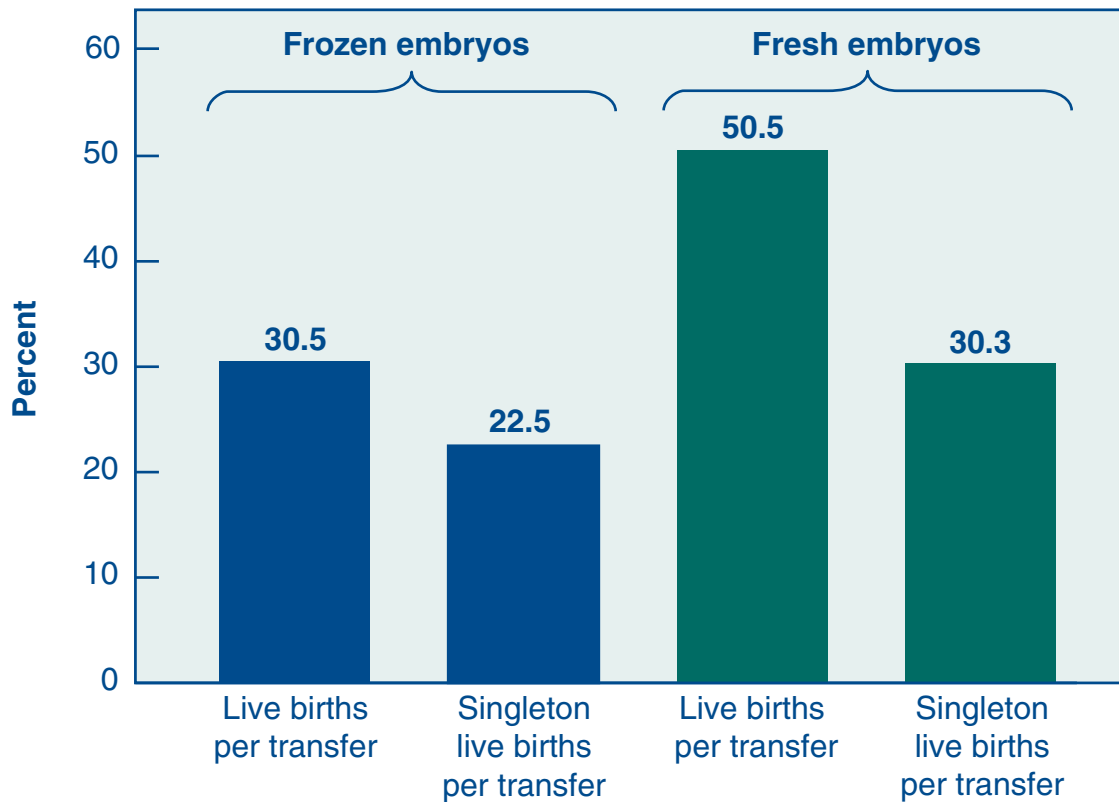
*Totals do not equal 100% due to rounding.

[†]Number of fetuses not known because the pregnancy ended in an early miscarriage.

How do success rates differ between women who use frozen donor embryos and those who use fresh donor embryos?

Figure 44 shows that the success rates per transfer for frozen donor embryos were substantially lower than the success rates per transfer for fresh donor embryos. This is similar to the findings for frozen nondonor embryos (see Figure 38, page 50). The average number of embryos transferred was similar for cycles using frozen donor embryos and those using fresh donor embryos. (See the national summary table on page 81 for information on the average number of embryos transferred for these cycles.)

Figure 44
Success Rates for ART Cycles Using Frozen Donor and Fresh Donor Embryos, 2004



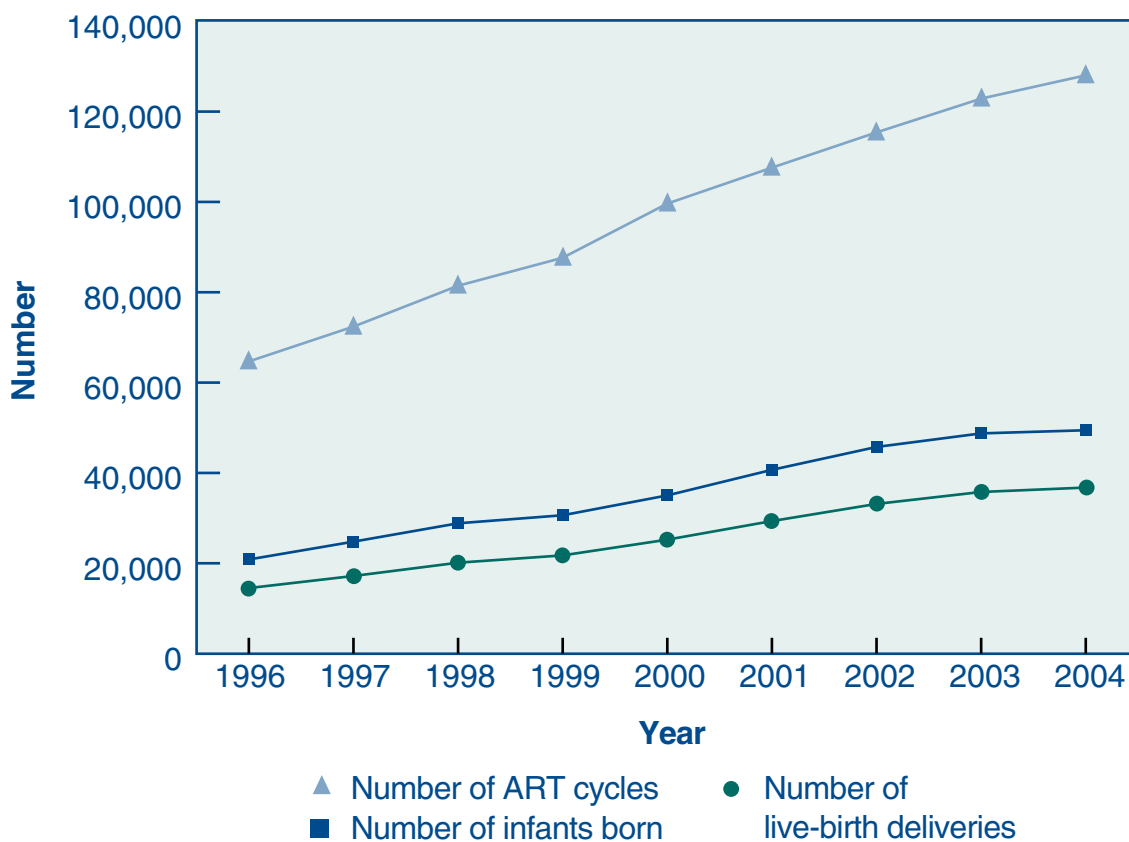
SECTION 5: ART TRENDS, 1996-2004

This report marks the tenth consecutive year that CDC has published an annual report detailing the success rates for ART clinics in the United States. Having several years of data provides us with the opportunity to examine trends in ART use and success rates over time. Because the first year of data collection, 1995, did not include non-SART member clinics, we limit our examination of trends to the years 1996–2004.

Is the use of ART increasing?

Figure 45 shows the numbers of ART cycles performed, live-birth deliveries, and infants born using ART from 1996 through 2004. The number of ART cycles performed in the United States has almost doubled, from 64,681 cycles in 1996 to 127,977 in 2004. The number of live-birth deliveries in 2004 (36,760) was about two and a half times higher than in 1996 (14,507). The number of infants born who were conceived using ART also increased steadily between 1996 and 2004. In 2004, 49,458 infants were born, which was more than double the 20,840 born in 1996. Because in some cases more than one infant is born during a live-birth delivery (e.g., twins), the total number of infants born is greater than the number of live-birth deliveries.

