2002

Assisted Reproductive Technology Success Rates

CDC Reproductive Health

National Summary and Fertility Clinic Reports

U.S. Department of Health and Human Services

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Mail Stop K-34; Atlanta GA 30341-3717.

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Centers for Disease Control and Prevention
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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Preface

For many people who want to start a family, the dream of having a child is not easily realized; about 15% 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 2002 report of pregnancy success rates is the eighth 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 2002 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 391 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 2002.
- **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 2002 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 1995 National Survey of Family Growth.

- Of the approximately 60 million women of reproductive age in 1995, about 1.2 million, or 2%, had had an infertility-related medical appointment within the previous year and an additional 13% 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 professional society, the Society for Assisted Reproductive Technology (SART), to obtain the data published each year in the ART success rates report. SART is an organization of ART providers affiliated with the American Society for Reproductive Medicine (ASRM). SART maintains a list of all ART clinics known to be in operation in each year and tracks clinic reorganizations and closings. This list includes clinics and individual providers that are members of SART as well as clinics and providers that are not SART members. SART actively follows up reports of ART physicians or clinics not on its list to update the list as needed. Each year SART distributes a standard database-management software system and instructions to all ART clinics. Clinics electronically enter data into the SART system 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 2002 success rates being published in 2004?)** 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 3, page 15, 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 SART and are counted in the clinic's success rates.

6. Why is the report of 2002 success rates being published in 2004?

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 2002 were not known until October 2003. After ART outcomes were known, the following steps had to be completed before the report could be published:

- Clinics entered their data into an electronic data collection system and verified the data's accuracy before sending the data to SART.
- SART 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 were compiled and laid out.
- CDC and SART/ASRM 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. After the data have been verified, a quality control process called validation begins. This year, 30 of 391 reporting clinics were selected for site visits. Two members of the SART Validation Committee visited these clinics and compared medical record data for a sample of the clinic's ART cycles 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 391 fertility clinics that provided and verified information about the outcomes of the ART cycles started in their clinics in 2002.

Although we believe that almost all clinics that provided ART services in the United States throughout 2002 are represented in this report, data for a few clinics or practitioners are not

included because they either were not in operation throughout 2002 or did not report as required. Clinics and practitioners known to have been in operation throughout 2002 that did not report and verify their data are listed in this report as nonreporters, as required by law (see Nonreporting ART Clinics for 2002, by State, on pages 509–510, Appendix C). 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 115,392 cycles performed by the 391 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 146 ART cycles fell into this category in 2002.

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 2002 are represented in multiple cycles. Success rates cannot be calculated on a "per woman" basis because women's names are not reported to SART 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 http://www.asrm.org and http://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 2002 report?

Overall, the content and format of this report are similar to those used in previous years.

2002 National Report

National Summary and Fertility Clinic Reports

INTRODUCTION TO THE 2002 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 391 fertility clinics in operation in 2002 that provided and verified data on the outcomes of all ART cycles started in their clinics. The 115,392 ART cycles performed at these reporting clinics in 2002 resulted in 33,141 live births (deliveries of one or more living infants) and 45,751 babies.

The national report consists of graphs and charts that use 2002 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 2002.

The national report has five sections:

- Section 1 (Figures 1 and 2) presents information from all ART procedures reported.
- Section 2 (Figures 3 through 32) presents information on the 85,826 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.
- Section 3 (Figures 33 and 34) presents information on the ART cycles that used only frozen embryos from nondonor eggs (16,383 cycles resulting in 14,598 transfers).
- Section 4 (Figures 35 through 39) presents information on the ART cycles that used only donated eggs or embryos (13,183 cycles resulting in 11,870 transfers).
- Section 5 (Figures 40 through 46) presents trends in the number of ART procedures and success rates from 1996 through 2002.

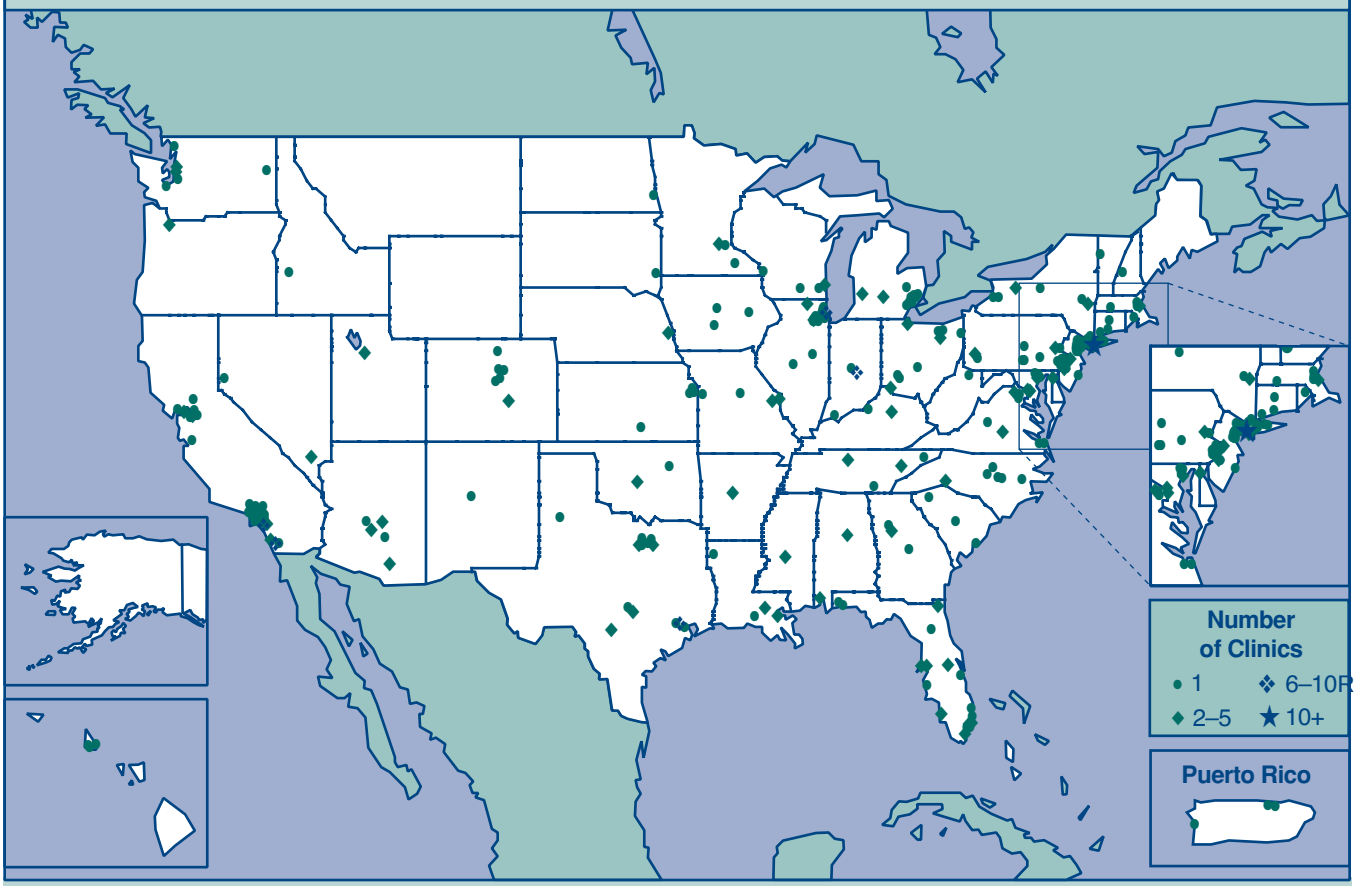
The 2002 national summary table, which is based on data from all clinics included in this report, is on page 71, immediately preceding the individual clinic tables. An explanation of how to read these tables is on pages 65–70.

SECTION 1: OVERVIEW

Where are U.S. ART clinics located, how many ART cycles did they perform in 2002, 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 391 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 live babies born as a result of ART all have increased steadily since CDC began collecting this information in 1995 (see Section 5, pages 52–58). Because in some cases more than one infant is born during a live-birth delivery (e.g., twins), the total number of live babies 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.

Figure 1
Location of ART Clinics in the United States and Puerto Rico, 2002



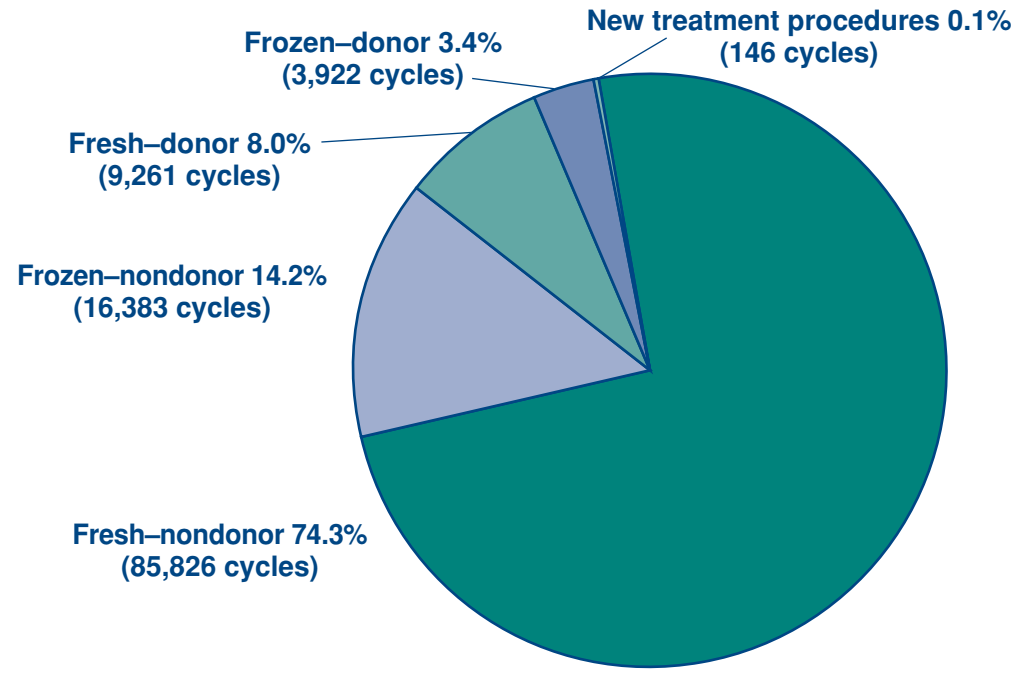
Number of ART clinics in the United States in 2002:	428
Number of U.S. ART clinics that submitted data in 2002:	391
Number of ART cycles reported for 2002:	115,392*
Number of live-birth deliveries resulting from ART cycles started in 2002:	33,141
Number of live babies born as a result of ART cycles carried out in 2002:	45,751

* Note: This number does not include 146 cycles in which a new treatment procedure was being evaluated (see Figure 2).

What types of ART procedures were used in the United States in 2002?

For slightly more than 74% of ART cycles carried out in 2002, fresh nondonor eggs or embryos were used. ART cycles that used frozen nondonor embryos were the next most common type, accounting for approximately 14% of the total. In about 11% 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 2002) 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 115,392 ART cycles.

Figure 2
Types of ART Procedures—United States, 2002



SECTION 2: ART CYCLES USING FRESH NONDONOR EGGS OR EMBRYOS

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

Figure 3 presents the steps for an ART cycle using fresh nondonor eggs or embryos and shows how ART users in 2002 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.

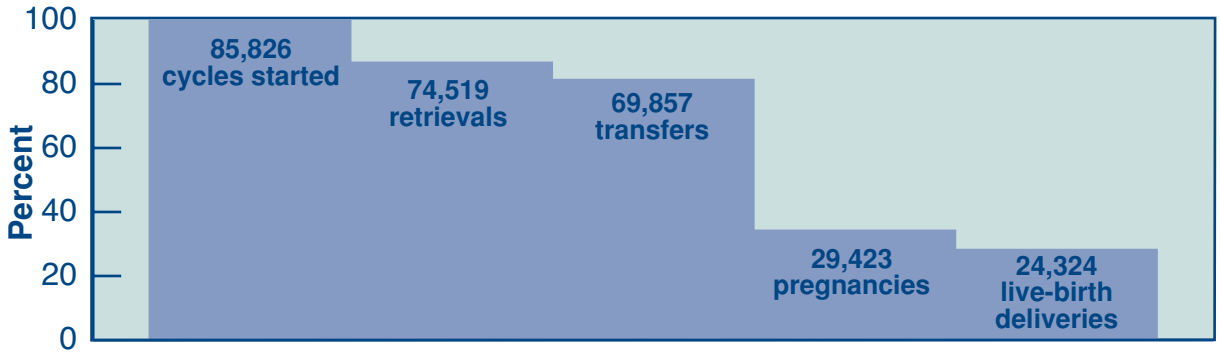
Once retrieved, eggs are combined with sperm in the laboratory. If fertilization is successful, one or more of the resulting embryos are selected for **transfer,** most often into a woman's uterus through the cervix (IVF), but sometimes into the fallopian tubes (e.g., GIFT, ZIFT; see pages 474 and 475 for definitions).

If one or more of the transferred embryos implant within the woman's uterus, the cycle then progresses 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.

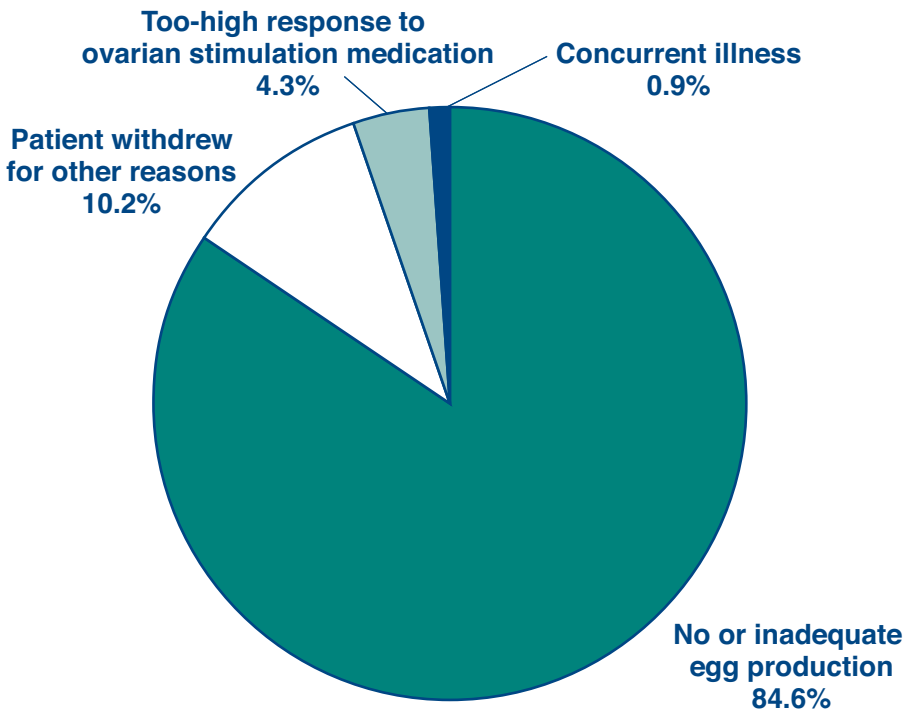
Figure 3
Outcome of ART Cycles Using Fresh Nondonor Eggs or Embryos, by Stage, 2002



Why are some ART cycles discontinued?

In 2002, 11,307 ART cycles (about 13%) were discontinued before the egg retrieval step (see Figure 3). Figure 4 shows reasons that the cycles were stopped. For approximately 85% 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 4
Reasons ART Cycles Using Fresh Nondonor Eggs or Embryos Were Discontinued in 2002

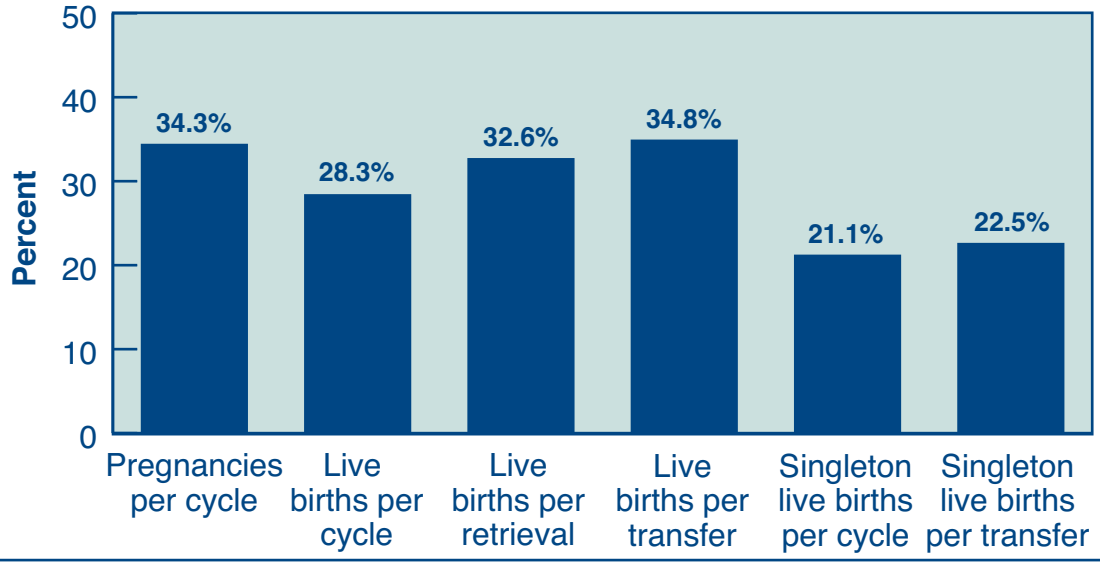


How is the success of an ART procedure measured?

Figure 5 shows ART success rates using six different measures, each providing slightly different information about this complex process. All of these rates have increased slightly each year since CDC began monitoring them in 1995 (see Section 5, pages 52–58).