Figure 45
Numbers of ART Cycles Performed, Live-Birth Deliveries,
and Infants Born Using ART, 1996–2004

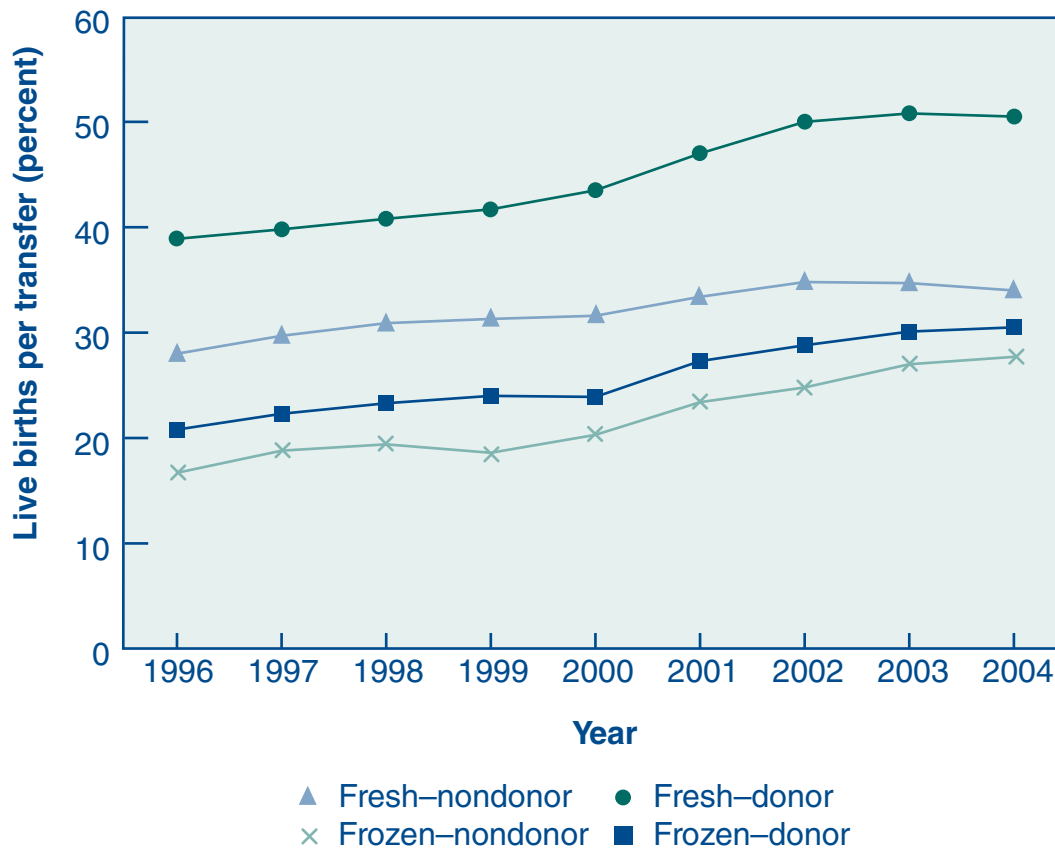


Are live birth rates improving?

Figure 46 presents live birth rates for the four primary types of ART cycles. Live birth rates are presented per transfer rather than per cycle because that is the only way to directly compare cycles using fresh embryos with those using frozen embryos.

From 1996 through 2004, the live birth rates for fresh–nondonor cycles increased 21%, from 28% in 1996 to 34% in 2004. Over the same time period, live birth rates increased 47% for frozen–nondonor cycles, 30% for fresh–donor cycles, and 66% for frozen–donor cycles.

Figure 46
Live Births per Transfer, by Type of ART Cycle,
1996–2004

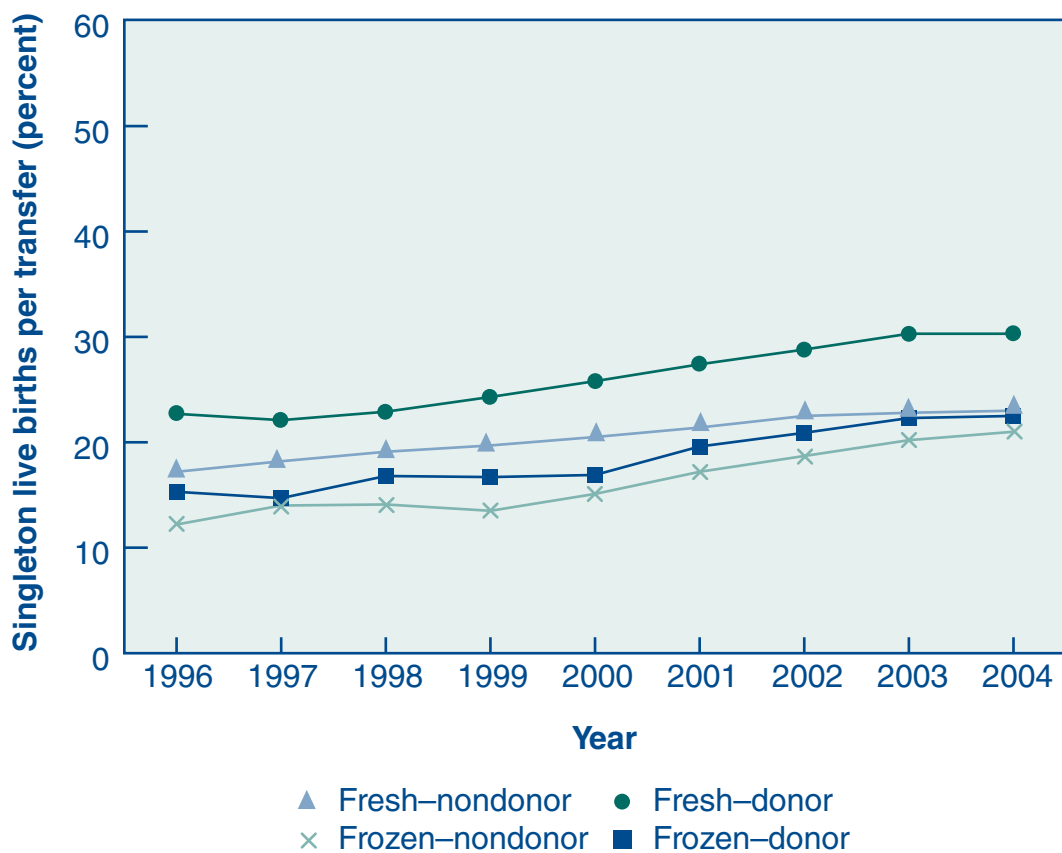


Are singleton live birth rates improving?

Singleton live births are an important measure of success because they have a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death. Figure 47 presents singleton live birth rates for the four primary types of ART cycles. Singleton live birth rates are presented per transfer rather than per cycle because that is the only way to directly compare cycles using fresh embryos with those using frozen embryos.

From 1996 through 2004, the singleton live birth rates for fresh–nondonor cycles increased 34%, from 17% in 1996 to 23% in 2004. Over the same time period, singleton live birth rates increased 72% for frozen–nondonor cycles, 33% for fresh–donor cycles, and 47% for frozen–donor cycles.

Figure 47
Singleton Live Births per Transfer, by Type of ART Cycle, 1996–2004

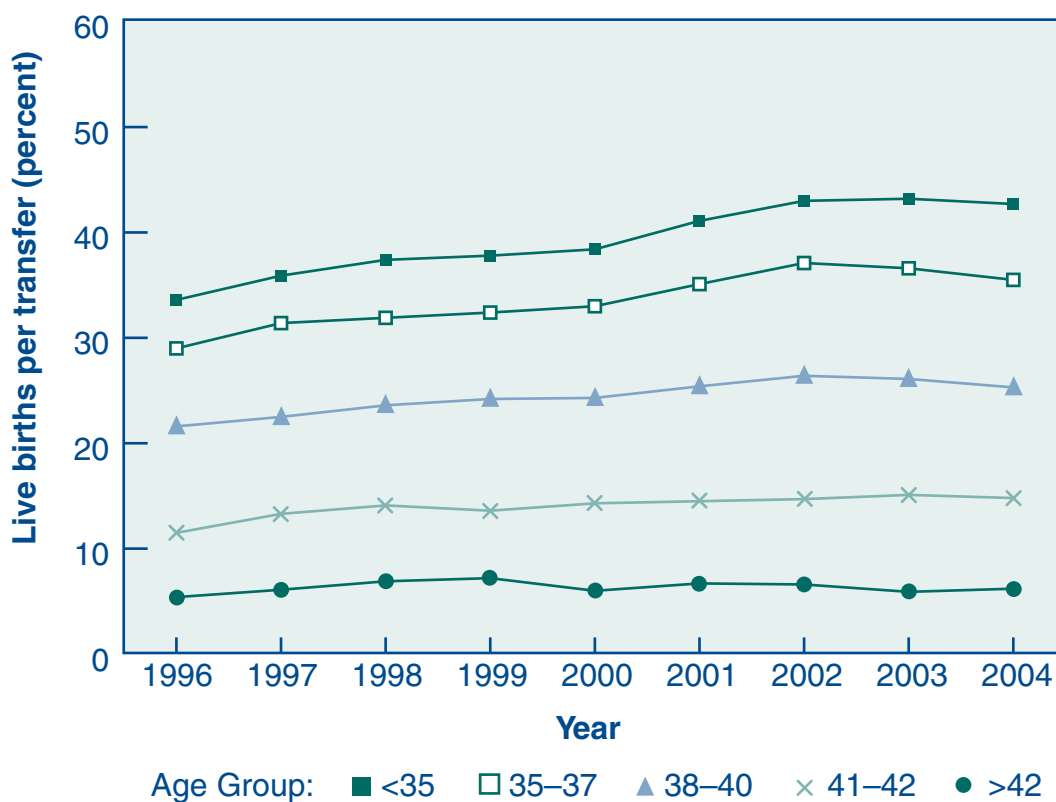


Are live birth rates improving for all ART patients or only for those in particular age groups?

Figure 48 presents live birth rates per transfer, by woman's age, for ART cycles using fresh nondonor eggs or embryos.

From 1996 through 2004, the live birth rates for women younger than 35 increased 27%, from 34% in 1996 to 43% in 2004. Over the same time period, live birth rates increased 22% for women 35–37, 17% for women 38–40, 29% for women 41–42, and 13% for women older than 42.

Figure 48
Live Births per Transfer for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Woman's Age, 1996–2004

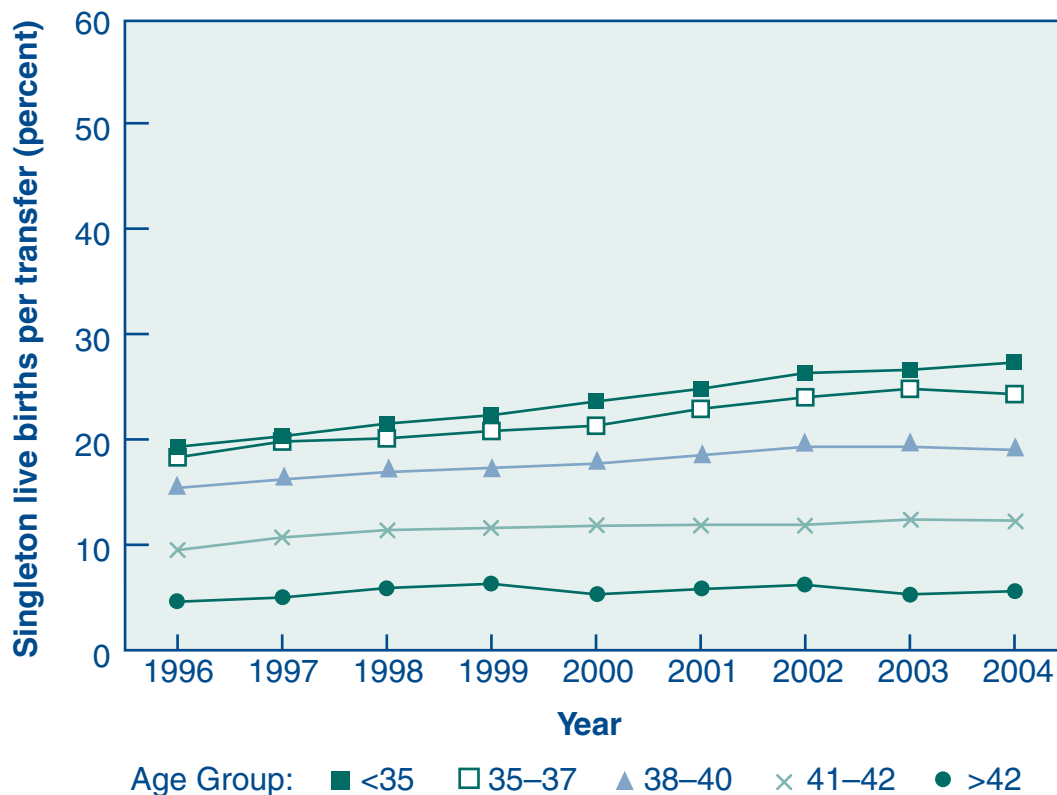


Are singleton live birth rates improving for all ART patients or only for those in particular age groups?

Singleton live births are an important measure of success because they have a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death. Figure 49 presents singleton live birth rates per transfer, by woman's age, for ART cycles using fresh nondonor eggs or embryos.

From 1996 through 2004, the singleton live birth rate for women younger than 35 increased about 41%, from 19% in 1996 to 27% in 2004. Over the same time period, live birth rates increased 33% for women 35–37, 23% for women 38–40, 29% for women 41–42, and 22% for women older than 42.

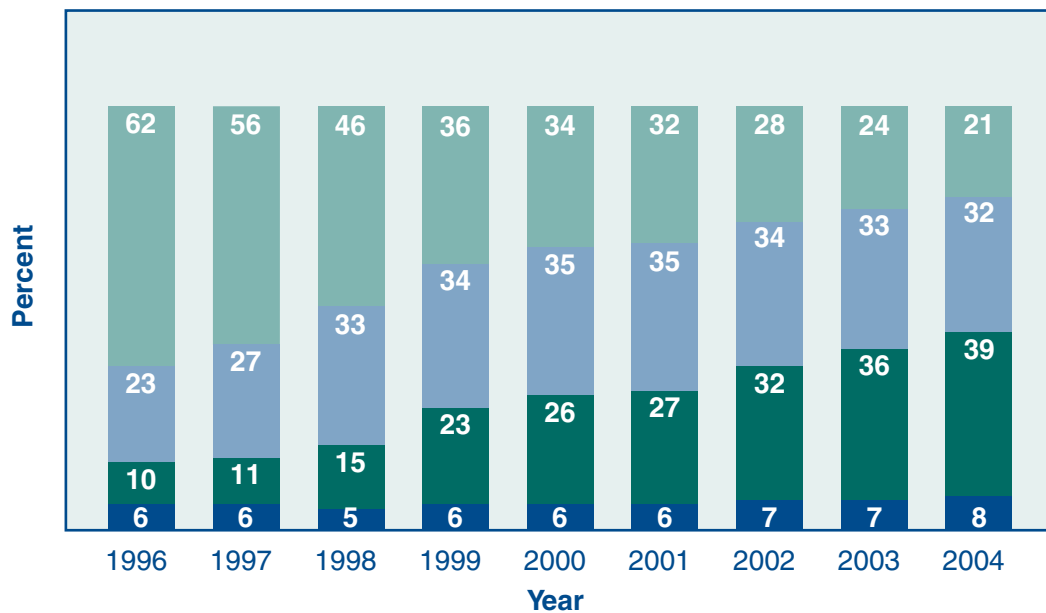
Figure 49
Singleton Live Births per Transfer for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Woman's Age, 1996–2004



Has the number of embryos transferred in fresh-nondonor cycles changed?

Figure 50 presents the trends for number of embryos transferred in fresh–nondonor cycles that progressed to the embryo transfer stage. From 1996 to 2004, cycles that involved the transfer of one embryo increased slightly, from 6% to 8%; cycles that involved the transfer of two embryos increased dramatically, from 10% in 1996 to 39% in 2004. Cycles that involved the transfer of three embryos increased from 23% in 1996 to 32% in 2004, and cycles that involved the transfer of four or more embryos decreased from 62% in 1996 to 21% in 2004.

Figure 50
Percentage of Fresh–Nondonor Cycles That Involved the Transfer of One, Two, Three, or Four or More Embryos,* 1996–2004



Number of embryos transferred:

■ One ■ Two ■ Three ■ Four or more

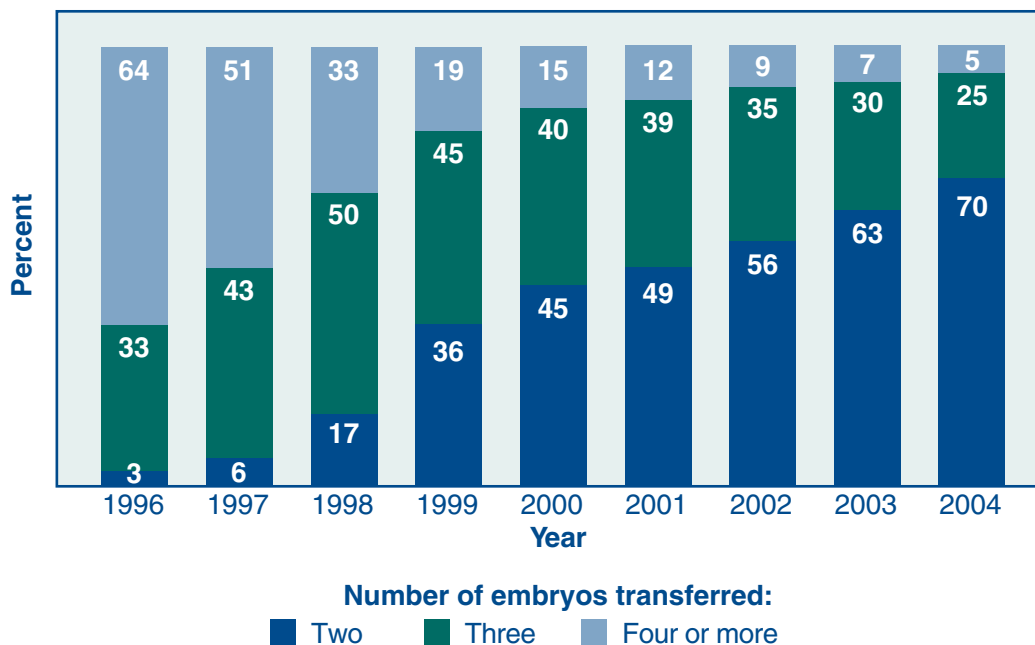
*Totals do not equal 100% due to rounding.