- **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 7, page 19).
- **Live birth per cycle rate:** the percentage of ART cycles started that resulted in a live birth (a delivery of one or more living babies). 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 2002, about 13% of all cycles using fresh nondonor eggs or embryos were canceled for a variety of reasons (see Figure 4).
- **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 5
Success Rates for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Different Measures, 2002

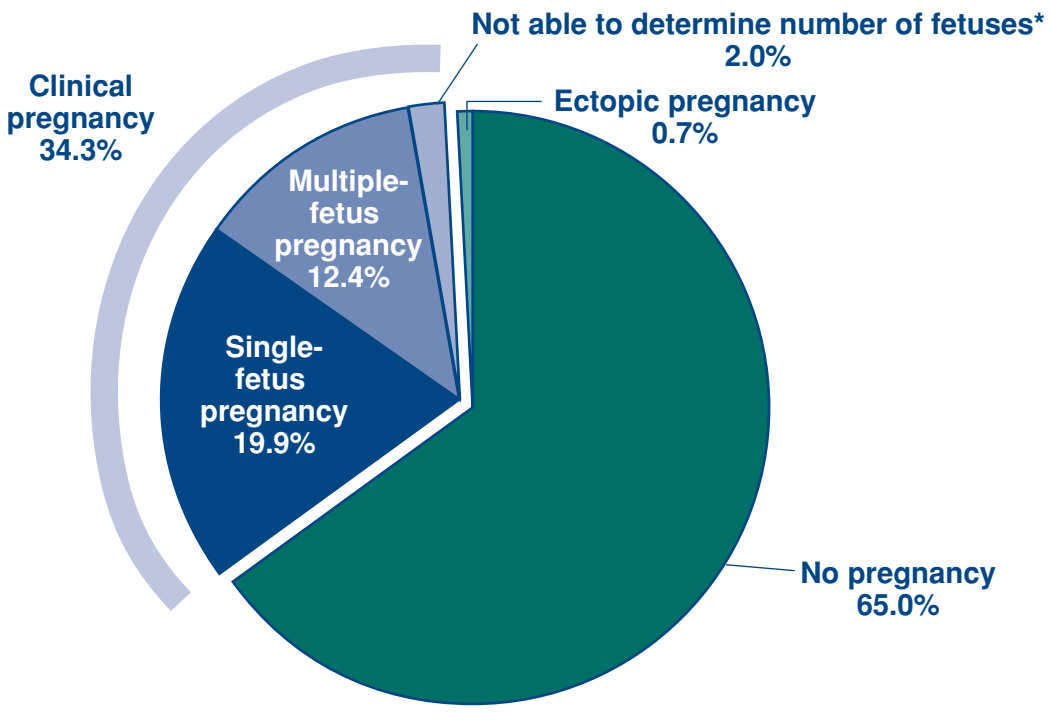


What percentage of ART cycles results in a pregnancy?

Figure 6 shows the results of ART cycles in 2002 that used fresh nondonor eggs or embryos. Most of these cycles (65%) did not produce a pregnancy; a very small proportion (0.7%) resulted in an ectopic pregnancy (the embryo implanted outside the uterus), and slightly more than 34% resulted in clinical pregnancy. Clinical pregnancies can be further subdivided as follows:

- 19.9% resulted in a single-fetus pregnancy.
- 12.4% resulted in a multiple-fetus pregnancy.
- 2.0% ended in miscarriage before the number of fetuses could be accurately determined.

Figure 6
Results of ART Cycles Using Fresh Nondonor Eggs or Embryos, 2002



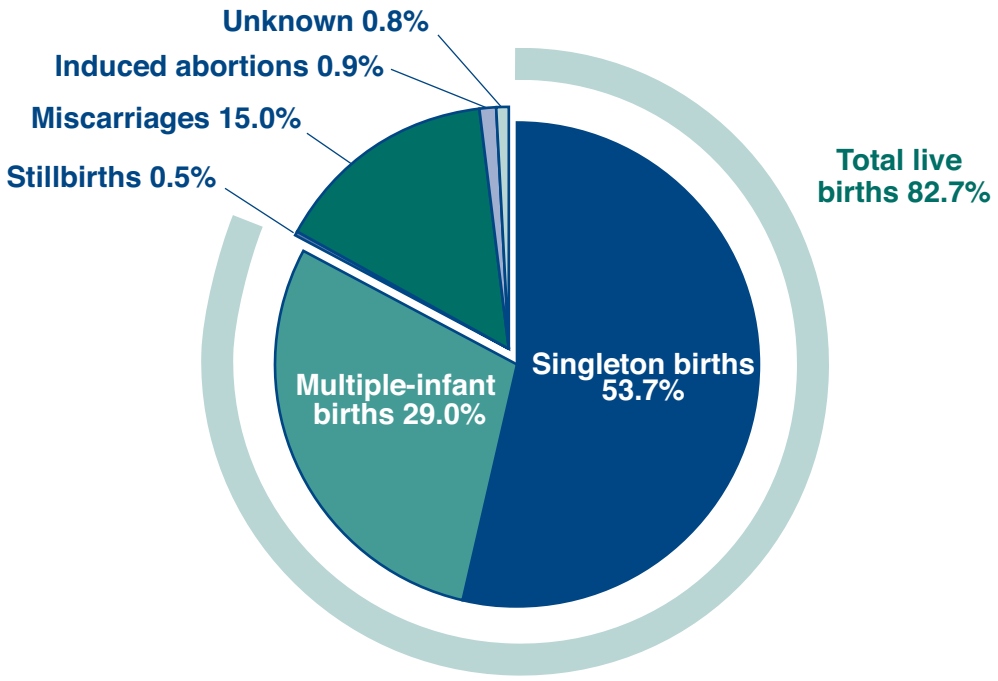
* Number of fetuses not known because the pregnancy ended in an early miscarriage.

What percentage of pregnancies results in live births?

Figure 7 shows the outcomes of pregnancies resulting from ART cycles in 2002 (see Figure 6). Approximately 83% of the pregnancies resulted in a live birth (nearly 54% in singleton births and 29% in multiple-infant births). About 16% of pregnancies resulted in an adverse outcome (miscarriage, induced abortion, or stillbirth). For 0.8% of pregnancies, the outcome was not reported.

Although the birth of more than one baby 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.

Figure 7
Outcomes of Pregnancies Resulting from ART Cycles Using Fresh Nondonor Eggs or Embryos,* 2002



* Total does not equal 100% due to rounding.

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

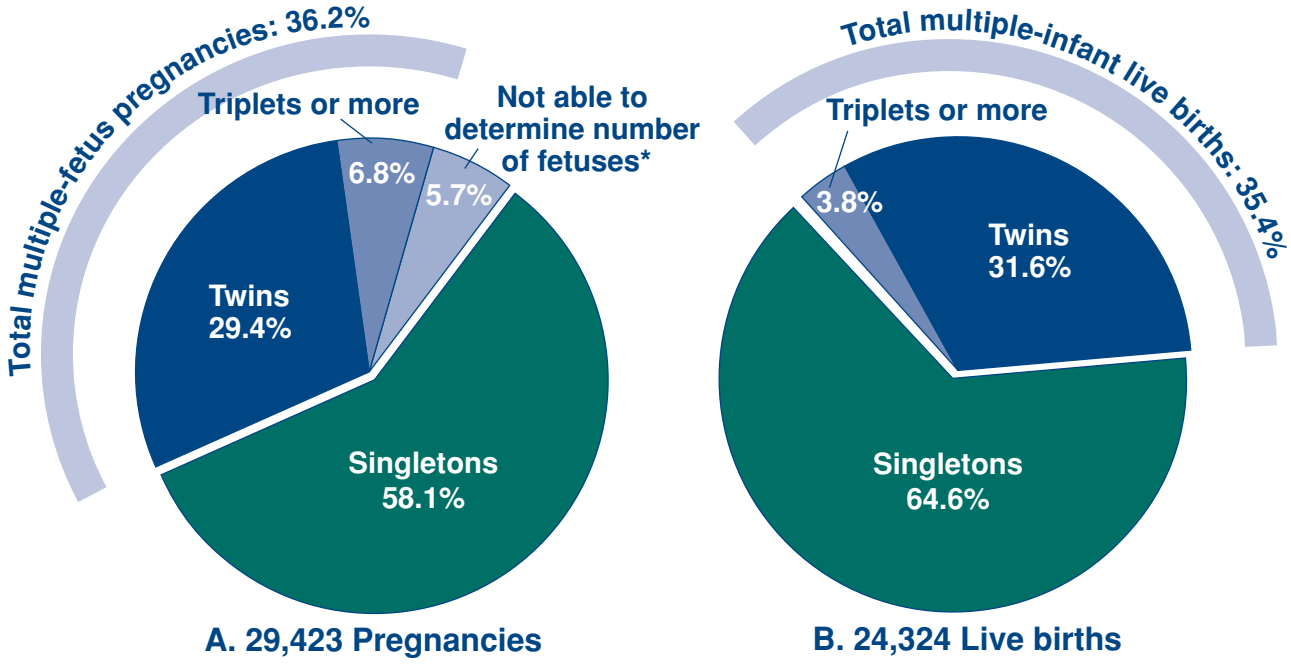
Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability or death.

Part A of Figure 8 shows that among the 29,423 pregnancies that resulted from ART cycles using fresh nondonor eggs or embryos, approximately 58% were singleton pregnancies, slightly more than 29% were twins, and about 7% were triplets or more. About 6% 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 36%).

In 2002, 4,854 pregnancies resulting from ART cycles ended in either miscarriage, stillbirth, or induced abortion, and 245 pregnancy outcomes were not reported. The remaining 24,324 pregnancies resulted in live births. Part B of Figure 8 shows that approximately 35% of these live births produced more than one infant (about 32% twins and about 4% 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 pregnancies than triplet 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 8
Risk of Having Multiple-Fetus Pregnancy and Multiple-Infant Live Birth from ART Cycles Using Fresh Nondonor Eggs or Embryos, 2002

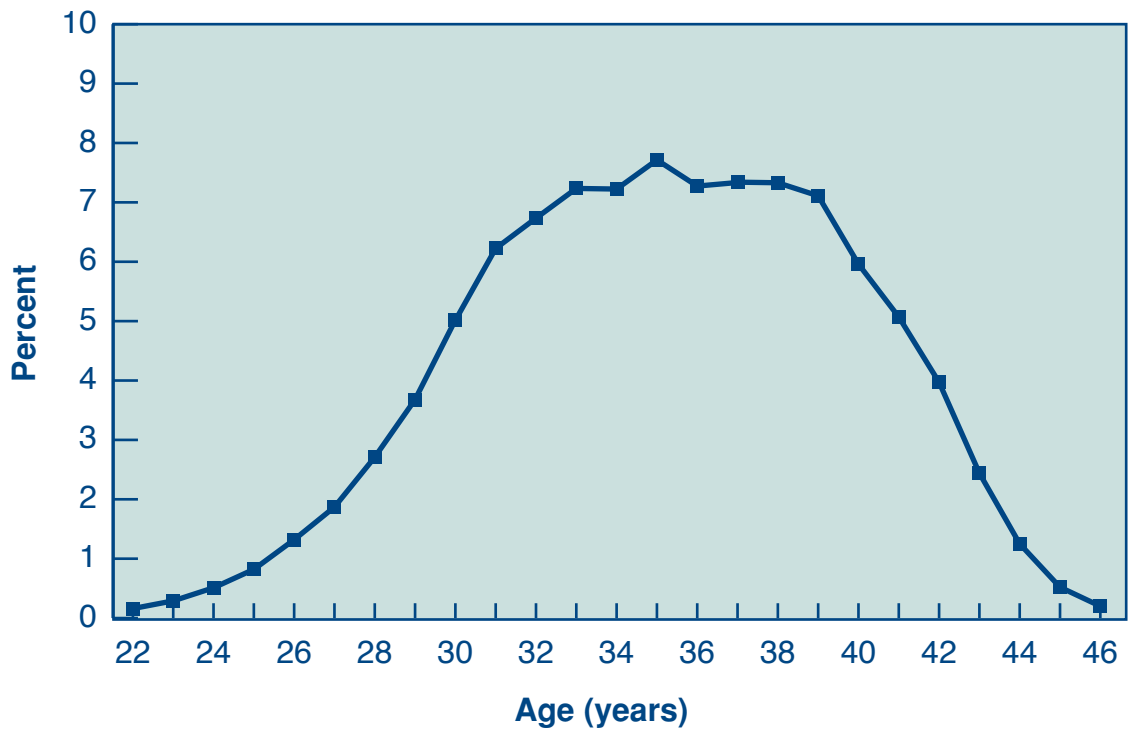


* Number of fetuses not known because the pregnancy ended in an early miscarriage.

What are the ages of women who have an ART procedure?

Figure 9 presents ART cycles using fresh nondonor eggs or embryos according to the age of the woman who had the procedure. About 69% of these cycles were among women aged 30–39. Because very few women younger than age 22 used ART and very few women older than age 46 used ART with their own eggs, those cycles are not included in the figure.

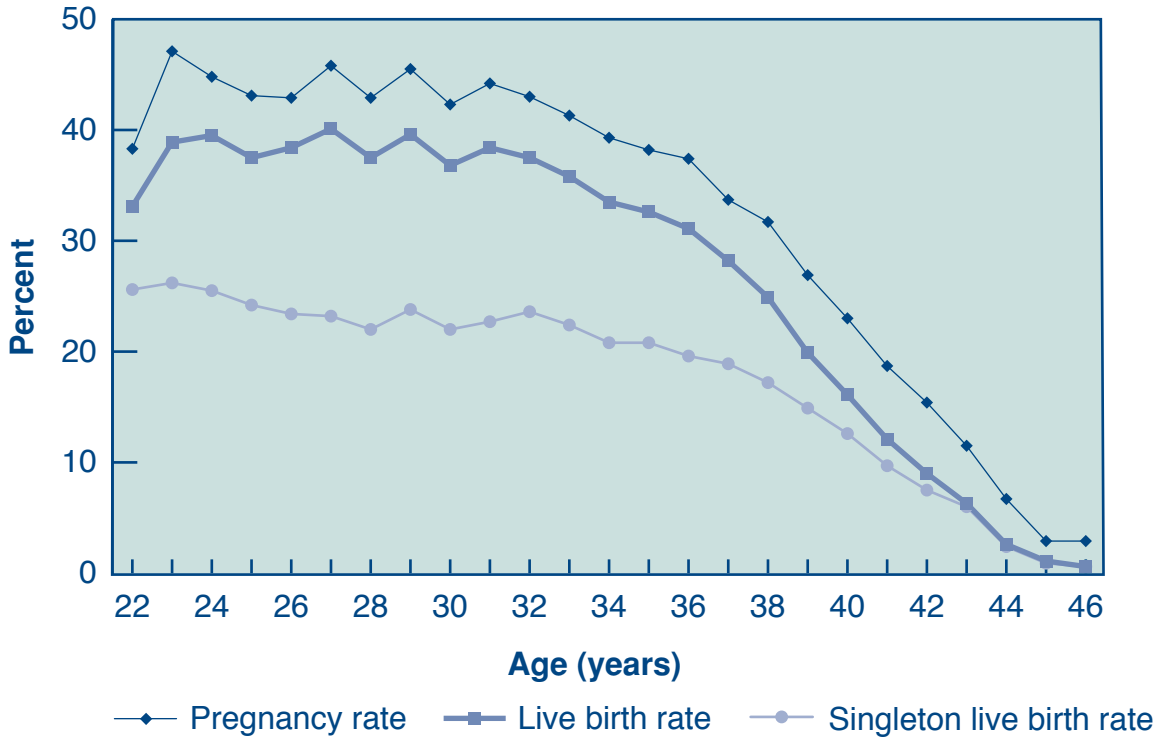
Figure 9
Age Distribution of Women Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos, 2002



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 10 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 2002. 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 younger women (see Figures 8, 23, and 24). 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 11.

Figure 10
Pregnancy Rates, Live Birth Rates, and Singleton Live Birth Rates for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Age of Woman,* 2002

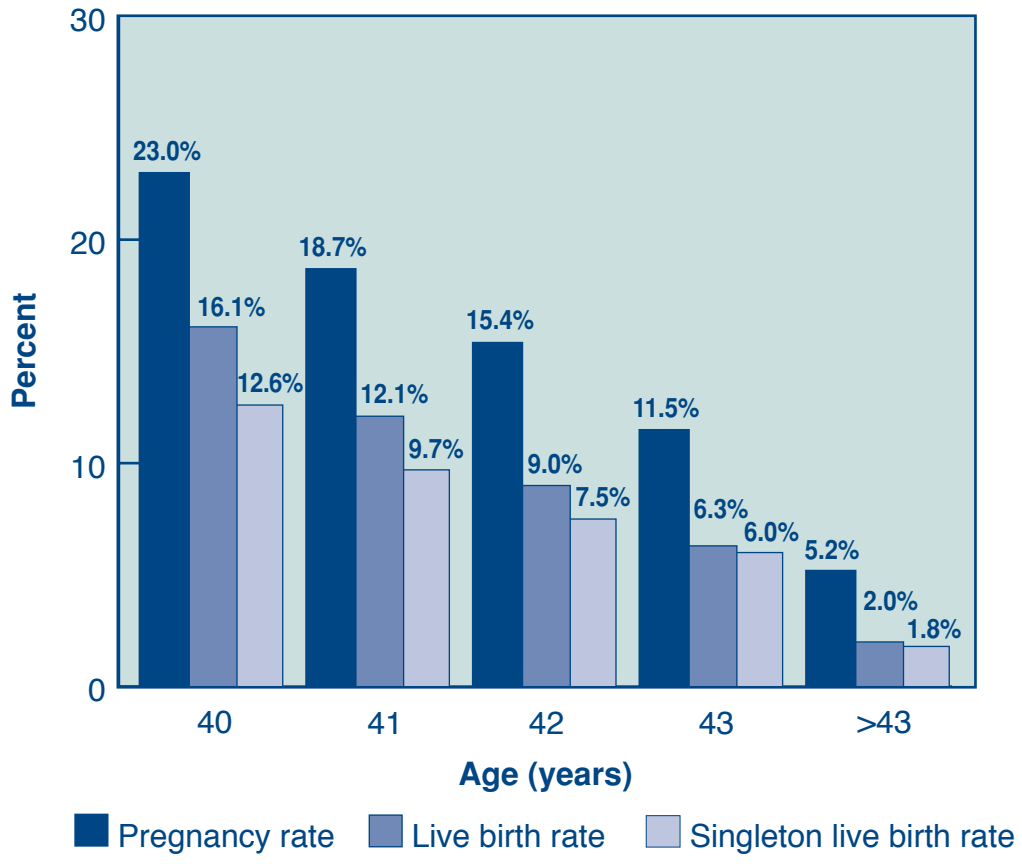


* For consistency, all rates are based on cycles started.

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 11 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 approximately 13%. All rates dropped steadily with each 1-year increase in age. For women age 43, the live birth rates and the singleton live birth rates were both approximately 6%. For women older than 43, the live birth rates and singleton live birth rates were both about 2%. Women 40 or older generally have much higher success rates using donor eggs (see Figure 36, page 48).