Has the number of embryos transferred in each ART cycle changed for women younger than 35 who have more embryos available than they choose to transfer?

As shown in Figure 50, the number of embryos transferred in fresh–nondonor cycles has decreased during the past 9 years. Figure 51 shows the change over time in the number of embryos transferred for ART procedures in which the woman was younger than 35 and the couple chose to set aside some embryos for future cycles rather than transfer all available embryos at one time. Previous research suggests that the number of embryos available for an ART cycle is important in predicting success. Younger women also tend to have higher success rates (see Figure 31).

Overall, the number of embryos transferred decreased among couples who chose to transfer fewer embryos than were available. In 1996, almost two-thirds (64%) of ART cycles involved the transfer of four or more embryos; 33%, three embryos; and only 3%, two embryos. By 1998, the percentage of cycles in which four or more embryos were transferred had decreased to 33%; half of all ART cycles involved the transfer of three embryos, and 17% of cycles, two embryos. By 2004, four or more embryos were transferred in only 5% of cycles, three in 25% of cycles, and two in more than two-thirds (70%) of cycles.

Figure 51
Percentage of Fresh–Nondonor Cycles That Involved the Transfer of Two, Three, or Four or More Embryos in Women Who Were Younger Than 35 and Set Aside Extra Embryos for Future Use,* 1996–2004



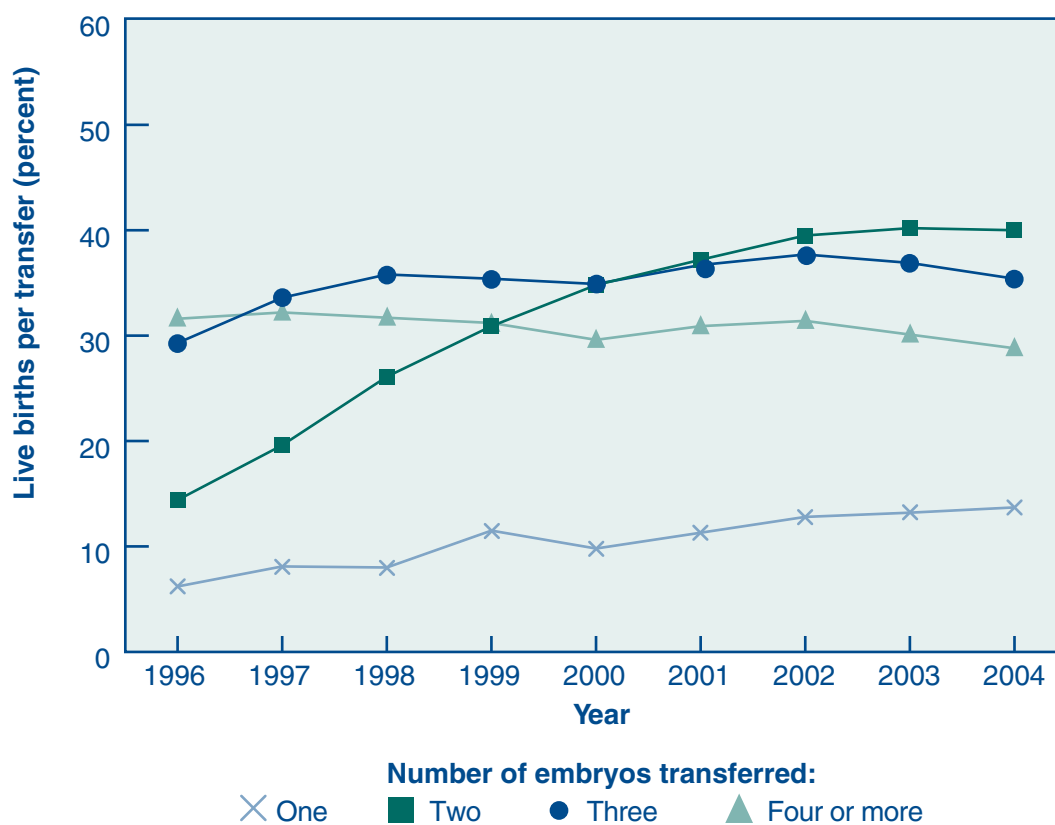
*Cycles involving the transfer of one embryo were not included because of the small number of cycles where one embryo was transferred and extra embryos were set aside for future use.

Have there been improvements in live birth rates, by number of embryos transferred?

Figure 52 presents live birth rates per transfer, by number of embryos transferred, for ART cycles using fresh nondonor eggs or embryos from 1996 through 2004. In general, the live birth rate was higher when two or more embryos were transferred. From 1996 through 2004, the live birth rate almost tripled, from 14% to 40%, for ART cycles that involved the transfer of two embryos. The live birth rates also increased for ART cycles that involved the transfer of two embryos. The live birth rates also increased for ART cycles that involved the transfer of either one or three embryos; however, live birth rates decreased 9%, from 32% to 29%, for ART cycles that involved the transfer of four or more embryos.

The relationship between number of embryos transferred and success rates is complicated by several factors, such as the woman's age and embryo quality. Trends over time may reflect changes in these factors.

Figure 52
Live Births per Transfer,
by Number of Embryos Transferred, 1996–2004

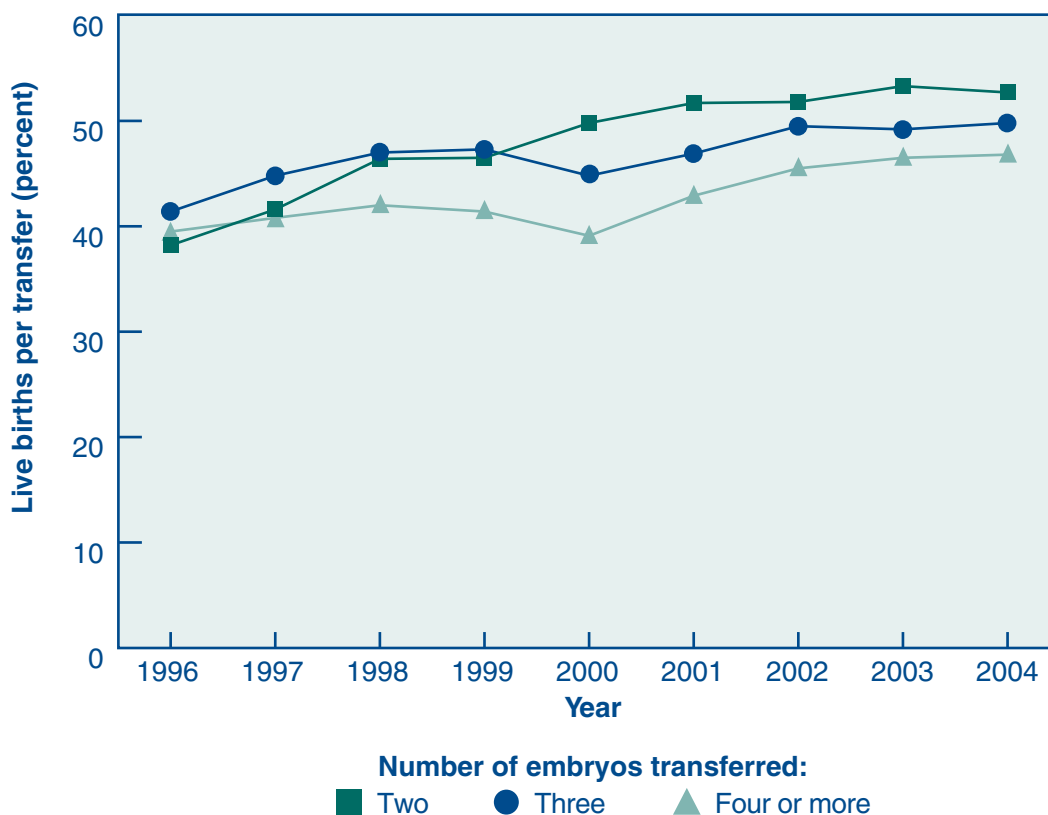


Have live birth rates improved for women younger than 35 who have more embryos available than they choose to transfer?

Figure 53 shows changes over time in the relationship between live birth rates and number of embryos transferred for ART procedures in which the woman was younger than 35 and the couple chose to set aside some embryos for future cycles rather than transfer all available embryos at one time. Previous research suggests that the number of embryos available for an ART cycle is an important predictor of success. Younger women also tend to have higher success rates (see Figure 31).

For this group, live birth rates increased over time for transfers involving any number of embryos. The increase in success rates was largest when two embryos were transferred. In 1996, the chance for a live birth using ART was highest (41%) when three embryos were transferred; however, in 2004, the chance for a live birth using ART was highest (53%) when two embryos were transferred.