Figure 11
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,* 2002



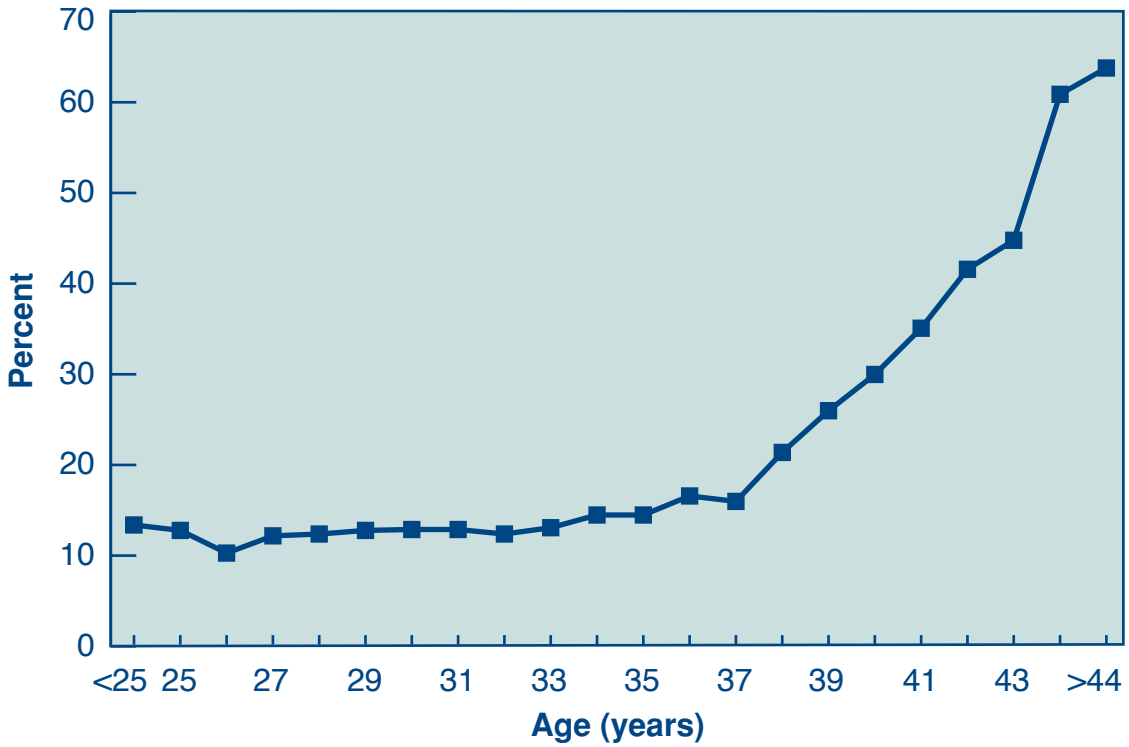
* For consistency, all rates are based on cycles started.

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 12 shows miscarriage rates for women of different ages who became pregnant using ART procedures in 2002. Miscarriage rates were below 14% 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 30% at age 40 and 45% at age 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 12
Miscarriage Rates Among Women Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos, by Age of Woman, 2002



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

In 2002, a total of 85,826 cycles using fresh nondonor eggs or embryos were started:

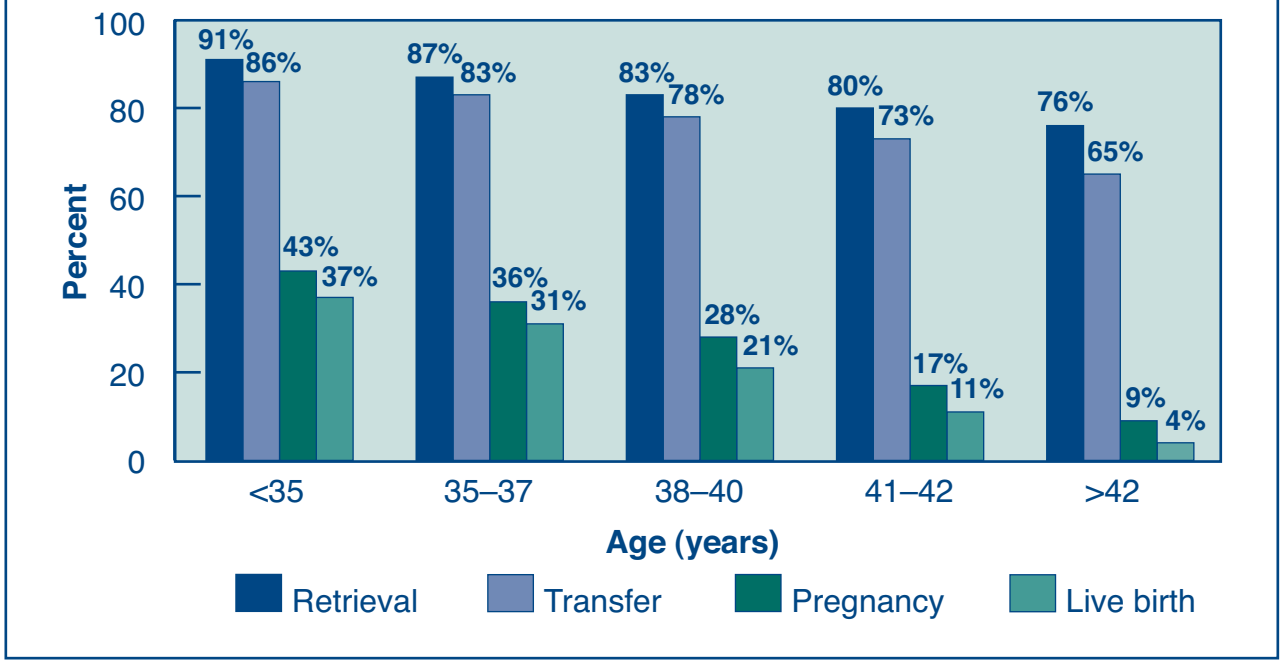
- 37,591 in women younger than 35
- 19,110 in women 35–37
- 17,454 in women 38–40
- 7,733 in women 41–42
- 3,938 in women older than 42

Figure 13 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 12).

Overall, 37% of cycles started in 2002 among women younger than 35 resulted in live births. This percentage decreased to 31% among women 35–37 years of age, 21% among women 38–40, 11% among women 41–42, and 4% among women older than 42. As noted in Figures 10 and 11, the proportion of cycles that resulted in singleton live births is even lower for each age group.

Figure 13
Outcomes of ART Cycles Using Fresh Nondonor Eggs or Embryos, by Stage and Age Group, 2002

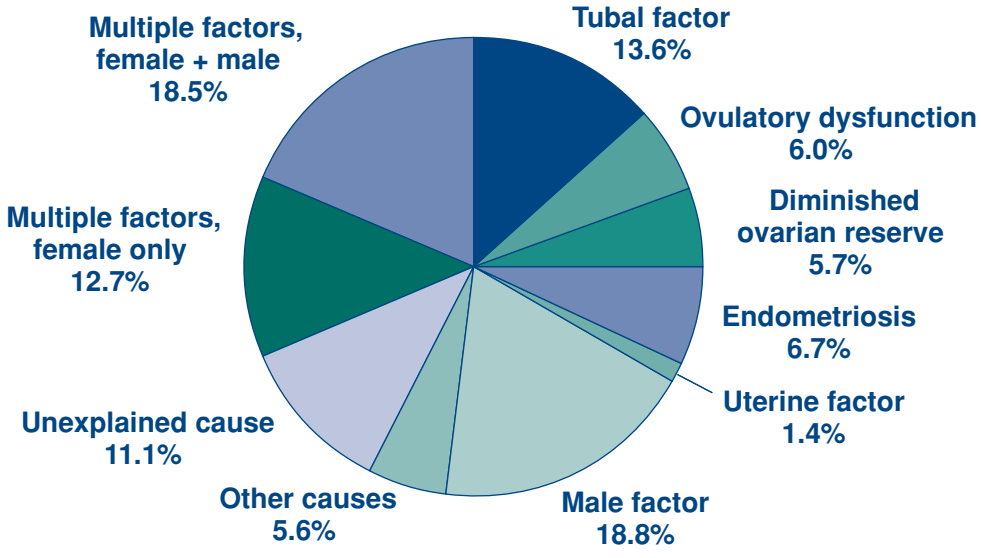


What are the causes of infertility among couples who use ART?

Figure 14 shows the infertility diagnoses reported among couples who had an ART procedure using fresh nondonor eggs or embryos in 2002. 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 be inexact.

- **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 14
Diagnoses Among Couples Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos,* 2002

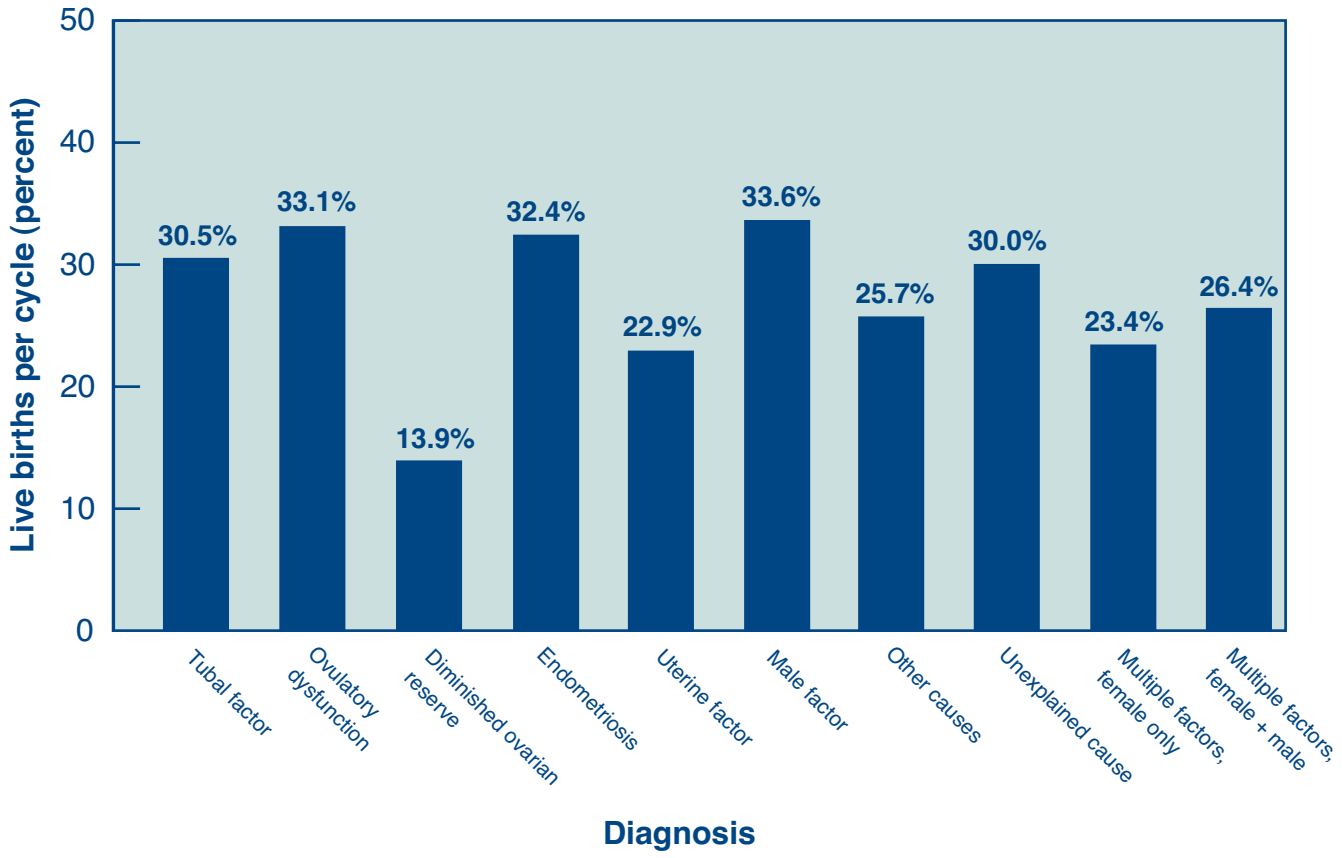


* Total does not equal 100% due to rounding.

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

Figure 15 shows the percentage of live births after an ART procedure according to the causes of infertility. (See Figure 14 or the Glossary in Appendix B for an explanation of the diagnoses.) Although the national average success rate was slightly more than 28%, 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.

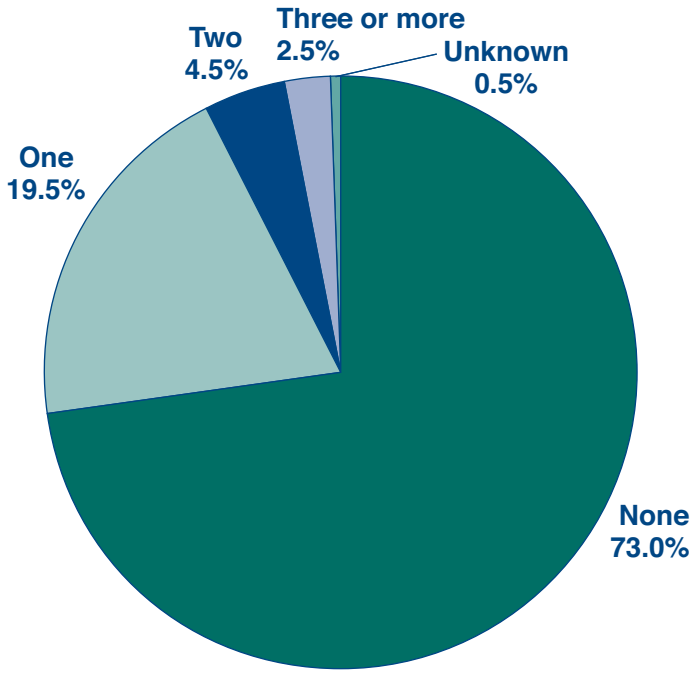
Figure 15
Live Birth Rates Among Women Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos, by Diagnosis, 2002



How many women who use ART have previously given birth?

Figure 16 shows the number of previous births among women who had an ART procedure using fresh nondonor eggs or embryos in 2002. Most of these women (73%) had no previous births, although they may have had a pregnancy that resulted in a miscarriage or an induced abortion. About 20% of women using ART in 2002 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, including the infertility of a new partner.

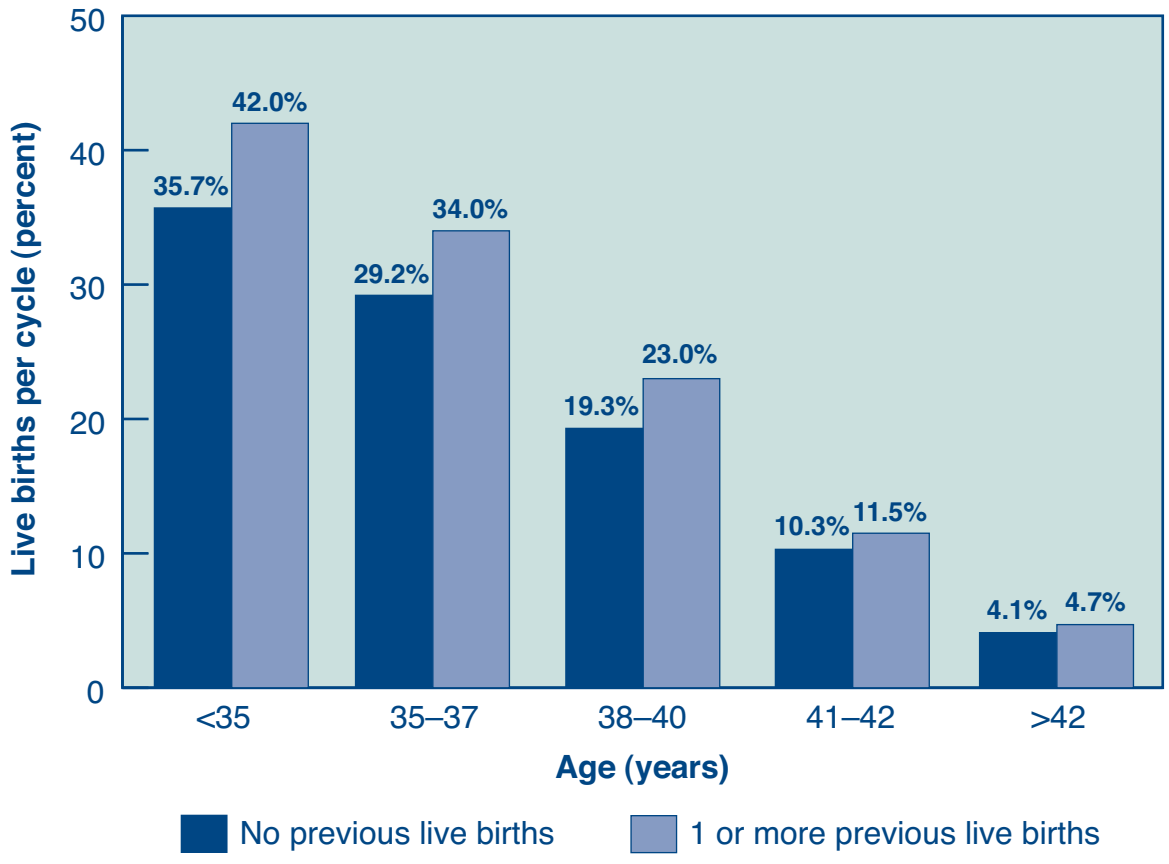
Figure 16
Number of Previous Births Among Women Who Had ART Cycles Using Fresh Nondonor Eggs or Embryos, 2002



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

Figure 17 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.

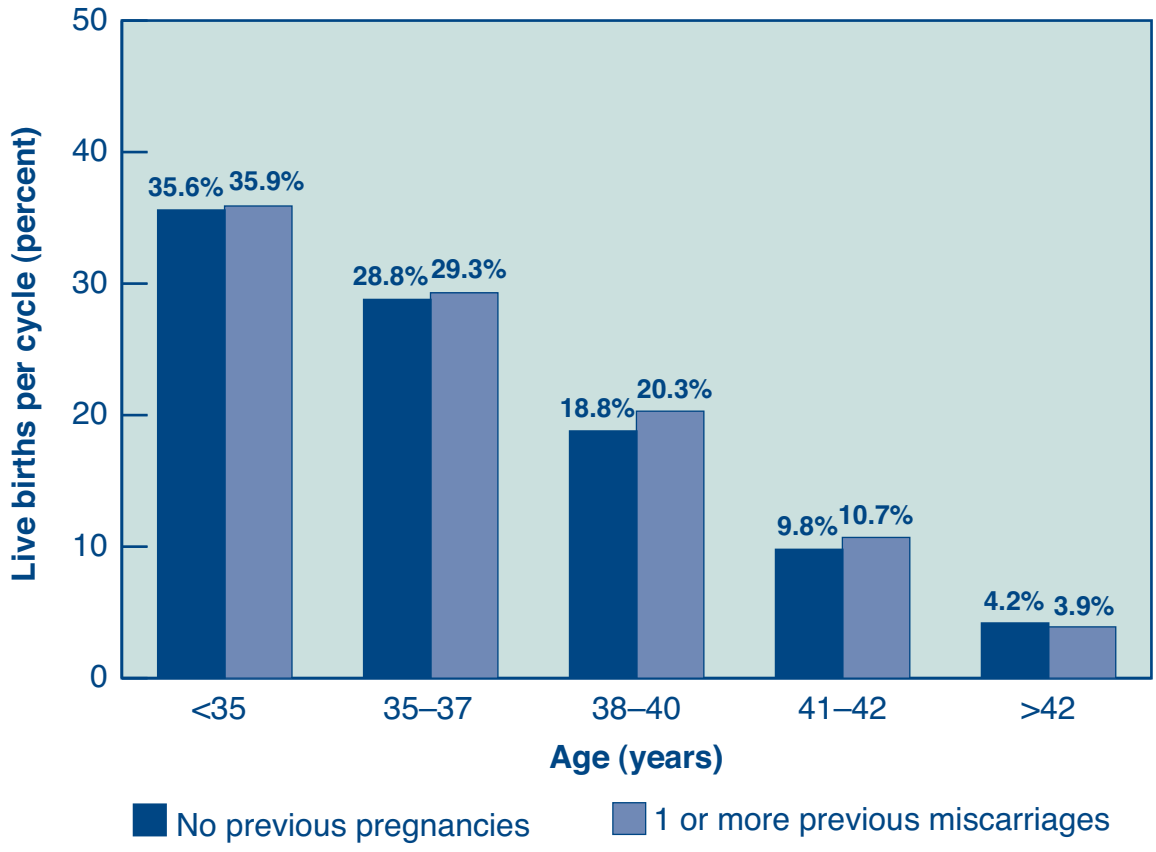
Figure 17
Live Birth Rates for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Woman's Age and Number of Previous Live Births, 2002



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

In 2002, 62,638 ART cycles were performed among women who had not previously given birth (see Figure 16). However, about 26% 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 18 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 18
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,* 2002

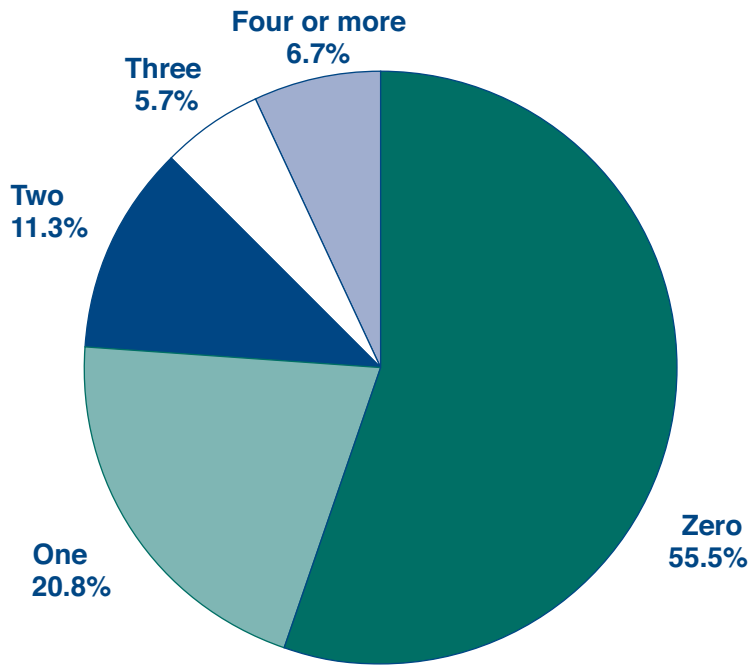


* Women reporting only previous ectopic pregnancies or pregnancies that ended in induced abortion were not included in the above statistics.

How many current ART users have undergone previous ART cycles?

Figure 19 presents ART cycles that used fresh nondonor eggs or embryos in 2002 according to whether previous ART cycles had been performed. For about 45%, 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.

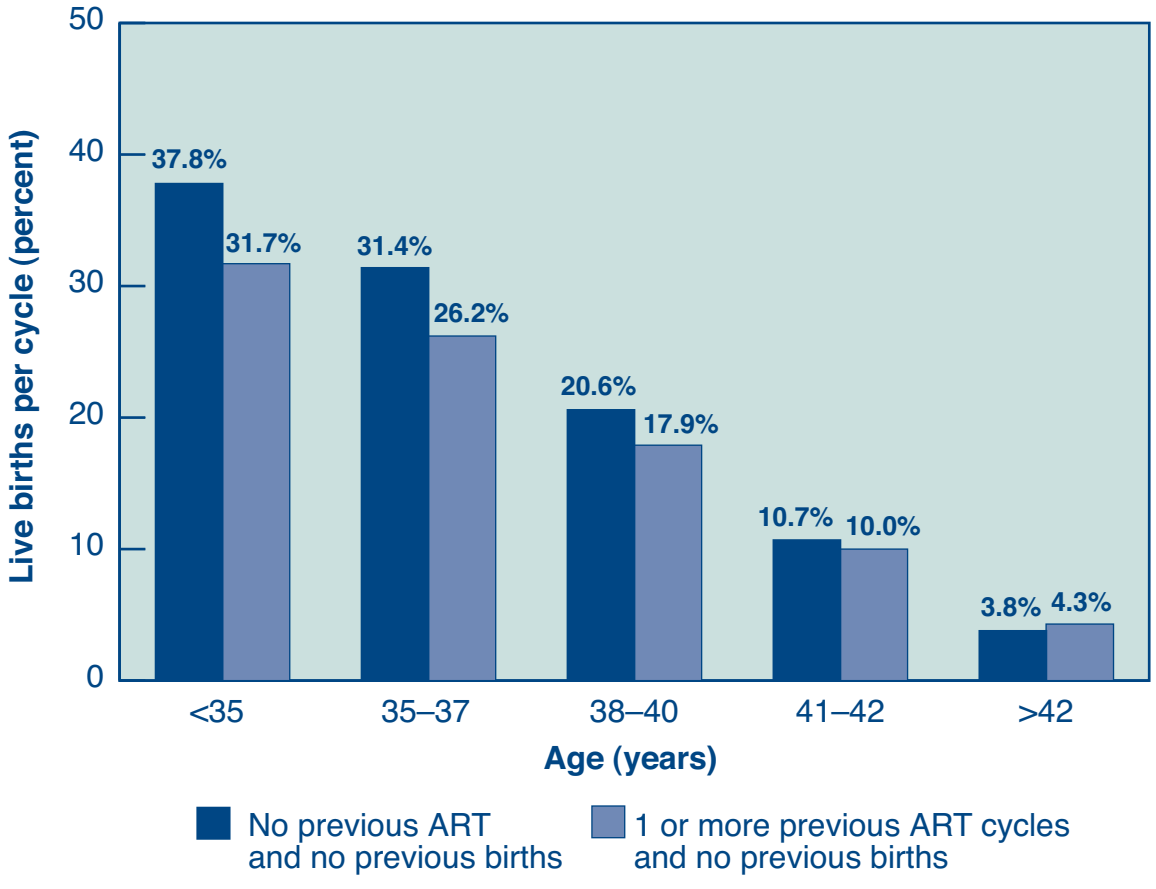
Figure 19
Number of Previous ART Cycles Among Women Undergoing ART in 2002 with Fresh Nondonor Eggs or Embryos



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

Figure 20 shows the relationship between the success of ART cycles performed in 2002 using fresh nondonor eggs or embryos and a history of previous ART cycles among women with no previous births. In all age groups up to age 42, success rates were lower for women who had previously undergone an unsuccessful ART cycle.

Figure 20
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, 2002

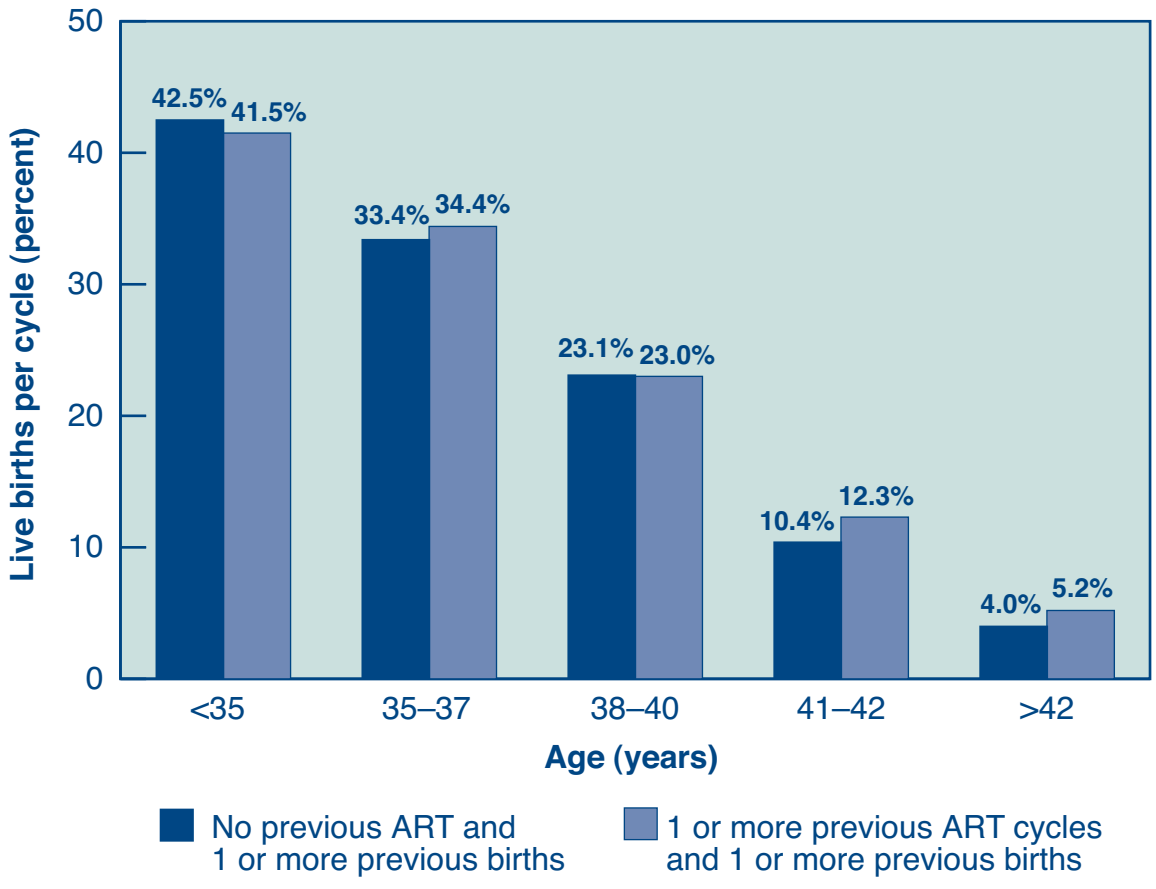


What are the success rates for women who have had *both* previous ART and previous births?

Figure 21 shows the relationship between the success of ART cycles performed in 2002 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, there was no decline in success rates if they had undergone previous ART cycles.

Taken together, Figures 20 and 21 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.

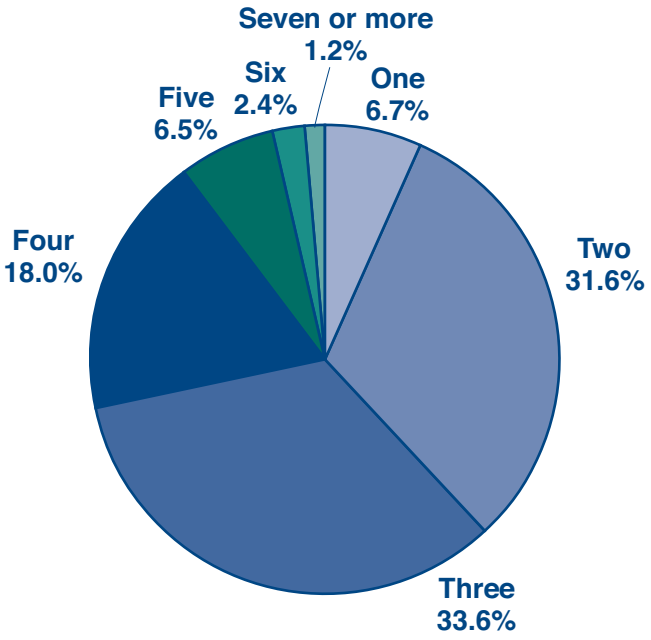
Figure 21
Live Birth Rates for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Woman's Age and History of Previous ART Cycles, Among Women with One or More Previous Births, 2002



How many embryos are transferred in an ART procedure?

Figure 22 shows that approximately 62% of ART cycles that used fresh nondonor eggs or embryos and progressed to the embryo transfer stage in 2002 involved the transfer of three or more embryos, about 28% of cycles involved the transfer of four or more, and approximately 10% of cycles involved the transfer of five or more embryos.

Figure 22
Number of Embryos Transferred During ART Cycles Using Fresh Nondonor Eggs or Embryos, 2002

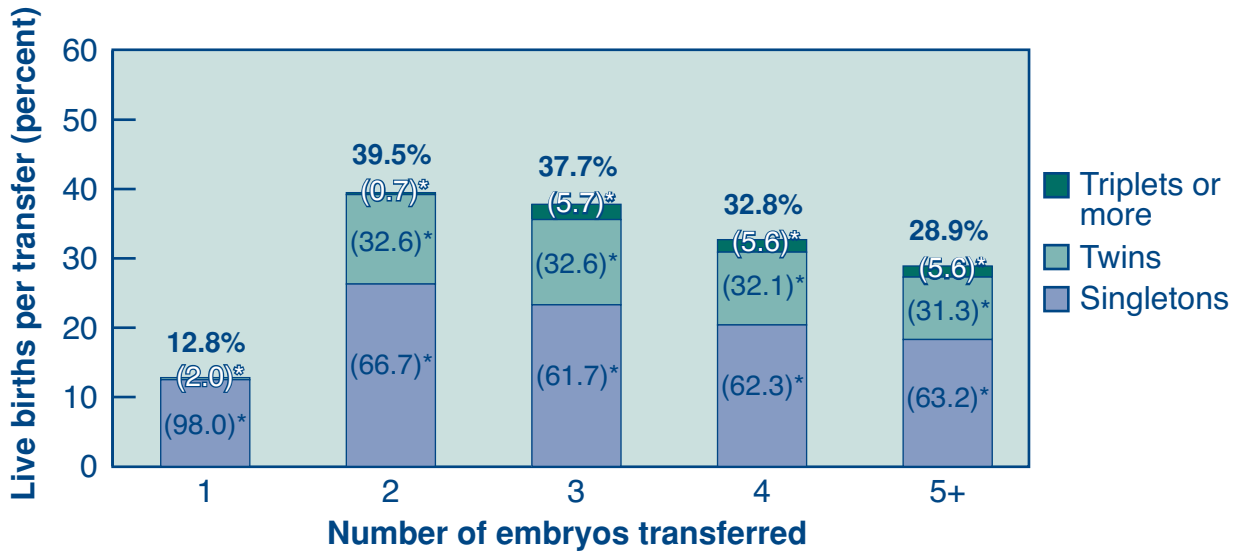


In general, is an ART cycle more likely to be successful if more embryos are transferred?

Figure 23 shows the relationship between the number of embryos transferred during an ART procedure in 2002 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 age and embryo quality. See Figure 24 for more details on women most at risk for multiple births.

Figure 23
Live Births per Transfer and Percentages of Multiple-Infant Births for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Number of Embryos Transferred, 2002



* Percentages of live births that were singletons, 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.

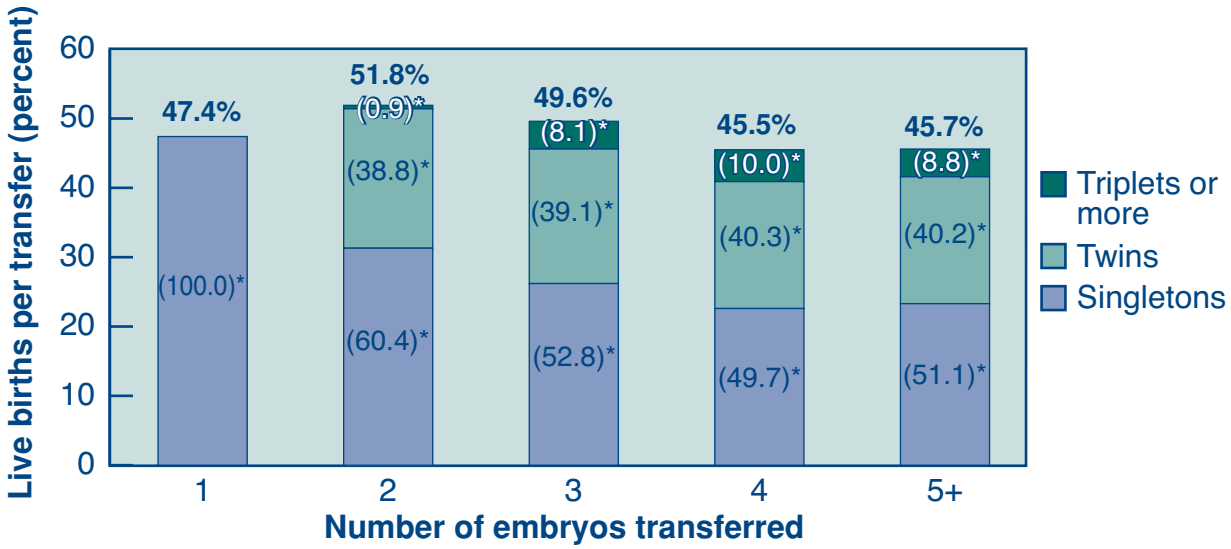
Are live birth rates affected by the number of embryos transferred for women who have more embryos available than they choose to transfer?

Although, in general, transferring more than one embryo tends to improve the chance for a successful ART procedure (see Figure 23), 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 24 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 47% 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 40% with two embryos and slightly more than 47% with three embryos. Transferring three or more embryos also created an additional risk for higher-order multiple births (i.e., triplets or more).

Figure 24
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, 2002



* Percentages of live births that were singletons, 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 triplets resulted when two embryos were transferred.

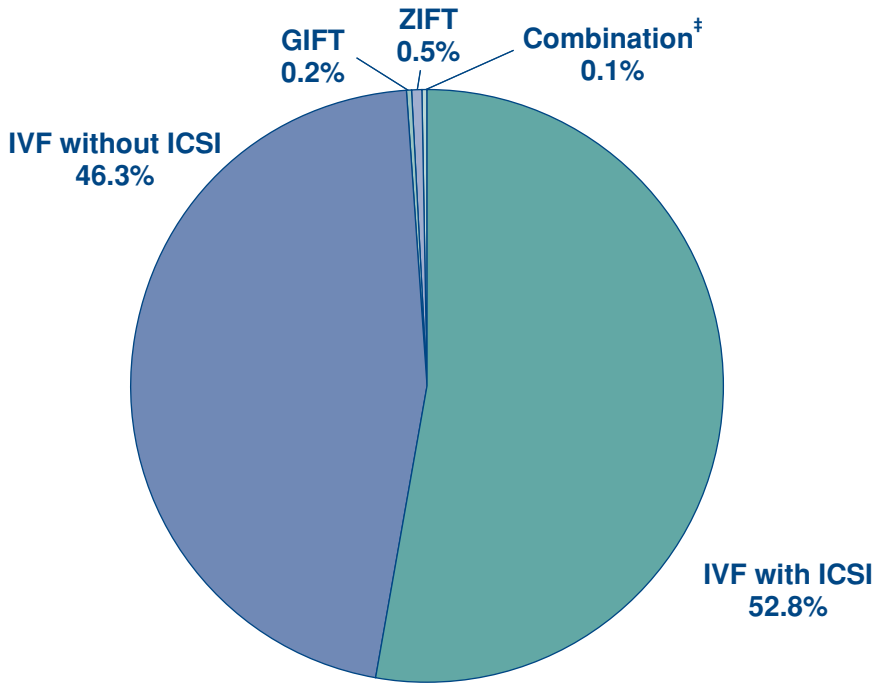
What were the specific types of ART performed among women who used fresh nondonor eggs or embryos in 2002?