Figure 53
Live Births per Transfer in Women Who Were Younger Than 35 and Set Aside Extra Embryos for Future Use, by Number of Embryos Transferred,* 1996–2004



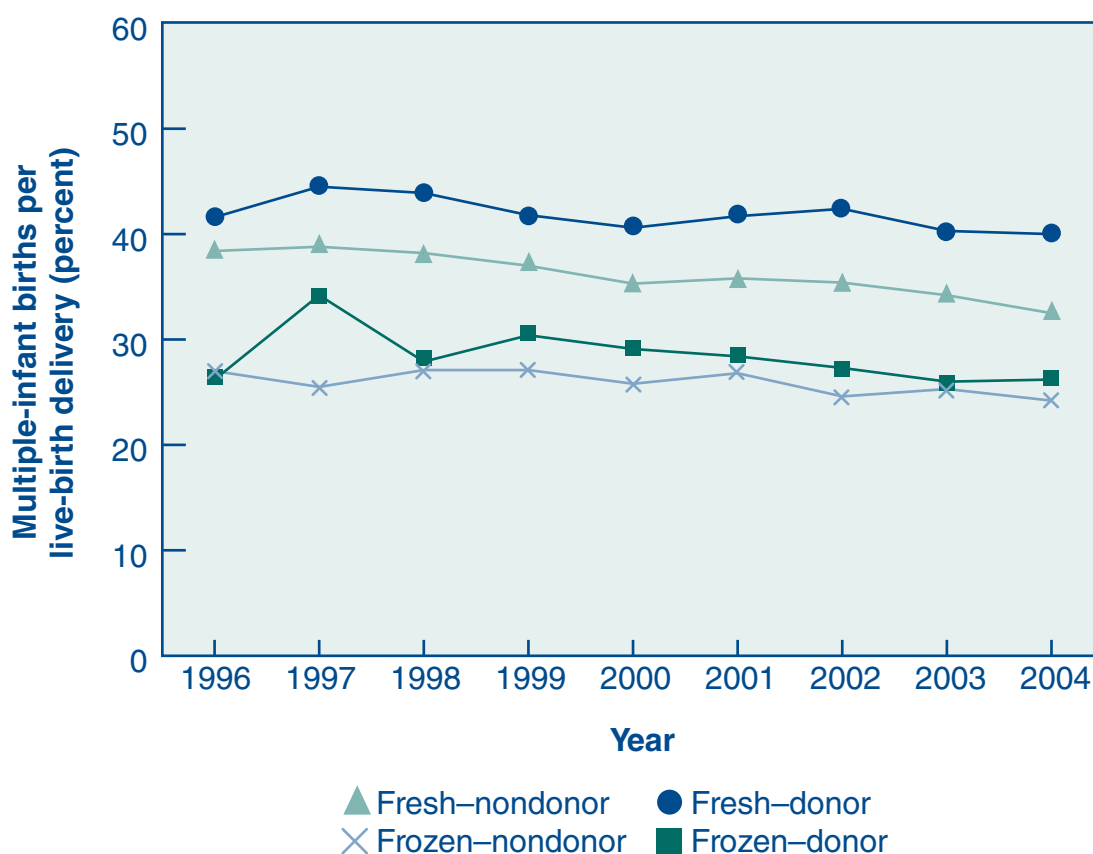
*Cycles involving the transfer of one embryo were not included because of the small number of cycles where one embryo was transferred and extra embryos were set aside for future use.

Have multiple-infant birth rates changed?

Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability or death. Figure 54 shows the multiple-infant birth rates for the four primary types of ART procedures.

From 1996 through 2004, the percentage of live-birth deliveries that were multiple-infant births decreased 15%, from 38% in 1996 to 33%, for fresh–nondonor cycles. Over the same time period, the percentage of live-birth deliveries that were multiple-infant births decreased 10% for frozen–nondonor cycles and 4% for fresh–donor cycles. In all years except 1997, the multiple-infant birth rates remained stable for frozen–donor cycles.

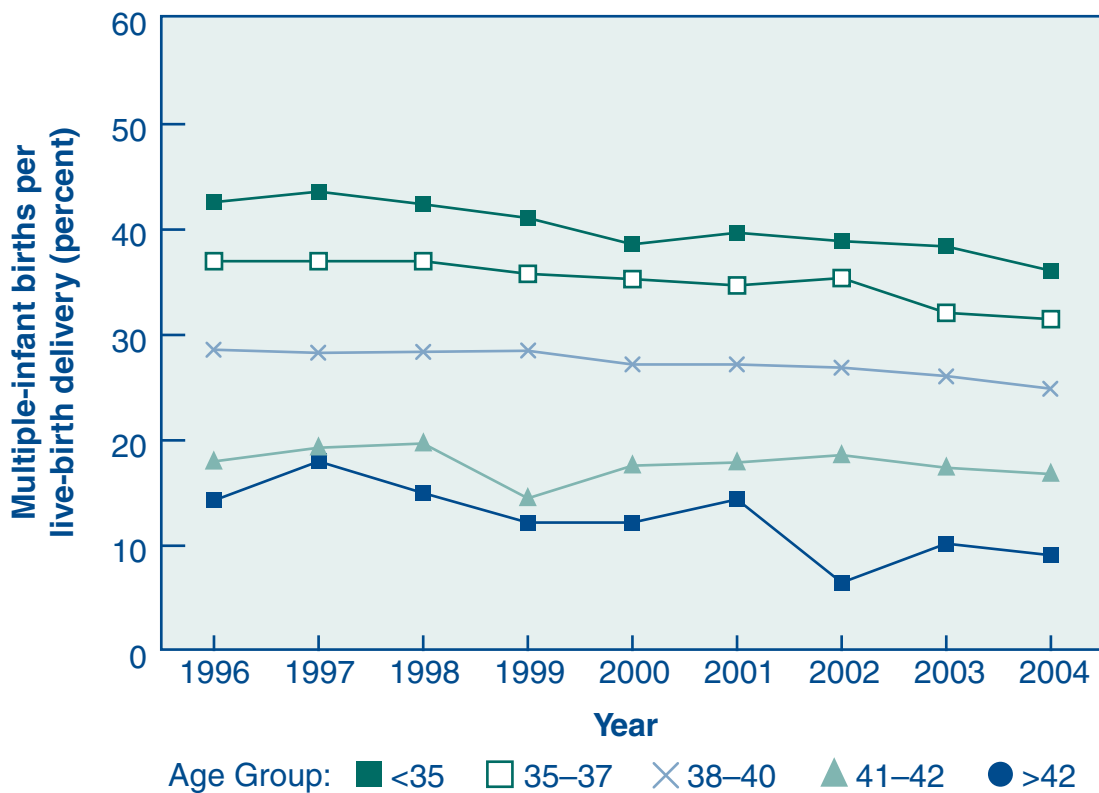
Figure 54
Multiple-Infant Births per Live-Birth Delivery,
by Type of ART Cycle, 1996–2004



Have multiple-infant birth rates for cycles using fresh nondonor eggs or embryos changed for all ART patients or only for those in particular age groups?

Figure 55 shows that the multiple-infant birth rates decreased slightly between 1996 and 2004 for women in all age groups. In 1996, 43% of live-birth deliveries to women younger than 35 were multiple-infant births, compared with 36% in 2004. Among women older than 42, the multiple-infant birth rates decreased from 14% in 1996 to 8% in 2004.

Figure 55
Multiple-Infant Births per Live-Birth Delivery,
for Fresh–Nondonor Cycles, by Woman’s Age, 1996–2004

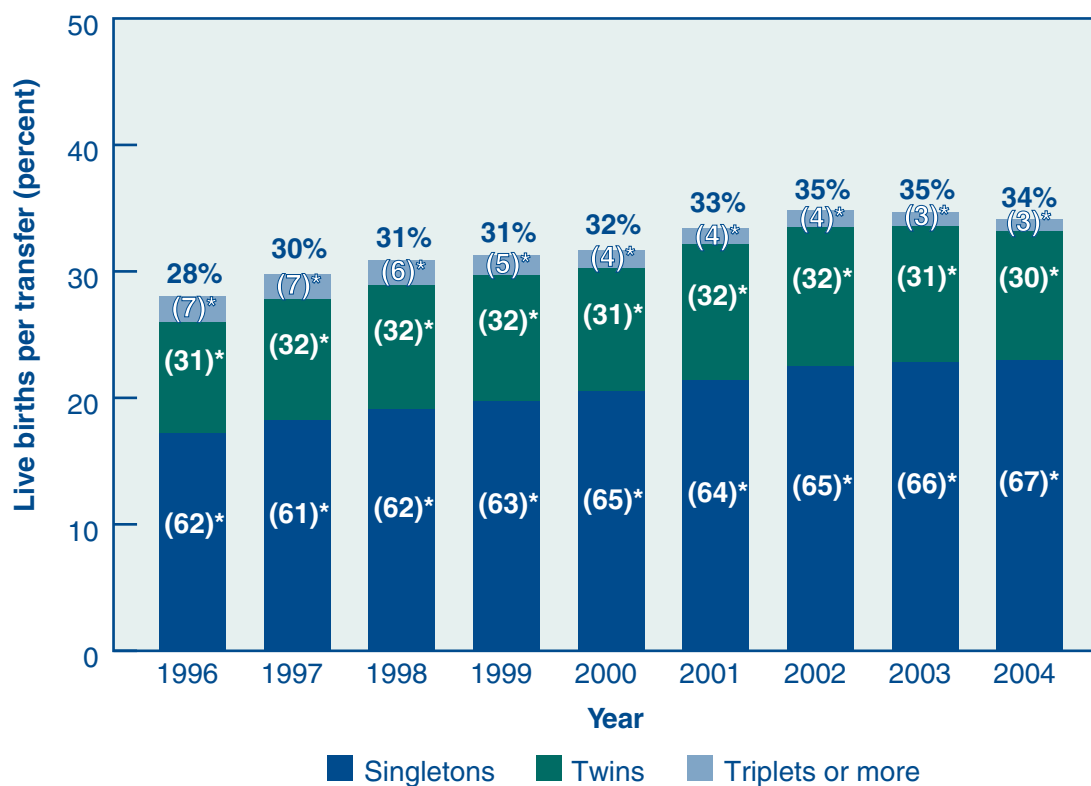


Have the percentages of singletons, twins, and triplets or more changed for ART cycles using fresh nondonor eggs or embryos?