For about 46% of ART procedures that used fresh nondonor eggs or embryos in 2002, 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 (about 53%) 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 25
Types of ART Procedures Using Fresh Nondonor Eggs or Embryos,*† 2002

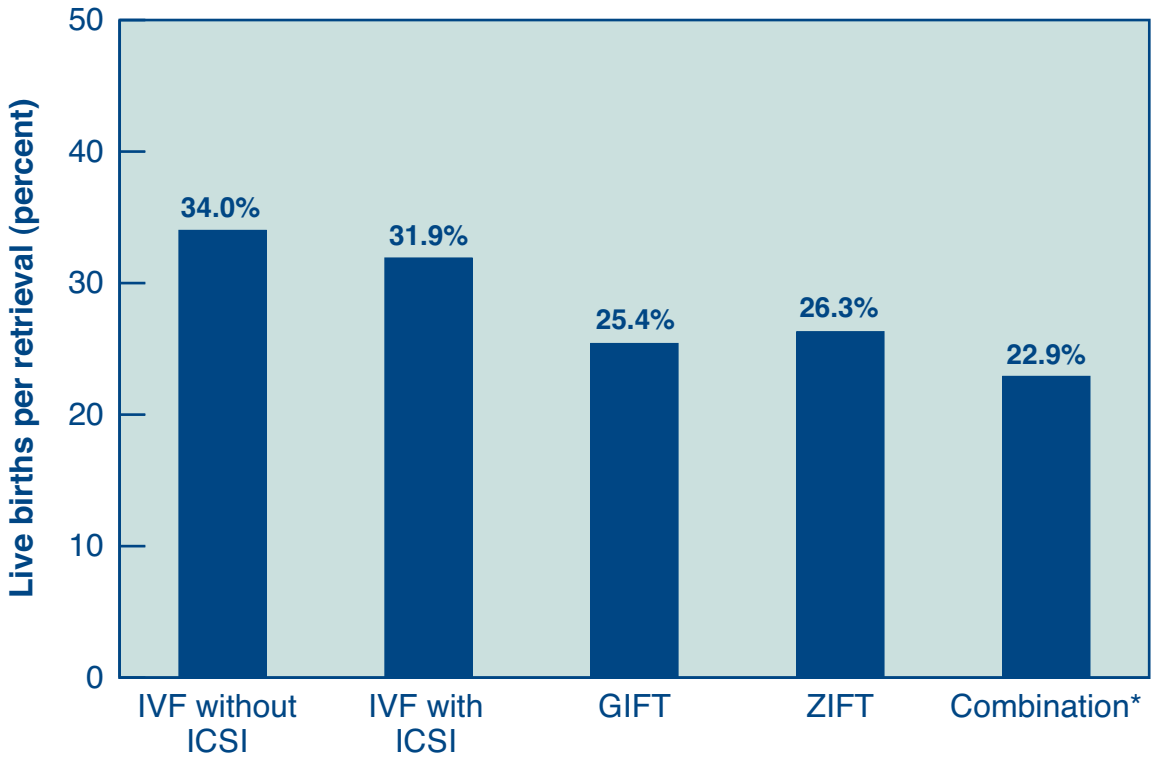


* Cycles that were canceled before egg retrieval were classified as IVF, GIFT, or ZIFT based on the intended ART method.
† Total does not equal 100% due to rounding.
‡ Combination of IVF with or without ICSI and either GIFT or ZIFT.

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

Figure 26 shows the percentage of egg retrievals that resulted in a live birth for each type of ART procedure started in 2002. 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, ZIFT, or a combination of IVF and either GIFT or ZIFT were much lower. See Figures 27–29 for further details on IVF procedures that used ICSI.

Figure 26
Live Births per Retrieval for Different Types of ART Procedures Using Fresh Nondonor Eggs or Embryos, 2002

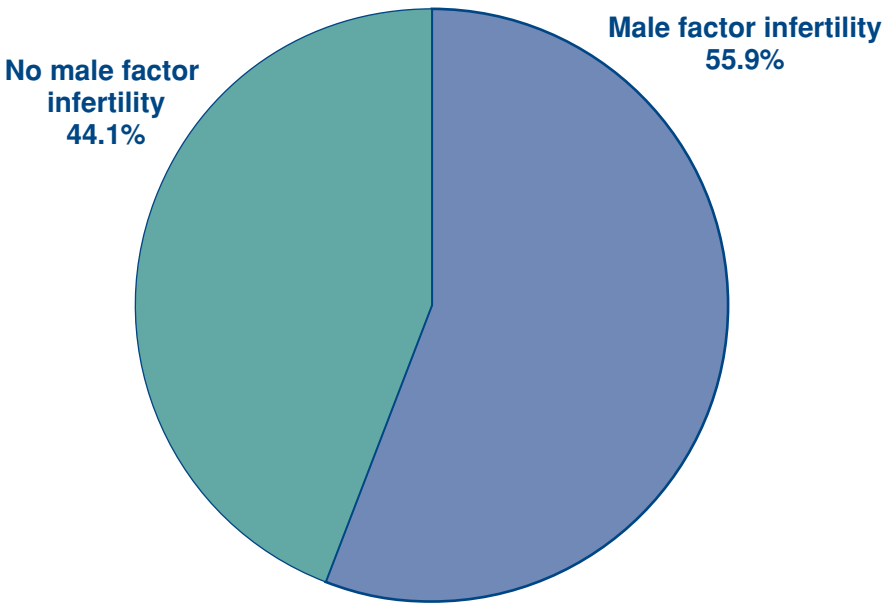


* Combination of IVF with or without ICSI and either GIFT or ZIFT.

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 2002, 45,334 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 44%) were performed for couples without a diagnosis of male factor infertility.

Figure 27
Use of ICSI* in Fresh–Nondonor Cycles Among Couples with and Without Diagnoses of Male Factor Infertility,† 2002



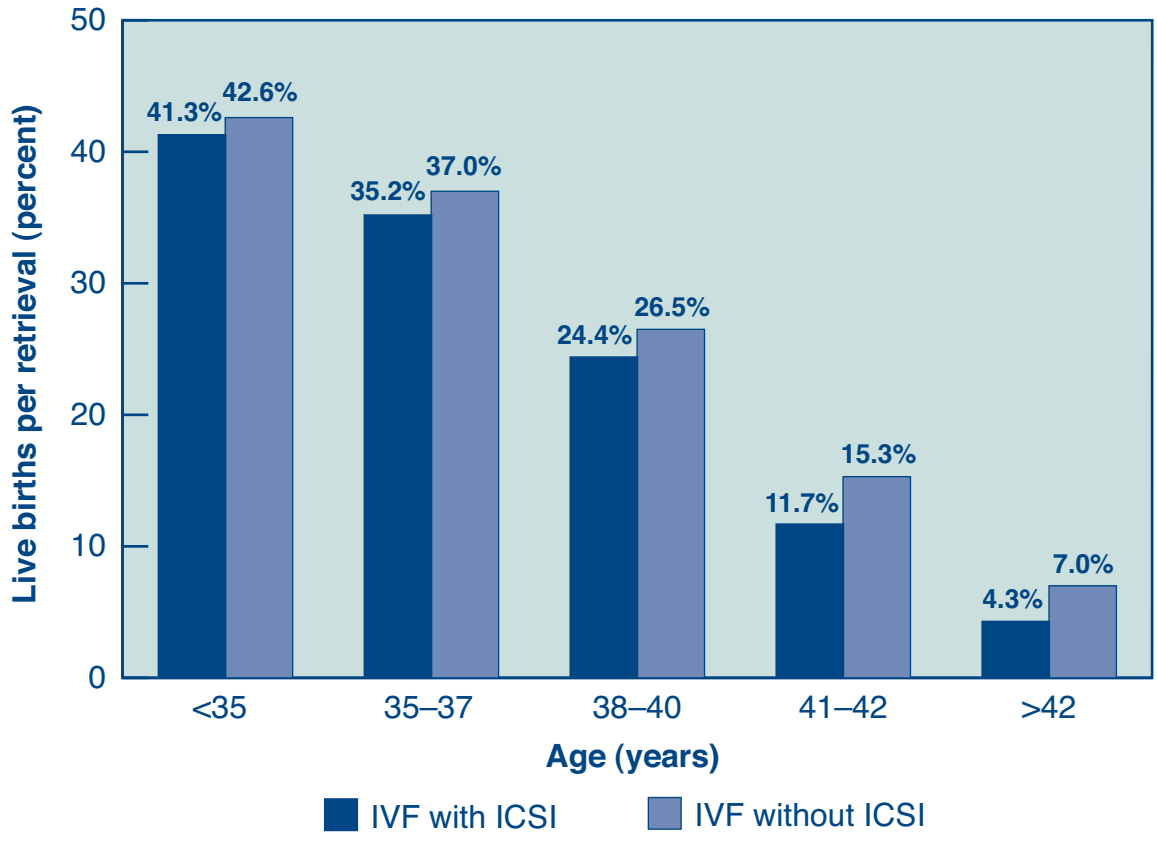
* Intracytoplasmic sperm injection.
† Based on 45,334 cycles that used IVF with ICSI.

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 2002, about 79% of couples diagnosed with male factor infertility used IVF with ICSI. Figure 28 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.

Figure 28
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* in Comparison to IVF Without ICSI, by Woman's Age,† 2002

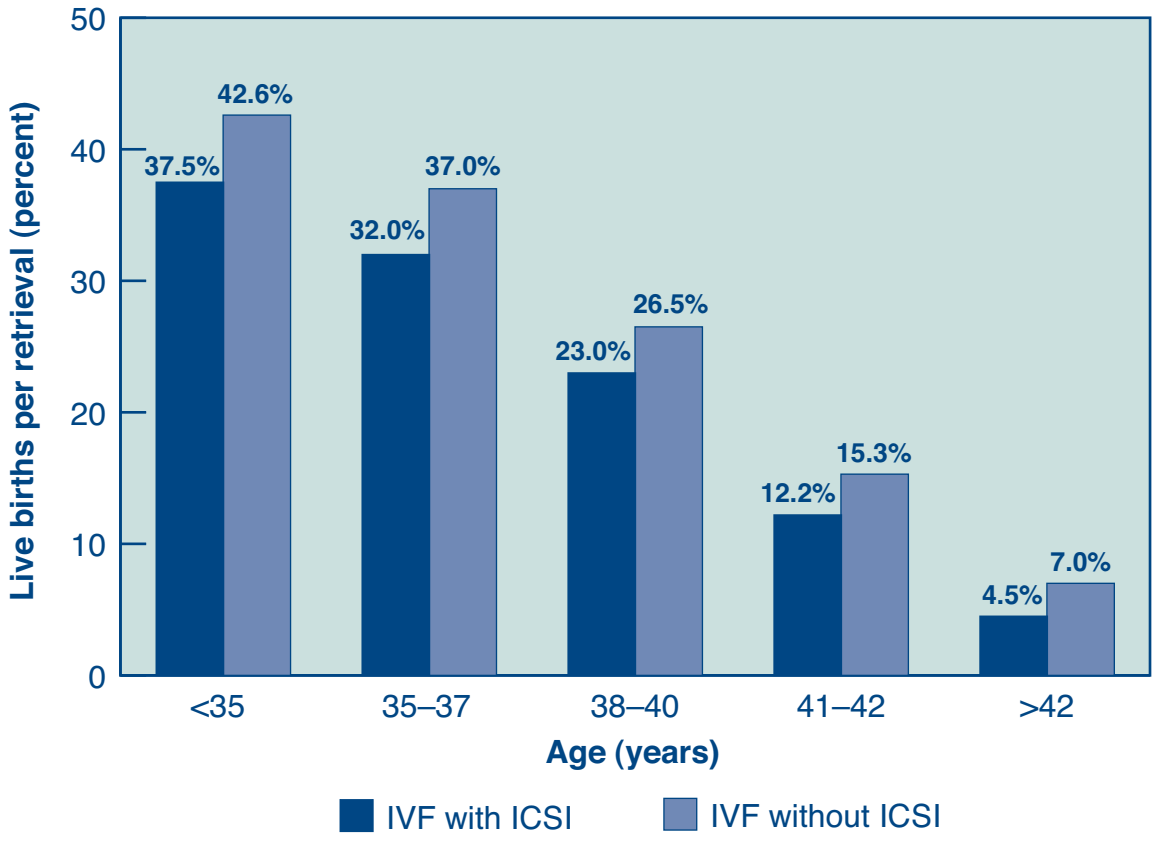


* Intracytoplasmic sperm injection.
† Cycles using donor sperm and cycles using GIFT or ZIFT are excluded. The comparison group of IVF without ICSI includes couples with all diagnoses except male factor infertility.

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

As shown in Figure 27, a large number of ICSI procedures are now performed even when couples are not diagnosed with male factor infertility. Figure 29 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. 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 used 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 diagnosed 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 29
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,† 2002

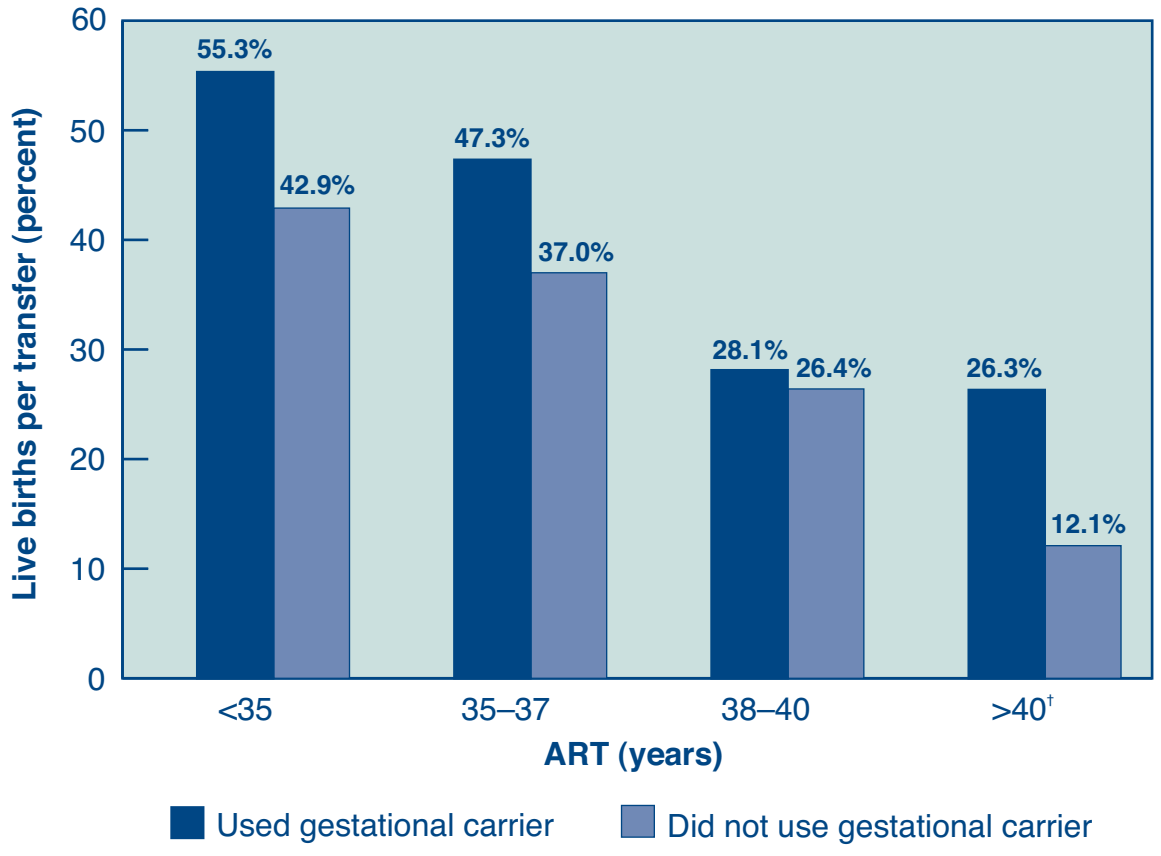


* Intracytoplasmic sperm injection.
† Cycles using GIFT or ZIFT are excluded.

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 0.6% of ART cycles using fresh nondonor embryos in 2002 (548 cycles). Figure 30 compares success rates per transfer for ART cycles that used a gestational carrier in 2002 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. However, the age of the ART patient (source of the egg) was a strong predictor of success regardless of whether a gestational carrier was used.

Figure 30
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,* 2002

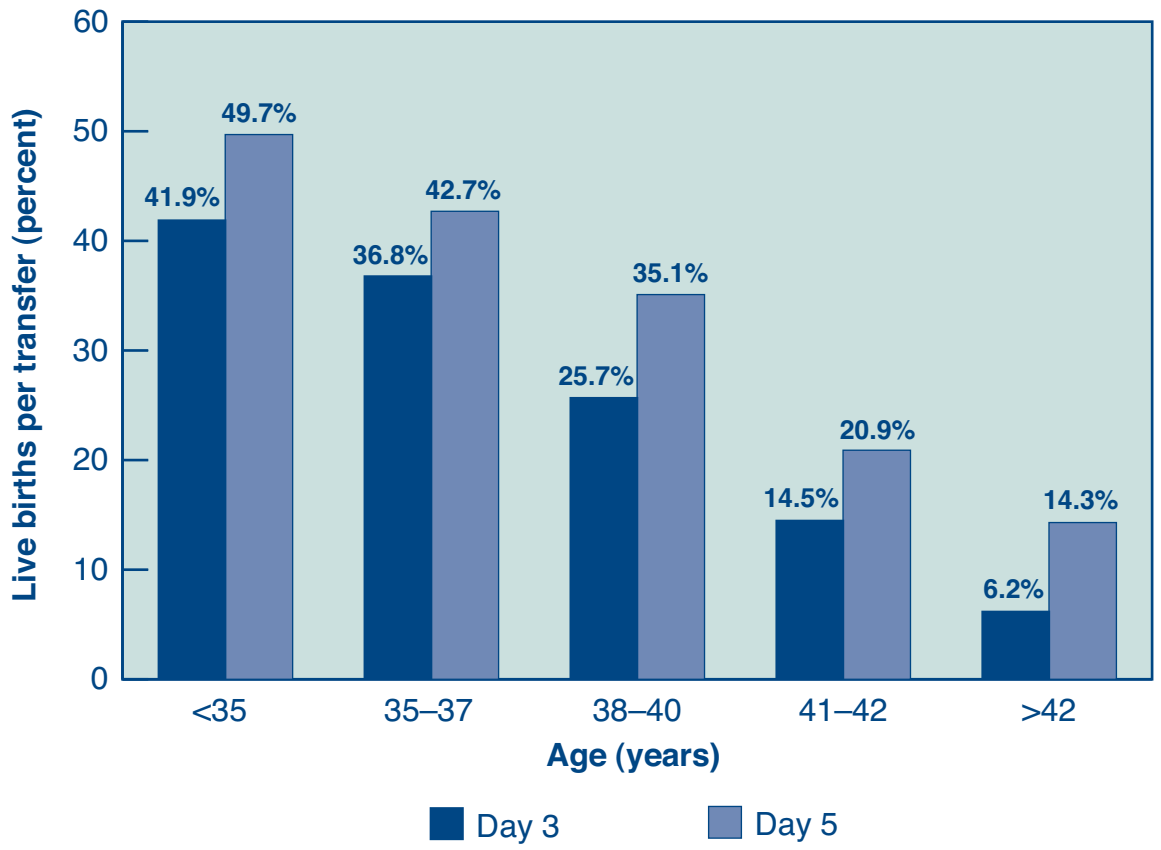


* Age categories reflect the age of the ART patient, not the age of the gestational carrier.
† We were unable to further subdivide ages >40 because the number of such cycles is very small.

Are success rates affected by the day of embryo transfer?

Once an ART cycle has progressed from egg retrieval to successful fertilization, the embryo(s) can be transferred into the woman's uterus anytime from 1 to 6 days after the eggs were retrieved. Figure 31 shows live birth rates per transfer for cycles that used fresh nondonor embryos by the day embryo transfer occurred. In 2002, about 75% of embryo transfers occurred on day 3. Using advanced laboratory techniques, embryo growth in the laboratory can be extended beyond day 3, most commonly to day 5. Among those ART cycles that progressed to the embryo transfer stage, the success rate was higher for embryos that had been cultured for 5 days than for those cultured for only 3 days. This pattern of results was seen for all age groups. However, it should be noted that embryo culture for 5 days may not be the best treatment option for all patients undergoing ART, because there is a risk that some embryos may not survive to day 5.

Figure 31
Live Births per Transfer for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Day of Embryo Transfer,* 2002

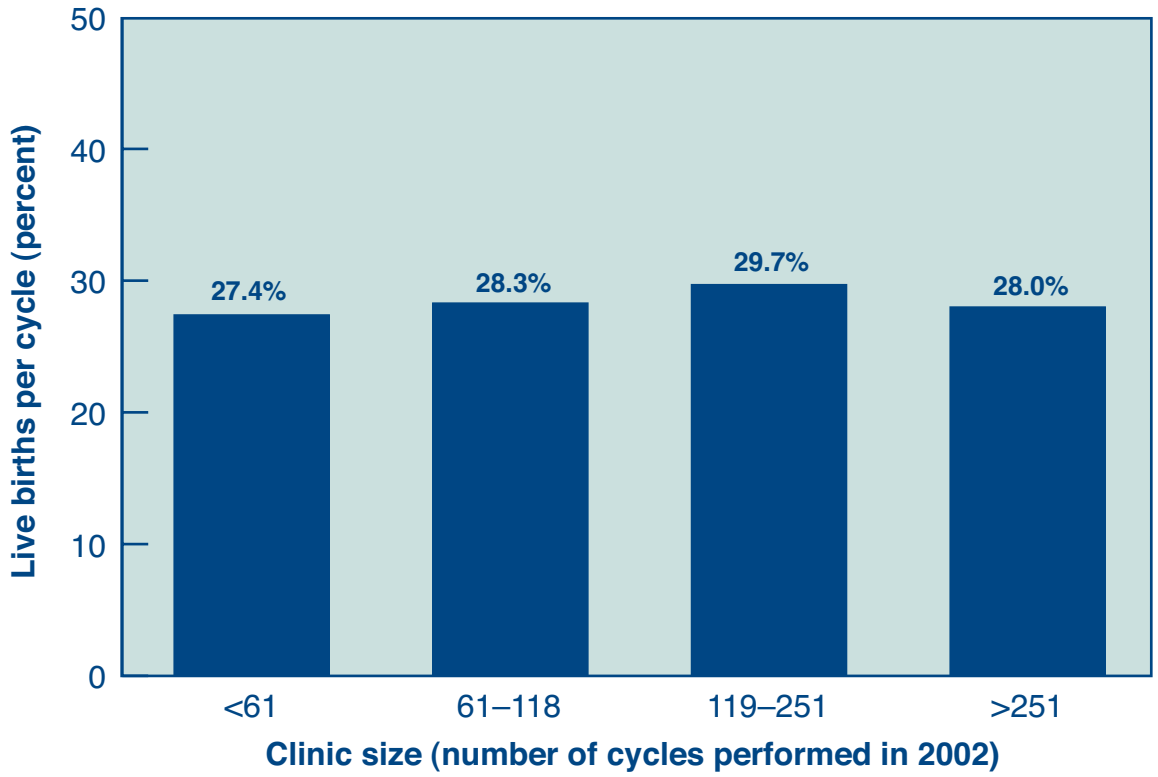


* Cycles using GIFT and ZIFT are excluded. This comparison is limited to transfers on day 3 and day 5. Embryo transfers performed on days 1, 2, 4, and 6 are not included because each of these accounted for a small proportion of procedures.

Does the size of the clinic affect its success rate?

The number of ART procedures carried out every year varies among fertility clinics in the United States. In 2002, clinics that performed a small number of cycles had live birth rates that were comparable to the live birth rates for clinics that performed a large number of cycles. For Figure 32, 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 32
Live Birth Rates for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Clinic Size, 2002

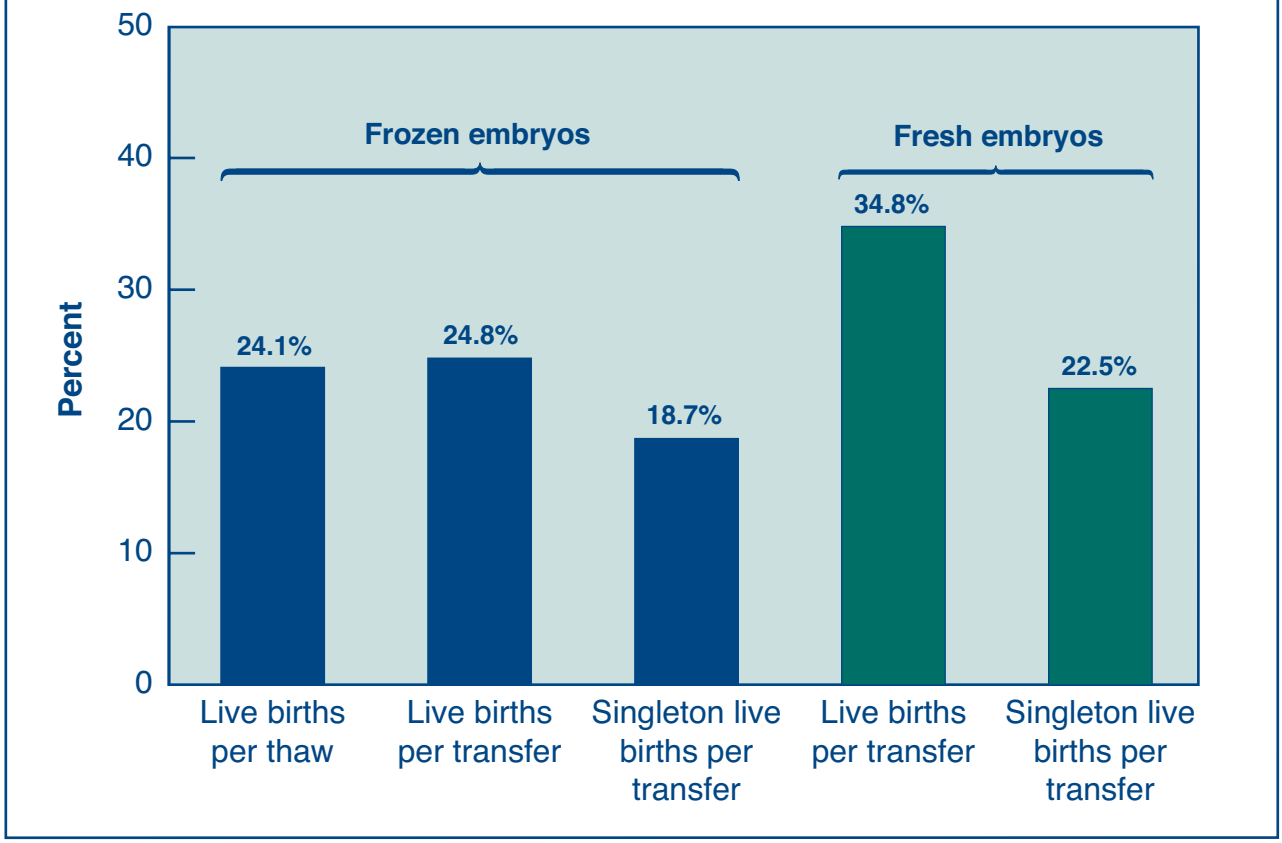


SECTION 3: ART CYCLES USING FROZEN NONDONOR EMBRYOS

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 2002 (16,383 cycles). Figure 33 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 2002, 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 71 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 33
Success Rates for ART Cycles Using Frozen Embryos and Fresh Embryos, 2002



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

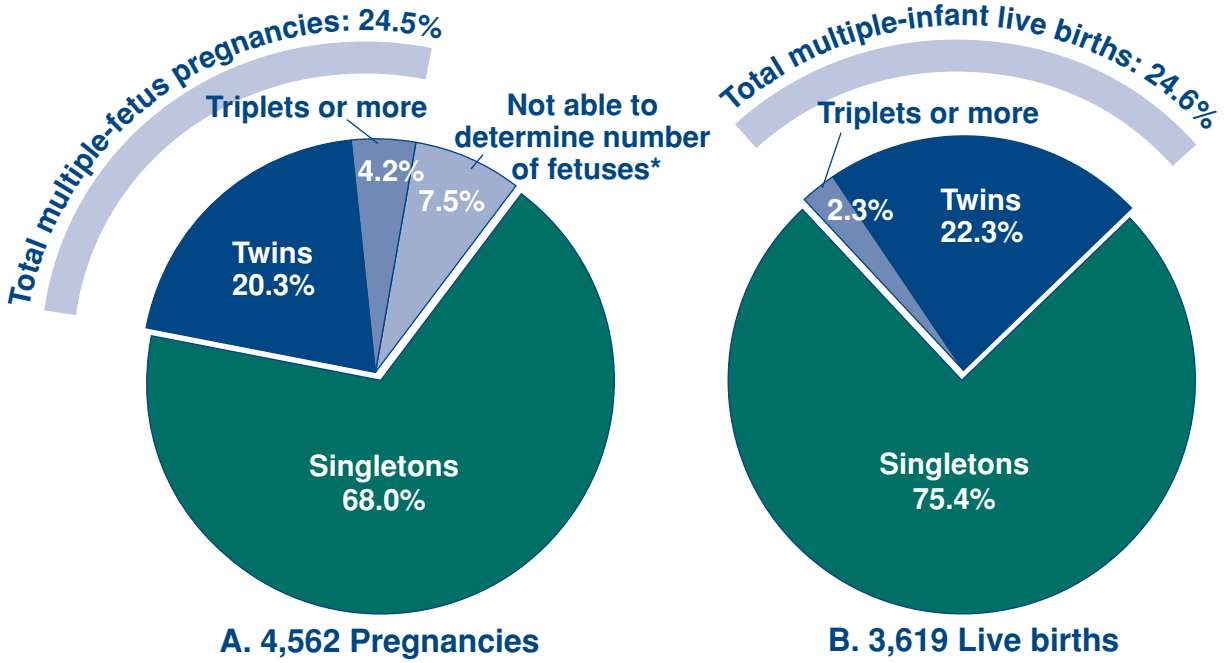
Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability and death.

Part A of Figure 34 shows that among the 4,562 pregnancies that resulted from ART cycles using frozen nondonor embryos, 68% were singleton pregnancies, about 20% were twins, and slightly more than 4% were triplets or more. Approximately 8% 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 (nearly 25%).

In 2002, 3,619 pregnancies from ART cycles that used frozen nondonor embryos resulted in live births. Part B of Figure 34 shows that approximately 25% of these live births produced more than one infant (about 22% twins and just over 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 the same for pregnancies and live births, there were more triplet pregnancies than triplet 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 34
Risk of Having Multiple-Fetus Pregnancy and Multiple-Infant Live Birth from ART Cycles Using Frozen Nondonor Embryos, 2002



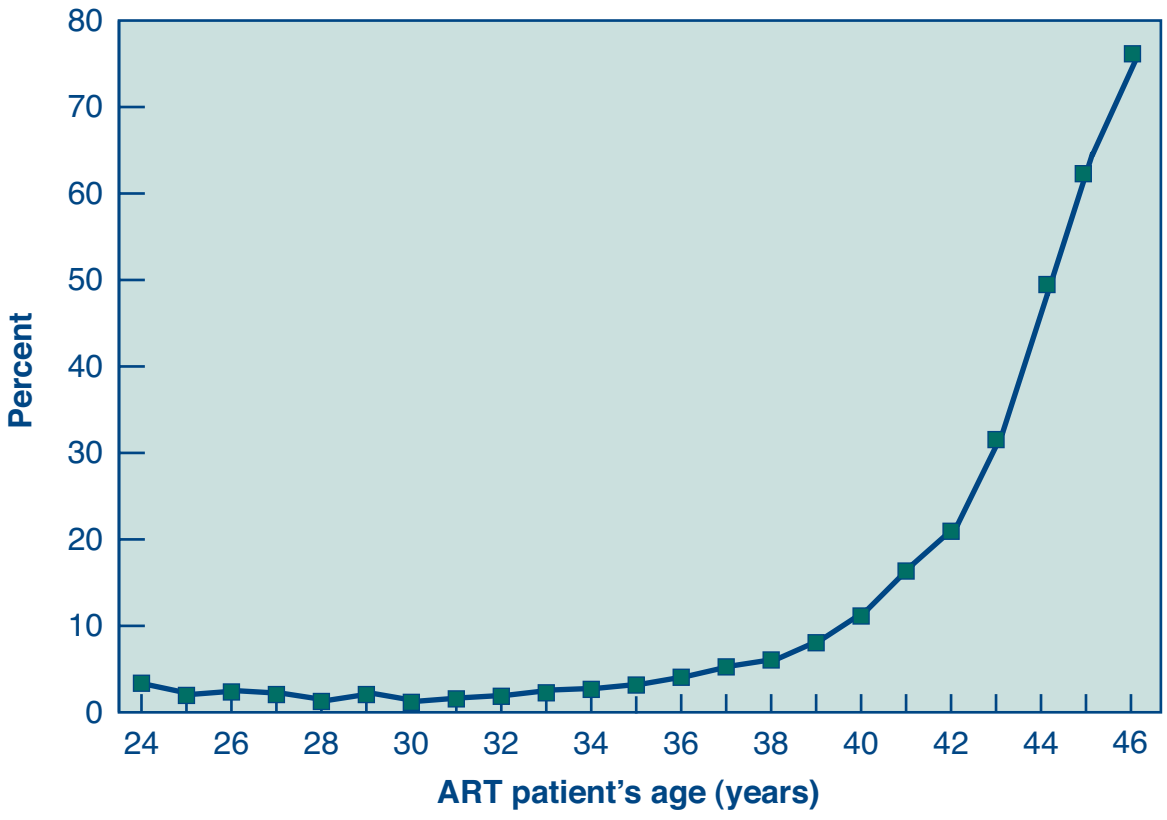
* Number of fetuses not known because the pregnancy ended in an early miscarriage.

SECTION 4: ART CYCLES USING DONOR EGGS

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

As shown in Figures 10, 11, and 12, 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 slightly more than 11% of all ART cycles carried out in 2002 (13,183 cycles). Figure 35 shows the percentage of ART cycles using donor eggs in 2002 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 45, about 77% of all ART cycles used donor eggs.

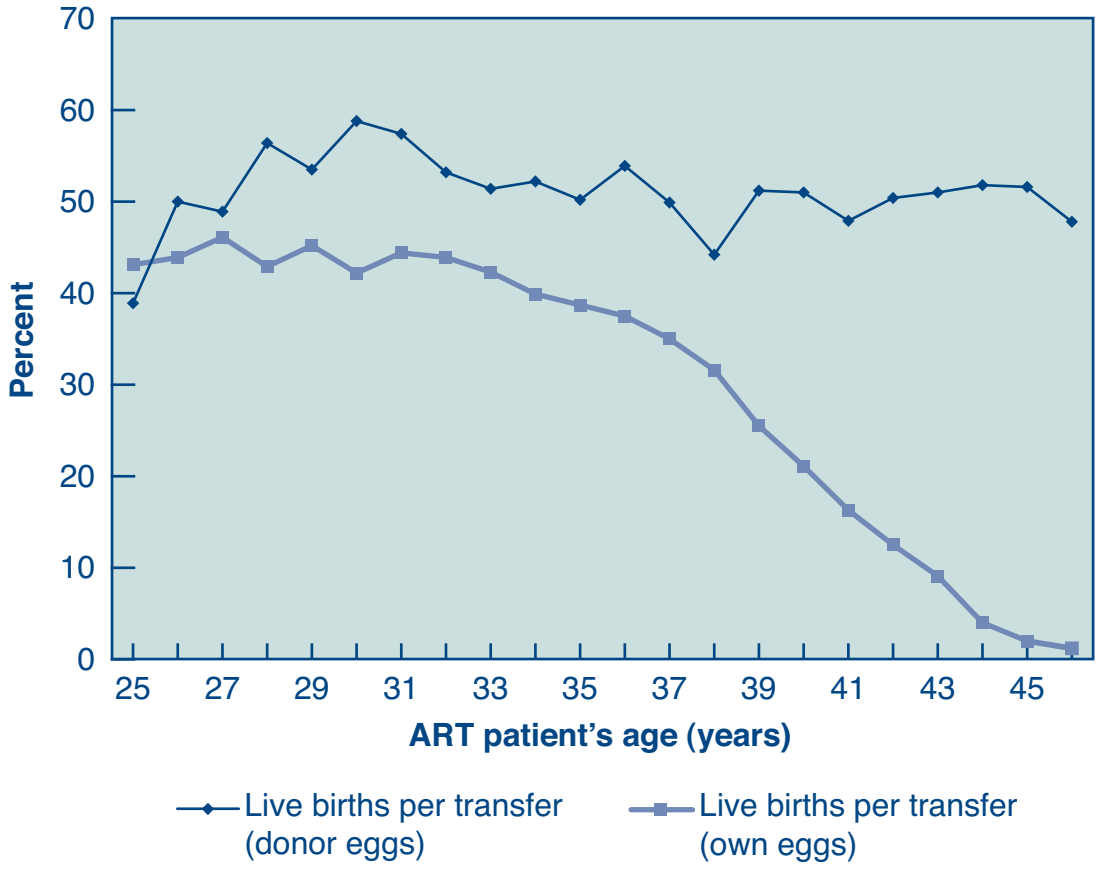
Figure 35
Percentage of ART Cycles Using Donor Eggs, by ART Patient's Age, 2002



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 36 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. The average live birth per transfer rate is 50%. In contrast, the live birth rates for cycles using embryos from women's own eggs decline steadily as women get older.