Figure 56 presents the trends in live birth rates and percentage of multiple-infant births for ART cycles using fresh nondonor eggs or embryos. Overall, live birth rates per transfer increased from 28% in 1996 to 35% in 2003 and decreased slightly, to 34%, in 2004. From 1996 to 2004, the percentage of singleton live births increased from 62% to 67%; the percentage of twin births remained stable, ranging from 30% to 32%; and the percentage of triplet-or-more births decreased from 7% in 1996 to 3% in 2004.

It is important to note that twins, albeit to a lesser extent than triplets or more, are still at substantially greater risk for illness and death than singletons. These risks include low birth weight, preterm birth, and neurological impairments such as cerebral palsy. Both the twin and triplet-or-more birth rates remain significantly higher for ART births than for births resulting from natural conception.

Figure 56
*Live Births per Transfer and Percentages of Multiple-Infant Births for ART Cycles Using Fresh Nondonor Eggs or Embryos, 1996–2004



*Percentages of live births that were singletons, twins, and triplets or more are in parentheses.

2004 Fertility Clinic Tables



INTRODUCTION TO FERTILITY CLINIC TABLES

The first table in this section is the national summary of combined data from all clinics. Individual clinic tables follow, with each clinic's data presented in a one-page table that includes the types of ART used, patient diagnoses, success rates that each clinic reported and verified for 2004, and individual program characteristics. Clinics are listed in alphabetical order by state, city, and clinic name.

Many people considering ART will want to use this report to find the "best" clinic. However, comparisons between clinics must be made with caution. Many factors contribute to the success of an ART procedure. Some factors are related to the training and experience of the ART clinic and laboratory professionals and the quality of services they provide. Other factors are related to the patients themselves, such as their age and the cause of their infertility. Some clinics may be more willing than others to accept patients with low chances of success or may specialize in various ART treatments that attract particular types of patients. These and other factors to consider when interpreting clinic data are discussed below.

Important Factors to Consider When Using These Tables to Assess a Clinic

- ***These statistics are for 2004.*** Data for cycles started in 2004 could not be published until 2006 because the final outcomes of pregnancies conceived in December 2004 were not known until October 2005. Additional time was then required to collect and analyze the data and prepare the report. Many factors that contribute to a clinic's success rate may have changed, for better or for worse, in the 2 years since these procedures were performed. Personnel may be different. Equipment and training may or may not have been updated. As a result, success rates for 2004 may differ from current rates.
- ***No reported success rate is absolute.*** A clinic's success rates will vary from year to year even if all determining factors remain the same. However, the more cycles that a clinic carries out, the less the rate is likely to vary. Conversely, clinics that carry out fewer cycles are likely to have more variability in success rates from year to year. As an extreme example, if a clinic reports only one ART cycle in a given category, as is sometimes the case in the data presented here, the clinic's success rate in that category would be either 0% or 100%. For further detail, see the explanation of confidence intervals on pages 497–498.
- ***Some clinics see more than the average number of patients with difficult infertility problems.*** Some clinics are willing to offer ART to most potential users, even those who have a low probability of success. Others discourage such patients or encourage them to use donor eggs, a practice that results in higher success rates among older women. Clinics that accept a higher percentage of women who previously have had multiple unsuccessful ART cycles will generally have lower success rates. In contrast, clinics that offer ART procedures to patients who might have become pregnant with less technologically advanced treatment will have higher success rates.

A related issue is that success rates shown in this report are presented in terms of cycles, as required by law, rather than in terms of women. As a result, women who had more than one ART cycle in 2004 are represented in multiple cycles. If a woman who underwent several ART cycles at a given clinic either never had a successful cycle or had a successful cycle only after numerous attempts, the clinic's success rates would be lowered.

- **Cancellation rates affect a clinic's success rate.** Cancellation rates for cycles using fresh nondonor eggs or embryos vary among clinics from less than 1% to about 41%. A high cancellation rate tends to lower the live birth per cycle rate but may increase the live birth per retrieval rate and the live birth per transfer rate.
- **Success rates for unstimulated (or "natural") cycles are included with those for stimulated cycles.** In an unstimulated cycle, the woman ovulates naturally rather than through the daily injections used in stimulated cycles. Unstimulated cycles are less expensive because they require no daily injections and fewer ultrasounds and blood tests. However, women who use natural or mild stimulation produce only one or two follicles, thus reducing the potential number of embryos for transfer. As a result, unstimulated cycles are less successful, and clinics that carry out a relatively high proportion of unstimulated cycles will have lower success rates. Nationally, fewer than 1% of ART cycles using fresh nondonor eggs or embryos in 2004 were unstimulated. In a very few clinics, more than 1% of cycles were unstimulated.
- **Success rates are calculated per cycle rather than per patient.** Therefore, for patients who undergo both fresh and frozen cycles, success rates are calculated separately for each cycle. Clinics that have very good live birth rates with frozen embryos would have higher ART success rates if these births were included as successes from the original stimulated cycle. Consumers should look at both rates (for cycles using fresh embryos and for those using frozen embryos) when assessing a clinic's success rates.
- **The number of embryos transferred varies from clinic to clinic.** In 2004, the average number of embryos that a clinic transferred to women younger than age 35 ranged from two to six for fresh–nondonor cycles. The American Society for Reproductive Medicine and the Society for Assisted Reproductive Technology discourage the transfer of a large number of embryos because it increases the likelihood of multiple gestations. Multiple gestations, in turn, increase both the probability of premature birth and its related problems and the need for multifetal pregnancy reductions.

In addition, success rates can be affected by many other factors, including

- Quality of eggs.
- Quality of sperm (including motility and ability to penetrate the egg).
- Skill and competence of the treatment team.
- General health of the woman.
- Genetic factors.

We encourage consumers considering ART to contact clinics to discuss their specific medical situations and their potential for success using ART. Because clinics did not have the opportunity to provide narratives to explain their data, such conversations could provide additional information to help people decide whether to use ART.

Although ART offers important options for the treatment of infertility, the decision to use ART involves many factors in addition to success rates. Going through repeated ART cycles requires substantial commitments of time, effort, money, and emotional energy. Therefore, consumers should carefully examine all related financial, psychological, and medical issues before beginning treatment. They also will want to consider the location of the clinic, the counseling and support services available, and the rapport that staff members have with their patients.

An explanation of how to read a fertility clinic table begins on page 75.

Sample Clinic Table

A comparison of clinic success rates may not be meaningful because patient medical characteristics and treatment approaches vary from clinic to clinic. For more details about this, along with information on how to interpret the statistics in this table, see pages 71–80.