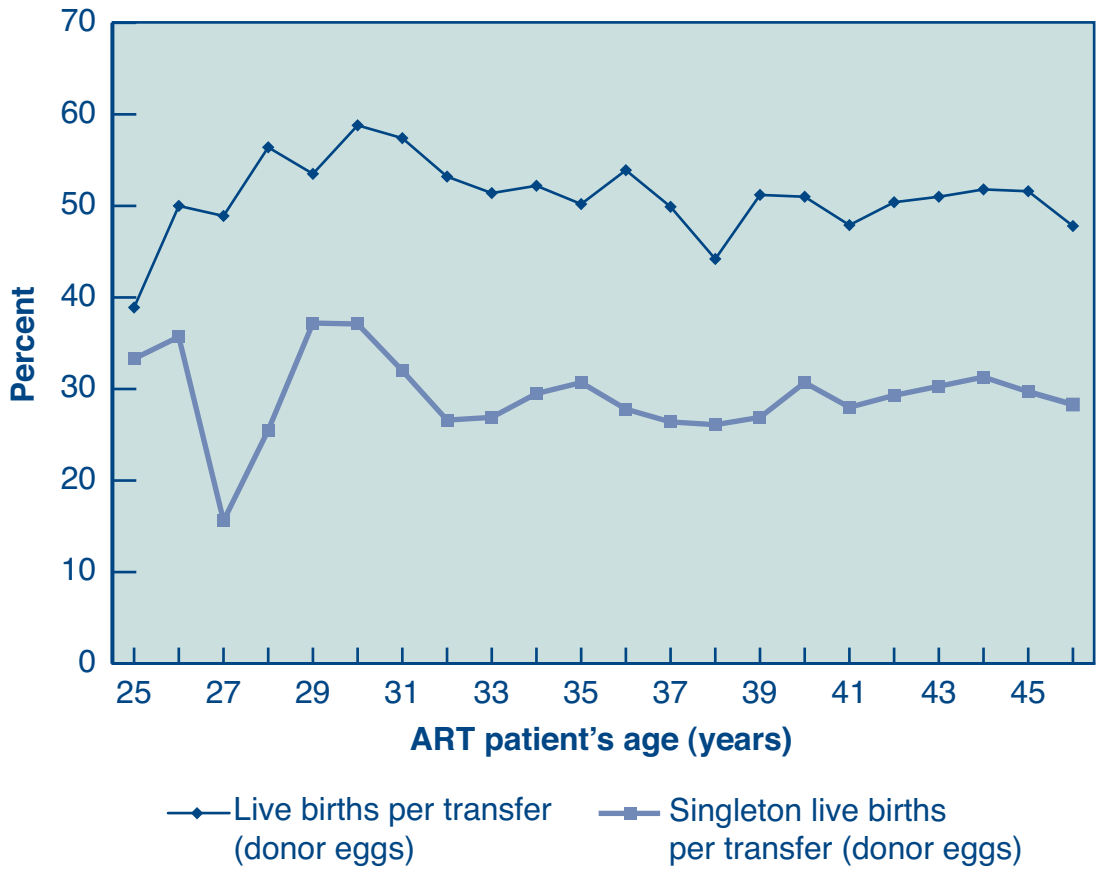
Figure 36
Live Births per Transfer for ART Cycles Using Fresh Embryos from Own and Donor Eggs, by ART Patient's Age, 2002



How successful is ART when donor eggs are used?

Figure 37 shows live birth per transfer rates and singleton live birth per transfer rates for ART procedures using fresh embryos from donor eggs among women of different ages. For all ages, the singleton live birth rates (average 29%) were lower than the total live birth rates (average 50%). 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 37
Live Births per Transfer and Singleton Live Births per Transfer for ART Cycles Using Fresh Embryos from Donor Eggs, by ART Patient's Age, 2002



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

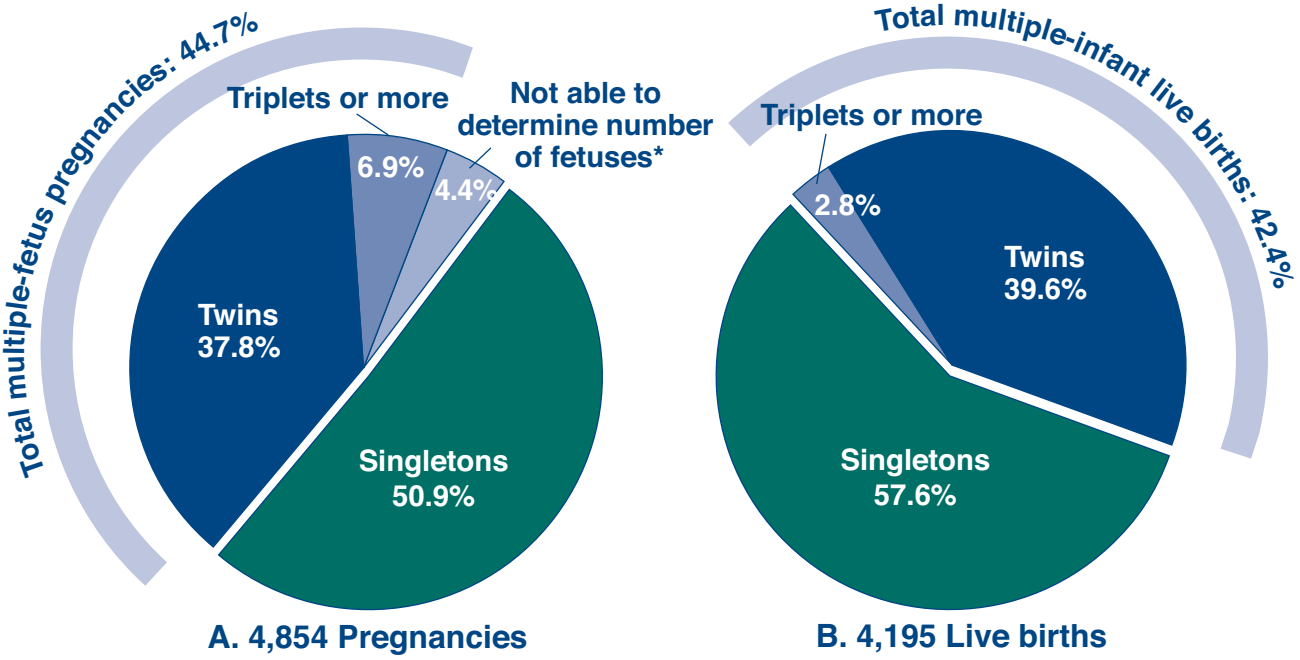
Multiple-infant births are associated with greater problems for both mothers and infants, including higher rates of caesarean section, prematurity, low birth weight, and infant disability or death.

Part A of Figure 38 shows that among the 4,854 pregnancies that resulted from ART cycles using fresh embryos from donor eggs, about 51% were singleton pregnancies, about 38% were twins, and nearly 7% were triplets or more. Slightly more than 4% 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 45%).

In 2002, 4,195 pregnancies from ART cycles that used fresh embryos from donor eggs resulted in live births. Part B of Figure 38 shows that slightly more than 42% of these live births produced more than one infant (about 40% twins and about 3% 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 pregnancies than triplet 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 38
Risk of Having Multiple-Fetus Pregnancy and Multiple-Infant Live Birth from ART Cycles Using Fresh Embryos from Donor Eggs, 2002

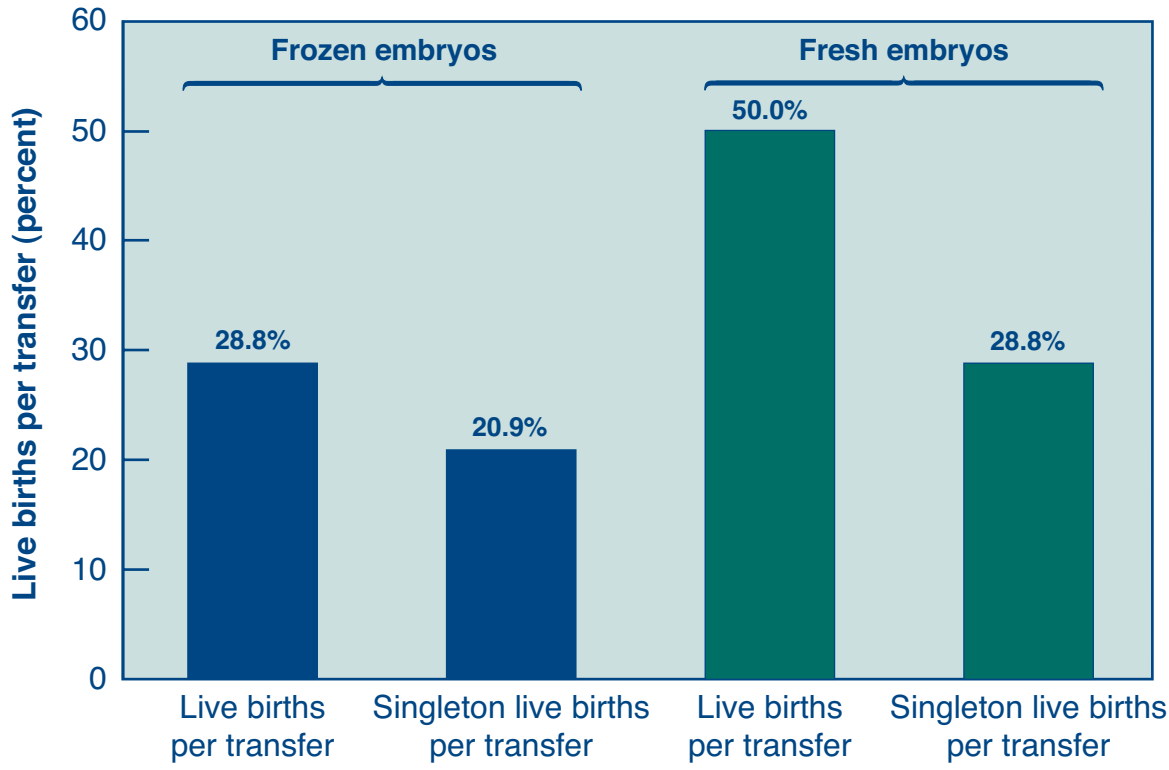


* Number of fetuses not known because the pregnancy ended in an early miscarriage.

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

Figure 39 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 33, page 45). 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 71 for information on the average number of embryos transferred for these cycles).

Figure 39
Success Rates for ART Cycles Using Frozen Donor and Fresh Donor Embryos, 2002



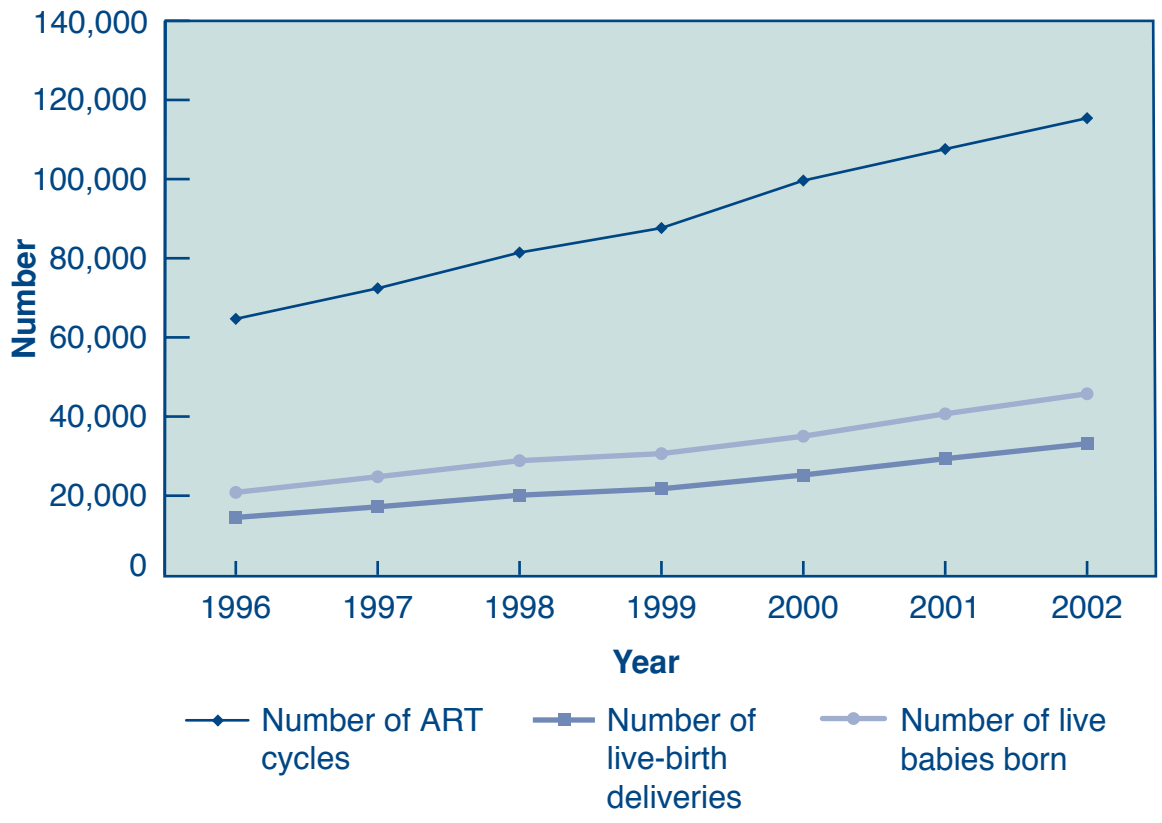
SECTION 5: ART TRENDS, 1996–2002

This report marks the eighth 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 gives us 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 1996–2002.

Is the use of ART increasing?

Figure 40 shows the number of ART cycles performed, the number of live-birth deliveries, and the number of live infants born using ART from 1996 through 2002. The number of ART cycles performed in the United States increased 78% overall, from 64,681 cycles in 1996 to 115,392 in 2002. The number of live-birth deliveries increased 128%, from 14,507 in 1996 to 33,141 in 2002. The number of live babies born who were conceived using ART also increased steadily between 1996 and 2002. In 2002, a total of 45,751 infants were born, an increase of 120% over 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 live babies born is greater than the number of live-birth deliveries.

Figure 40
Number of ART Cycles Performed, Number of Live-Birth Deliveries, and Number of Live Babies Born Using ART, 1996–2002

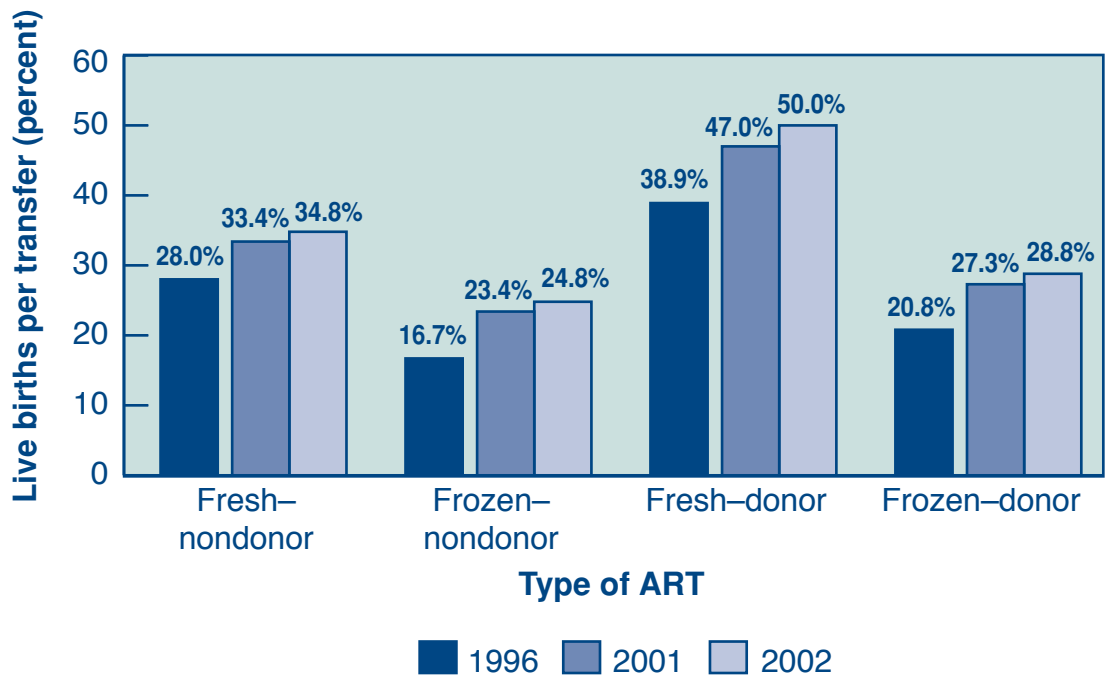


Are live birth rates improving?

Figure 41 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. Trends in live birth rates were considered in two ways. First, we assessed whether there was a change in the live birth rate over the previous year (that is, we compared the 2002 live birth rates with the 2001 live birth rates). We also assessed the total change in live birth rates from 1996 (the first full year of data collection) through 2002.

Between 2001 and 2002, the live birth rate for fresh–nondonor cycles increased 4%, from slightly more than 33% in 2001 to about 35% in 2002. Likewise, during the same time period, live birth rates increased 6% for frozen–nondonor cycles, 6% for fresh–donor cycles, and 8% for frozen–donor cycles. The live birth rates from 1996 through 2002 increased 24% for fresh–nondonor cycles, 49% for frozen–nondonor cycles, 29% for fresh–donor cycles, and 39% for frozen–donor cycles.

Figure 41
Live Births per Transfer, by Type of ART Procedure, 1996, 2001, and 2002

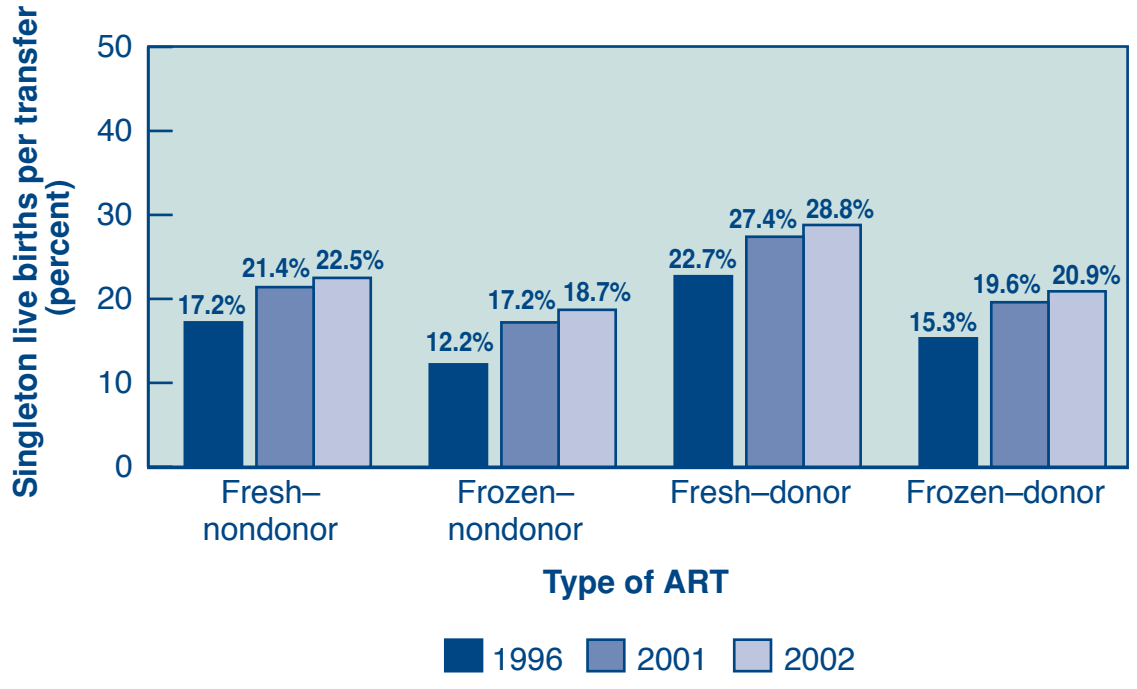


Are singleton live birth rates improving?