2004 ART CYCLE PROFILE

1 Type of ART ^a		2 Patient Diagnosis					
IVF	>99%	Procedural Factors:		Tubal factor	13%	Other factor	7%
GIFT	<1%	With ICSI	53%	Ovulatory dysfunction	6%	Unknown factor	10%
ZIFT	<1%	Unstimulated	<1%	Diminished ovarian reserve	9%	Multiple Factors:	
Combination	<1%	Used gestational carrier	<1%	Endometriosis	6%	Female factors only	13%
				Uterine factor	1%	Female & male factors	18%
				Male factor	17%		

4 2004 PREGNANCY SUCCESS RATES

3 Data verified by X.Y. Zee, MD

	Type of Cycle	5 Age of Woman			
		<35	35–37	38–40	41–42 ^d
4A	Fresh Embryos from Nondonor Eggs				
	Number of cycles	115	106	68	19
	Percentage of cycles resulting in pregnancies ^b	45.2	37.7	23.5	5/19
	Percentage of cycles resulting in live births ^{b,c}	37.4	31.1	20.6	2/19
6	(Confidence Interval)	(28.5-46.2)	(22.3-39.9)	(11.0-30.2)	
	Percentage of retrievals resulting in live births ^{b,c}	42.6	33.3	23.7	2/17
	Percentage of transfers resulting in live births ^{b,c}	52.4	34.7	24.1	2/15
	Percentage of transfers resulting in singleton live births ^b	29.3	29.5	19.0	2/15
	Percentage of cancellations ^b	12.2	6.6	13.2	2/19
	Average number of embryos transferred	2.0	2.5	3.8	2.9
	Percentage of pregnancies with twins ^b	38.5	12.5	4/16	1/5
	Percentage of pregnancies with triplets or more ^b	3.8	2.5	1/16	0/5
	Percentage of live births having multiple infants ^{b,c}	44.2	15.2	3/14	0/2
4B	Frozen Embryos from Nondonor Eggs				
	Number of transfers	62	25	20	14
	Percentage of transfers resulting in live births ^{b,c}	27.4	24.0	20.0	2/14
	Average number of embryos transferred	2.1	2.0	2.7	3.1
		All Ages Combined^e			
4C	Donor Eggs	Fresh Embryos	Frozen Embryos		
	Number of transfers	49	14		
	Percentage of transfers resulting in live births ^{b,c}	51.0	4/14		
	Average number of embryos transferred	2.1	3.4		

7 CURRENT CLINIC SERVICES AND PROFILE

Current Name: ART Clinic of the United States

Donor egg?	Yes	Gestational carriers?	Yes	SART member?	Yes
Donor Embryo?	Yes	Cryopreservation?	Yes	Verified lab accreditation	Yes
Single women?	No	(See Appendix C for details.)			

^a Reflects patient and treatment characteristics of ART cycles performed in 2004 using fresh nondonor eggs or embryos.

^b When fewer than 20 cycles are reported in an age category, rates are shown as a fraction and confidence intervals are not given. Calculating percentages from fractions may be misleading and is not encouraged.

^c A multiple-infant birth is counted as one live birth.

^d Clinic-specific outcome rates are unreliable for women older than 42 undergoing ART cycles using fresh or frozen embryos with nondonor eggs. Readers are urged to review national outcomes for these age groups (see page 25).

^e All ages (including ages >42) are reported together because previous data show that patient age does not materially affect success with donor eggs.

How to Read a Fertility Clinic Table

This section is provided to help consumers understand the information presented in the fertility clinic tables. The number before each heading refers to the number of the corresponding section in the sample clinic table on the opposite page. Technical terms are defined in the Glossary (Appendix B).

1. Type of ART used

This section gives the breakdown of ART cycle types that each clinic performed using fresh nondonor eggs or embryos (IVF, GIFT, ZIFT, or combinations thereof). It also lists the percentage of procedures that involved intracytoplasmic sperm injection (ICSI), which was not performed by all clinics in 2004; the percentage of cycles that were unstimulated; and the percentage of cycles that used a gestational carrier. (See Glossary for definitions of IVF, GIFT, ZIFT, ICSI, and gestational carrier.)

2. ART patient diagnosis

Consumers may want to know what percentage of a particular clinic's patients have the same diagnosis as they do. (See Glossary for definitions of diagnoses.) In addition, patients' diagnoses may affect a clinic's success rates. However, the use of these diagnostic categories may vary somewhat from clinic to clinic.

3. Verification

To have success rates published in the annual report, a clinic's medical director must verify the accuracy of the tabulated success rates. The name of the individual who verified the clinic's data is shown.

4. Success rates by type of cycle

Success rates are given for the three categories of cycles described in 4A–C below: cycles using fresh embryos from nondonor eggs, cycles using frozen embryos from nondonor eggs, and cycles using donor eggs. The ART success rates shown were calculated based on data from all ART cycle types (IVF, both with and without ICSI; GIFT; and ZIFT). Data from these procedures were combined because there was little difference in success rates when we examined each type of ART procedure separately.

The success rates indicate the average chance of success for the given procedure at the clinic in 2004 for each of four age groups. Success rates are calculated as the percentage of cycles started, egg retrievals, or embryo transfers that resulted in either pregnancies or live births at the ART clinic in 2004. For example, if a clinic started a total of 50 cycles in 2004 and these resulted in 15 live births, the average success rate for cycles started at that clinic would be

$$15 \text{ (births)} \div 50 \text{ (cycles)} = 0.3 \text{ or } 30\%.$$

Thus, the success rate at that clinic in 2004 was 30%, meaning that 30% of cycles started that year resulted in a live birth.

Success rate calculations are very unstable if they are based on a small number of cycles. Therefore, when fewer than 20 cycles are reported in a given category, the rates are shown as fractions rather than percentages. For example, the sample clinic carried out only 19 fresh

embryo cycles using nondonor eggs among women aged 41–42 years. Of these 19 cycles, 2– or 10%—were successful. However, because of the small number of cycles, 10% is not a statistically reliable success rate, so the success rate is presented as 2/19, meaning 2 out of 19.

4A. Cycles using fresh embryos from nondonor eggs

This section includes IVF, ICSI, GIFT, and ZIFT cycles that used a woman’s own eggs. Cycles that used frozen embryos or donor eggs or embryos are not included here.

- **Percentage of cycles resulting in pregnancies**

(Number of pregnancies divided by number of cycles started, expressed as a percentage of cycles)

A stimulated cycle is started when a woman begins taking fertility drugs; an unstimulated cycle is started when egg production begins being monitored. The number of cycles that a clinic starts is not the same as the number of patients that it treats because some women start more than one cycle in a year. Because some pregnancies end in a miscarriage, induced abortion, or stillbirth, this rate is usually higher than the live birth rate.

- **Percentage of cycles resulting in live births**

(Number of live births divided by number of cycles started, expressed as a percentage of cycles)

This number represents the cycles that resulted in a live birth out of all ART cycles started. One live birth may include one or more children born alive; that is, a multiple-infant birth (e.g., twins, triplets) is counted as one live birth.

- **Percentage of retrievals resulting in live births**

(Number of live births divided by number of egg retrieval procedures, expressed as a percentage of retrievals)

This number represents the cycles that resulted in a live birth out of all cycles in which an egg retrieval was performed. The number of egg retrievals a clinic performs often is smaller than the number of cycles started because some cycles are canceled before the woman has an egg retrieved. As a result, this rate is usually higher than the live births per cycle started rate. Cycles are canceled for many reasons: eggs may not develop, the patient may become ill, or the patient may choose to stop treatment (see Figure 6).

- **Percentage of transfers resulting in live births**

(Number of live births divided by number of embryo transfer procedures, expressed as a percentage of transfers)

This number represents the cycles that resulted in a live birth out of all cycles in which one or more embryos were transferred into the woman’s uterus or, in the case of GIFT and ZIFT, egg and sperm or embryos were transferred into the woman’s fallopian tubes. A clinic may carry out more egg retrievals than embryo transfers because not every retrieval results in egg fertilization and embryo transfer. For this reason, live birth rates based on transfers generally will be higher than those reported for egg retrievals and for cycles started.

- **Percentage of transfers resulting in singleton live births**

(Number of singleton live births divided by number of embryo transfer procedures, expressed as a percentage of transfers)

This number represents the cycles that resulted in the birth of a single infant out of all cycles in which one or more embryos were transferred into the woman's uterus or, in the case of GIFT and ZIFT, egg and sperm or embryos were transferred into the woman's fallopian tubes. Singleton births have a much lower risk than multiple-infant births for adverse infant health outcomes, including prematurity, low birth weight, disability, and death.

- **Percentage of cancellations**

(Number of cycles canceled divided by the total number of cycles, expressed as a percentage of cycles)

This number refers to the cycles that were stopped before an egg was retrieved. A cycle may be canceled if a woman's ovaries do not respond to fertility medications and thus do not produce a sufficient number of follicles. Cycles also may be canceled because of illness or other medical or personal reasons.

- **Average number of embryos transferred**

(Average number of embryos per embryo transfer procedure)

The average number of embryos transferred varies from clinic to clinic. The American Society for Reproductive Medicine (ASRM) and the Society for Assisted Reproductive Technology (SART) have practice guidelines that address this issue.

- **Percentage of pregnancies with twins**

(Number of pregnancies with two fetuses divided by the total number of pregnancies, expressed as a percentage of pregnancies)

A pregnancy with two fetuses is counted as one pregnancy.

- **Percentage of pregnancies with triplets or more**

(Number of pregnancies with three or more fetuses divided by the total number of pregnancies, expressed as a percentage of pregnancies)

Pregnancies with multiple fetuses can be associated with increased risk for mothers and infants (e.g., higher rates of caesarean section, prematurity, low birth weight, infant death) and the possibility of multifetal pregnancy reduction.

A pregnancy with three or more fetuses is counted as one pregnancy.

- **Percentage of live births having multiple infants**

(Number of deliveries resulting in a birth of more than one infant divided by the number of live births, expressed as a percentage of live births)

A delivery of one or more live-born infants is counted as one live birth.

4B. Cycles using frozen embryos from nondonor eggs

Frozen (cryopreserved) embryo cycles are those in which previously frozen embryos are thawed and then transferred. Because frozen embryo cycles use embryos formed from a previous stimulated cycle, no stimulation or retrieval is involved. As a result, these cycles usually are less expensive and less invasive than cycles using fresh embryos. In addition, freezing some of the embryos from a retrieval procedure may increase a woman's overall chances of having a child from a single retrieval.

4C. Cycles using donor eggs

Success rates are presented separately for cycles using fresh donor eggs or embryos and those using frozen donor embryos. Older women, women with premature ovarian failure (early menopause), women whose ovaries have been removed, and women with a genetic concern about using their own eggs may consider using eggs that are donated by a young, healthy woman. Embryos donated by couples who previously had ART also may be available. Many clinics provide services for donor egg and embryo cycles. For these cycle types, results from women in all age groups (including older than 42) are reported together because previous data show that patient age does not affect success rates with donor eggs (see Figures 41 and 42 on pages 53 and 54).

5. Age of woman

Because a woman's fertility declines with age, clinics report lower success rates for older women attempting to become pregnant with their own eggs. For this reason, rates for women using nondonor eggs or embryos are reported separately for women younger than age 35, for women 35–37, for women 38–40, and for women 41–42. Clinic-specific outcome rates are not shown for women older than 42 who undergo ART using their own eggs because the number of women in this age group at each clinic is small; therefore, a calculation of the live birth rate in older age groups may not be meaningful. Readers are encouraged to review national outcomes for these age groups shown on page 25. The sample clinic table illustrates the decline in ART success rates among older women. For example, for cycles that used fresh embryos from nondonor eggs, the percentage of cycles resulting in live births among women younger than 35 was 37.4%, whereas the percentage of cycles resulting in live births among women aged 38–40 was 20.6%.

6. Confidence interval

The tables show a range, called the **95% confidence interval**, that conveys the reliability of a clinic's demonstrated success rate. This range is calculated only if 20 or more cycles are reported in an age category. (When fewer than 20 cycles are reported in a given category, success rates are shown as fractions rather than percentages; see paragraph 4, Success rates by type of cycle, page 75.) In general, the more cycles that a clinic performs, the narrower the range. A narrow range means we are more confident that a clinic would have a similar success rate if it treated other similar groups of patients under similar clinical conditions. On the other hand, a wide range tells us that a clinic's success rate is more likely to vary under similar circumstances because we had less information (fewer cycles) on which to base our estimates. Even though one clinic's success rate may appear higher than another's based on the confidence intervals, **these confidence intervals are only one indication that the success rate may be better. Other factors also must be considered** when comparing rates

from two clinics. For example, some clinics see more than the average number of patients with difficult infertility problems, whereas others discourage patients with a low probability of success. For further information on important factors to consider when using the tables to assess a clinic, refer to pages 71–73.

For a more detailed explanation and examples of confidence intervals, see pages 497–498 in Appendix A.

7. Clinic services and profile

- **Current name.** This name reflects name changes that may have occurred since 2004, whereas the clinic name at the top of the table was the name of the ART clinic as it existed in 2004. Some clinics not only have changed their names but have reorganized as well. Reorganization is defined as a change in ownership or affiliation or a change in at least two of the three key staff positions (practice director, medical director, or laboratory director). In such cases, no current name will be listed, but a statement will be included that the clinic has undergone reorganization since 2004. Also, in such cases, no current clinic services or profile will be listed.
- **Donor egg program.** Some clinics have programs for ART using donor eggs. Donor eggs are eggs that have been retrieved from one woman (the donor) and then transferred to another woman who is unable to conceive with her own eggs (the recipient). Policies regarding sharing of donor eggs vary from clinic to clinic.
- **Donor embryo.** These are embryos that were donated by another couple who previously underwent ART treatment and had extra embryos available.
- **Single women.** Clinics have varying policies regarding ART services for single (unmarried) women.
- **Gestational carriers.** A gestational carrier is a woman who carries a child for another woman; sometimes such women are referred to as gestational surrogates. Policies regarding ART services using gestational carriers vary from clinic to clinic. Some states do not permit clinics to offer this service.
- **Cryopreservation.** This item refers to whether the clinic has a program for freezing extra embryos that may be available from a couple's ART cycle.
- **SART member.** In 2004, 373 of the 411 reporting clinics were SART members.
- **Verified lab accreditation.** If "yes" appears next to this item, the ART clinic uses an embryo laboratory accredited by one of the following organizations:
 - College of American Pathologists (CAP)/American Society for Reproductive Medicine (ASRM), Reproductive Laboratory Accreditation Program.
 - Joint Commission on Accreditation of Healthcare Organizations (JCAHO).
 - New York State Tissue Bank Program (NYSTB).

If “pending” appears here, it means that the clinic has submitted an application for accreditation to one of the above organizations and has provided proof of such application to Westat. “No” indicates that the embryo laboratory has not been accredited by any of these three organizations.

CDC provides this information as a public service. ***Please note that CDC does not oversee any of these accreditation programs.*** They are all nonfederal programs. To become certified, laboratories must have in place systems and processes that comply with the accrediting organization’s standards. Depending on the organization, standards may include those for personnel, quality control and quality assurance, specimen tracking, results reporting, and the performance of technical procedures. Compliance with these standards is confirmed by documentation provided by the laboratory and by on-site inspections. For further information, consumers may contact the following accrediting organizations directly:

- CAP/ASRM, Reproductive Laboratory Accreditation Program: For a list of accredited laboratories, call 800-323-4040 and ask for Laboratory Accreditation.
- JCAHO: Call 630-792-5000 to inquire about the status of individual laboratories.
- New York State: Call 518-485-5341 to find out which laboratories are certified under the tissue bank regulations.

Further information on laboratory accreditation is provided in Appendix C.

2004 National Summary

A comparison of clinic success rates may not be meaningful because patient medical characteristics and treatment approaches vary from clinic to clinic. For more details about this, along with information on how to interpret the statistics in this table, see pages 71–80.

2004 ART CYCLE PROFILE

Type of ART ^a				Patient Diagnosis			
IVF	>99%	Procedural Factors:		Tubal factor	11%	Other factor	8%
GIFT	<1%	With ICSI	58%	Ovulatory dysfunction	6%	Unknown factor	11%
ZIFT	<1%	Unstimulated	<1%	Diminished ovarian reserve	12%	Multiple Factors:	
Combination	<1%	Used gestational carrier	<1%	Endometriosis	6%	Female factors only	12%
				Uterine factor	1%	Female & male factors	18%
				Male factor	17%		

2004 PREGNANCY SUCCESS RATES

Type of Cycle	Age of Woman			
	<35	35–37	38–40	41–42 ^c
Fresh Embryos from Nondonor Eggs				
Number of cycles	40,853	21,019	19,174	8,487
Percentage of cycles resulting in pregnancies	42.5	35.5	26.5	17.3
Percentage of cycles resulting in live births ^b	36.9	29.3	19.5	10.7
Percentage of retrievals resulting in live births ^b	40.2	33.3	23.2	13.3
Percentage of transfers resulting live births ^b	42.7	35.5	25.3	14.8
Percentage of transfers resulting in singleton live births	27.3	24.3	19.0	12.3
Percentage of cancellations	8.4	12.0	15.8	19.5
Average number of embryos transferred	2.5	2.7	3.0	3.3
Percentage of pregnancies with twins	32.7	28.0	21.2	14.5
Percentage of pregnancies with triplets or more	5.1	5.6	4.4	2.5
Percentage of live births having multiple infants ^b	36.1	31.5	24.9	16.8
Frozen Embryos from Nondonor Eggs				
Number of transfers	8,790	4,123	2,618	765
Percentage of transfers resulting in live births ^b	30.6	27.7	23.1	18.7
Average number of embryos transferred	2.5	2.6	2.7	2.9
All Ages Combined^d				
Donor Eggs	Fresh Embryos		Frozen Embryos	
Number of transfers	9,283		4,439	
Percentage of transfers resulting in live births ^b	50.5		30.5	
Average number of embryos transferred	2.4		2.7	

CURRENT CLINIC SERVICES AND PROFILE

Total number of reporting clinics: 411

Percentage of clinics that offer the following services:

Donor egg?	94	Gestational carriers?	76
Donor Embryo?	64	Cryopreservation?	99
Single women?	89		

Clinic profile:

SART member	91
Verified lab accreditation	
Yes	91
No	4
Pending	5

^a Reflects patient and treatment characteristics of ART cycles performed in 2004 using fresh nondonor eggs or embryos.

^b A multiple-infant birth is counted as one live birth.

^c See page 25 for national summary statistics for women older than 42.

^d All ages (including ages >42) are reported together because previous data show that patient age does not materially affect success with donor eggs.