Singleton 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 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. Trends in singleton live birth rates were considered in two ways. First, we assessed whether there was a change in the singleton live birth rate over the previous year (that is, we compared the 2002 singleton live birth rates with the 2001 singleton live birth rates). We also assessed the total change in singleton live birth rates from 1996 (the first full year of data collection) through 2002.

Between 2001 and 2002, the singleton live birth rate for fresh–nondonor cycles increased 5%, from slightly more than 21% in 2001 to about 23% in 2002. Likewise, during the same time period, singleton live birth rates increased 9% for frozen–nondonor cycles, 5% for fresh–donor cycles, and 7% for frozen–donor cycles. The singleton live birth rates from 1996 through 2002 increased 31% for fresh–nondonor cycles, 53% for frozen–nondonor cycles, 27% for fresh–donor cycles, and 37% for frozen–donor cycles.

Figure 42
Singleton Live Births per Transfer, by Type of ART Procedure, 1996, 2001, and 2002

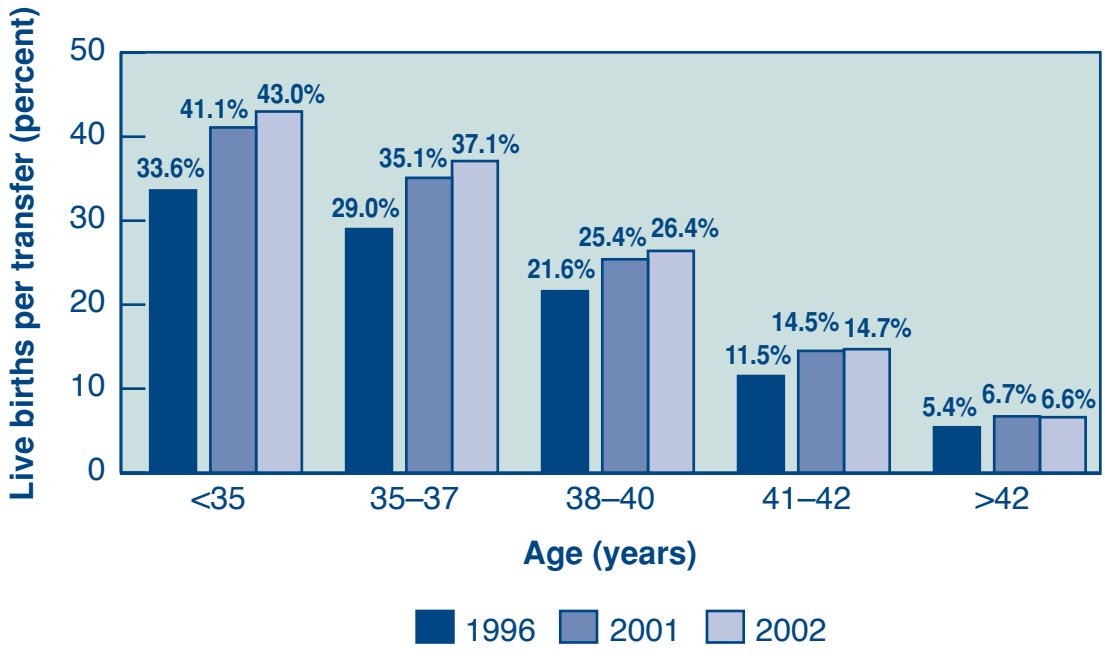


Are live birth rates improving for all ART patients or only for those in particular age groups?

Figure 43 presents live birth rates per transfer, by woman's age, for ART cycles using fresh nondonor eggs or embryos. Trends in live birth rates were considered in two ways. First, we assessed whether there was a change in the live birth rate over the previous year (that is, we compared the 2002 live birth rates with the 2001 live birth rates). We also assessed the total change in live birth rates from 1996 (the first full year of data collection) through 2002.

Between 2001 and 2002, the live birth rate increased 5% for women younger than 35, from about 41% in 2001 to 43% in 2002. Likewise, during the same time period, live birth rates increased 6% among women 35–37 and 4% for women 38–40. For women 41 or older, live birth rates were similar between 2001 and 2002. The increase in live birth rates from 1996 through 2002 was 28% for women younger than 35, 28% for women 35–37, 22% for women 38–40, 28% for women 41–42, and 22% for women older than 42.

Figure 43
Live Births per Transfer for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Woman's Age, 1996, 2001, and 2002

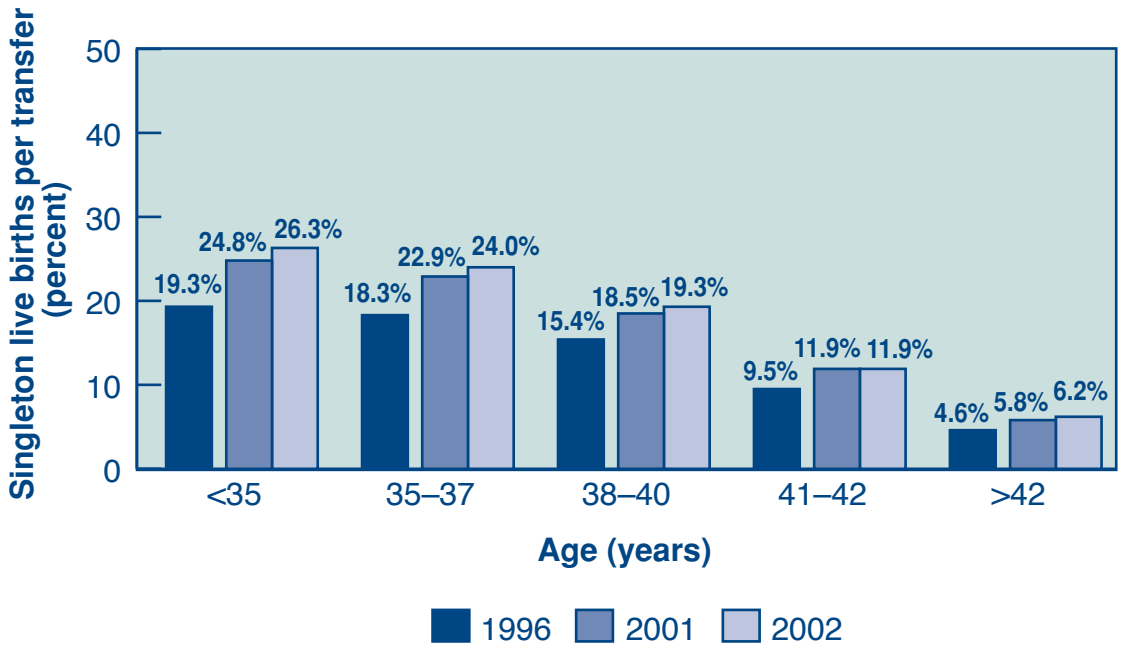


Are singleton live birth rates improving for all ART patients or only for those in particular age groups?

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 44 presents singleton live birth rates per transfer, by woman's age, for ART cycles using fresh nondonor eggs or embryos. Trends in singleton live birth rates were considered in two ways. First, we assessed whether there was a change in the singleton live birth rate over the previous year (that is, we compared the 2002 singleton live birth rates with the 2001 singleton live birth rates). We also assessed the total change in singleton live birth rates from 1996 (the first full year of data collection) through 2002.

Between 2001 and 2002, the singleton live birth rate increased 6% for women younger than 35, from about 25% in 2001 to slightly more than 26% in 2002. Likewise, during the same time period, live birth rates increased 5% among women 35–37, 4% for women 38–40, and 7% for women older than 42. There was no change in the singleton live birth rate among women 41–42 years old. From 1996 through 2002, the singleton live birth rate for women younger than 35 increased 36%, from about 19% in 1996 to about 26% in 2002. Likewise, over the same time period, live birth rates increased 31% for women 35–37, 25% for women 38–40, 25% for women 41–42, and 35% for women older than 42.

Figure 44
Singleton Live Births per Transfer for ART Cycles Using Fresh Nondonor Eggs or Embryos, by Woman's Age, 1996, 2001, and 2002

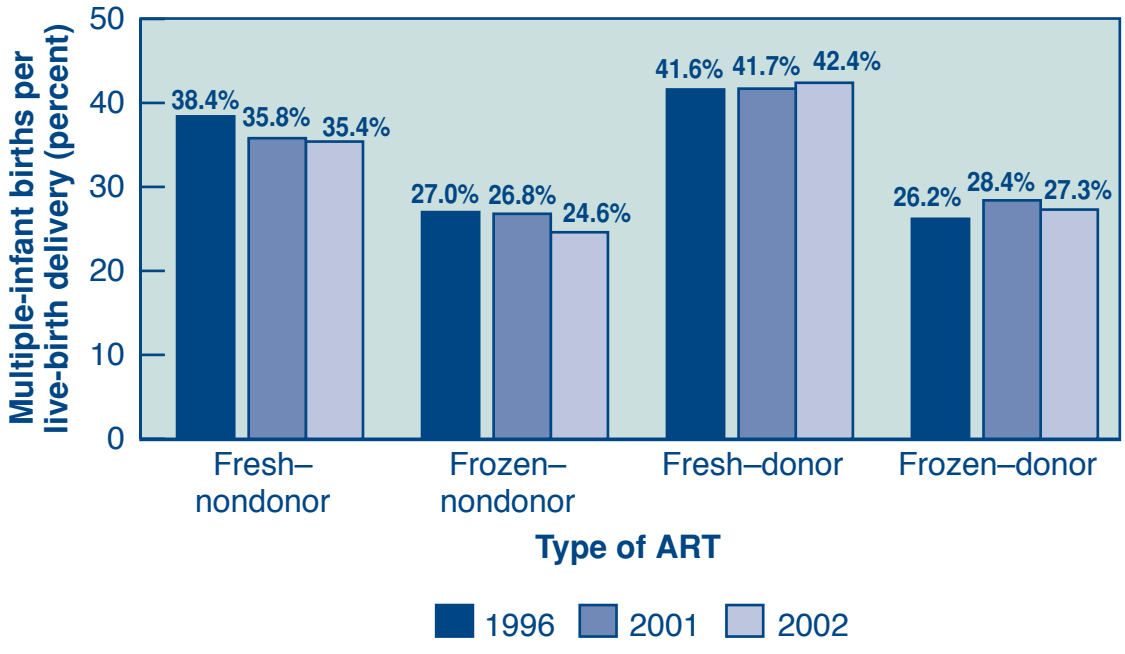


Have multiple-infant birth rates changed?

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 45 shows multiple-infant birth rates for the four primary types of ART cycles. Trends in multiple-infant birth rates were considered in two ways. First, we assessed whether there was a change in these rates over the previous year (that is, we compared the 2002 rates with the 2001 rates). We also assessed the total change in multiple-infant birth rates from 1996 (the first full year of data collection) through 2002.

There was little change between 2001 and 2002 in the multiple-infant birth rates for both fresh–nondonor and fresh–donor cycles. During the same time period, multiple-infant birth rates decreased 8% for frozen–nondonor cycles and 4% for frozen–donor cycles. The multiple-infant birth rates from 1996 to 2002 decreased 8% for fresh–nondonor cycles and 9% for frozen–nondonor cycles. The multiple-infant birth rates from 1996 through 2002 were similar for fresh–donor and frozen–donor cycles.

Figure 45
Multiple-Infant Births per Live-Birth Delivery, by Type of ART Procedure, 1996, 2001, and 2002

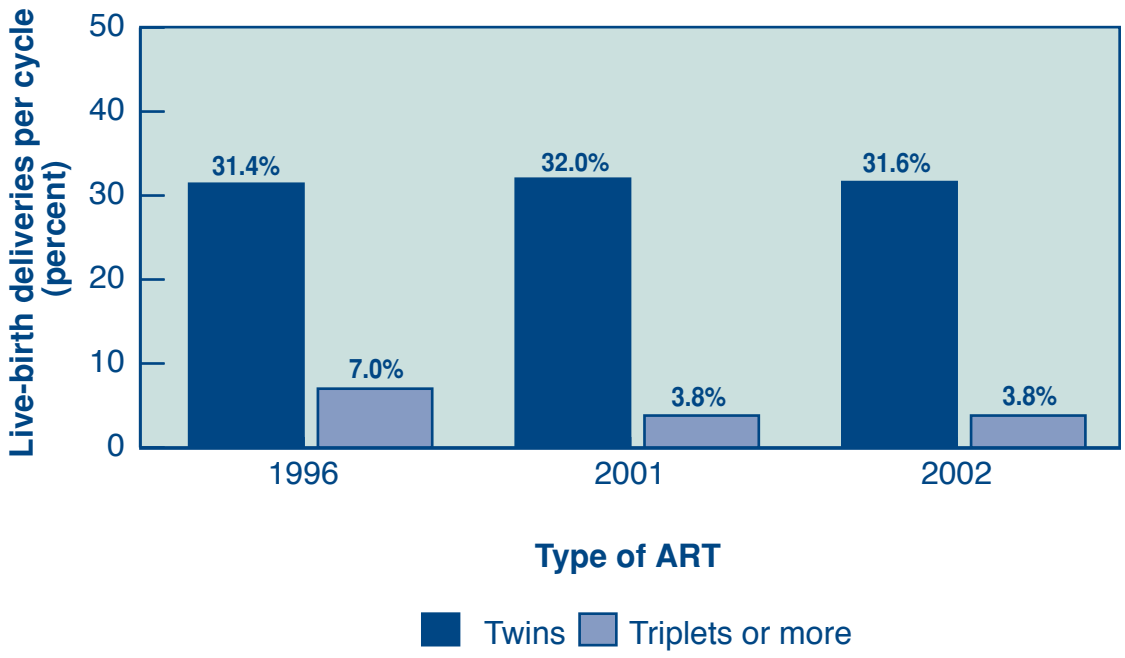


Have twin and triplet-or-more birth rates changed?

Figure 46 compares twin and triplet-or-more birth rates for ART cycles using fresh nondonor eggs or embryos in 1996 (the first full year of data collection), 2001, and 2002. Twins made up the vast majority of multiple-infant births in each of these years. Since 1996, the triplet-or-more birth rate for fresh–nondonor cycles has decreased, but there has been no change in the twin birth rate.

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 46
Twin Births per Live-Birth Delivery and Triplet-or-More Births per Live-Birth Delivery, for Fresh–Nondonor Cycles, 1996, 2001, and 2002



2002 Fertility Clinic Tables

National Summary and Fertility Clinic Reports

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 2002, 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 2002.*** Data for cycles started in 2002 could not be published until 2004 because the final outcomes of pregnancies conceived in December 2002 were not known until October 2003. 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 2002 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 467–468.

- ***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 2002 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 40%. 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 2002 were unstimulated. However, in a very few clinics, more than 5% 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 2002, the average number of embryos that a clinic transferred to women younger than age 35 ranged from two to five 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 65.

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 61–70.

2002 ART CYCLE PROFILE

1 Type of ART[a]

IVF	>99%	**Procedural Factors:**	
GIFT	<1%	With ICSI	53%
ZIFT	<1%	Unstimulated	<1%
Combination	<1%	Used gestational carrier	<1%

2 Patient Diagnosis

Tubal factor	13%	Other factor	7%
Ovulatory dysfunction	6%	Unknown factor	10%
Diminished ovarian reserve	9%	*Multiple Factors:*	
Endometriosis	6%	Female factors only	13%
Uterine factor	1%	Female & male factors	18%
Male factor	17%		

4 2002 PREGNANCY SUCCESS RATES

3 Data verified by X. Y. Zee, M.D.

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 2002 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 23).
[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 2002; 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 2002 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 2002. For example, if a clinic started a total of 50 cycles in 2002 and these resulted in 15 live births, the average success rate for cycles started at that clinic would be

15 (births) ÷ 50 (cycles) = 0.3 or 30%.

Thus, the success rate at that clinic in 2002 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 4).

- **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 babies (e.g., higher rates of caesarean section, prematurity, low birth weight, infant death) and the possibility of multifetal 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 babies 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 36 and 37 on pages 48 and 49).

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 23. 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, pages 65–66.) 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 61–63.

For a more detailed explanation and examples of confidence intervals, see pages 467–468 in Appendix A.

7. Clinic services and profile

- **Current Name.** This name reflects name changes that may have occurred since 2002, whereas the clinic name at the top of the table was the name of the ART clinic as it existed in 2002. 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 2002. 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 2002, 357 of the 391 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), Reproductive Laboratory Accreditation Program
    - Joint Commission on Accreditation of Healthcare Organizations (JCAHO)
    - New York State tissue bank program

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 SART. "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 accrediting organizations directly, as follows:

- CAP, 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.

2002 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 61–70.

2002 ART CYCLE PROFILE

Type of ART[a]

IVF	>99%
GIFT	<1%
ZIFT	<1%
Combination	<1%

Procedural Factors:

With ICSI	53%
Unstimulated	<1%
Used gestational carrier	<1%

Patient Diagnosis

Tubal factor	13%
Ovulatory dysfunction	6%
Diminished ovarian reserve	9%
Endometriosis	6%
Uterine factor	1%
Male factor	17%
Other factor	7%
Unknown factor	10%
Multiple Factors:	
Female factors only	13%
Female & male factors	18%

2002 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	37,591	19,110	17,454	7,733
Percentage of cycles resulting in pregnancies	42.5	36.4	27.5	17.3
Percentage of cycles resulting in live births[b]	36.9	30.6	20.5	10.7
Percentage of retrievals resulting in live births[b]	40.7	35.1	24.7	13.4
Percentage of transfers resulting in live births[b]	43.0	37.1	26.4	14.7
Percentage of transfers resulting in singleton live births	26.3	24.0	19.3	11.9
Percentage of cancellations	9.2	12.6	16.8	19.9
Average number of embryos transferred	2.7	3.0	3.3	3.5
Percentage of pregnancies with twins	33.2	28.9	22.6	15.5
Percentage of pregnancies with triplets or more	7.2	8.2	5.1	3.0
Percentage of live births having multiple infants[b]	38.9	35.4	26.9	18.6
Frozen Embryos from Nondonor Eggs				
Number of transfers	7,680	3,463	2,327	699
Percentage of transfers resulting in live births[b]	27.9	24.1	20.0	16.6
Average number of embryos transferred	2.8	2.8	2.9	3.1

Donor Eggs	All Ages Combined[d] Fresh Embryos	Frozen Embryos
Number of transfers	8,394	3,476
Percentage of transfers resulting in live births[b]	50.0	28.8
Average number of embryos transferred	2.7	2.9

CURRENT CLINIC SERVICES AND PROFILE

Total number of reporting clinics: 391

Percentage of clinics that offer the following services:

Donor egg	90%	Gestational carriers	72%
Donor embryo	60%	Cryopreservation	97%
Single women	85%		

Clinic profile:

SART member	91%
Verified lab accreditation	
Yes	92%
No	4%
Pending	4%

[a] Reflects patient and treatment characteristics of ART cycles performed in 2002 using fresh nondonor eggs or embryos.
[b] A multiple-infant birth is counted as *one* live birth.
[c] See page 23 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.