Updates to this report will be posted on the CDC Web site at the following address:
http://www.cdc.gov/nccdphp/drh/art.htm

1997 ASSISTED REPRODUCTIVE TECHNOLOGY SUCCESS RATES

NATIONAL SUMMARY AND FERTILITY CLINIC REPORTS

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

RESOLVE: The National Fertility Association
Somerville, Massachusetts

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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, which requires the Centers for Disease Control and Prevention (CDC) to publish pregnancy success rates for ART procedures carried out in fertility clinics in the United States. Since 1995, SART and CDC have worked together to report ART success rates.

The 1997 report of pregnancy success rates is the third to be issued under the law. It is coauthored by CDC, SART/ASRM, and RESOLVE: the National Infertility Association. This report is based on the latest available data collected by SART on the number and outcome of ART cycles performed in U.S. clinics.

In addition to a brief question and answer section that follows this preface, the 1997 ART report has three major sections:

- *A national report*: The national report section presents overall success rates and shows how they are influenced by certain patient and treatment characteristics. Because the national report contains information from all 335 fertility clinics that reported data, it can give people considering ART a good idea of the average chances of having a child by using ART.
- *Fertility clinic tables*: Success is also related to the expertise of a particular clinic's staff and the quality of its laboratory. The fertility clinic table section displays ART success rates for individual U.S. fertility clinics in 1997.
- *An appendix*: The appendix contains a guide to interpreting confidence intervals and a glossary, which provides definitions for technical and medical terms used throughout the report. The appendix also contains the names and addresses of all reporting clinics and a list of nonreporting clinics.

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, SART/ASRM, and RESOLVE hope 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 This Report

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 manipulated. In general, ART involves 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. It does NOT include procedures in which only sperm are manipulated (i.e., artificial insemination or intrauterine 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
- IVF (in vitro fertilization).
- GIFT (gamete intrafallopian transfer).
- ZIFT (zygote intrafallopian transfer).

These terms are explained in Figure 1 on page 10 and in the glossary, which begins on page 383.

In addition, ART is often 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).

How many people in the United States have infertility problems?

The latest data on infertility available at 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 they had not used contraception for 12 months and had not become pregnant.

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

As mandated by law, the report describes a woman's average chances of success using ART and presents the success rates of individual U.S. fertility clinics in a particular year. Although the report provides some information about factors such as age and primary diagnosis that may affect success with ART, it doesn't address specific medical problems. 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.

In addition, the American Society for Reproductive Medicine (ASRM) and the Society for Assisted Reproductive Technology (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 (telephone 205-978-5000 or Web site http://www.asrm.org).

Why is the report of 1997 success rates being published in 1999?

Before success rates based on live births can be calculated, every ART pregnancy must be followed up to determine if a birth occurred. Thus the earliest that clinics can report annual data is late in the year *after* ART treatment was initiated (9 months past year-end, when all the births have occurred). Accordingly, the results of all cycles initiated in 1997 were not known until October 1998. 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 randomly selected a percentage of the reporting clinics for on-site quality control visits by SART validation teams, who checked the submitted data against the information in the medical records to be sure they corresponded.
- CDC data analysts did comprehensive checks of the numbers reported for every clinic.
- Clinic tables, national figures, and accompanying text in both the printed and Web site versions were compiled and laid out.
- CDC, SART/ASRM, and RESOLVE reviewed and approved the report.

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

Which clinics are represented in this report?

The data in both the national report and the individual fertility clinic reports come from 335 fertility clinics that provided and verified information about the outcomes of the ART cycles started in their clinics in 1997. A few clinics that are now independent were operating as part of other clinics in 1997 and accordingly are not listed separately in the report. For current information on SART member clinics, contact SART (205-978-5000, extension 109).

Although we believe that almost all clinics that provided ART services in the United States throughout 1997 are represented in this report, data for a few clinics or practitioners have not been included because they either were not in operation throughout 1997 or did not report as required. Clinics and practitioners known to have been in operation throughout 1997 that did not report and verify their data are listed in this report as nonreporters, as required by law.

(See Appendix, Nonreporting ART Clinics for 1997, by State). We will continue to make every effort to include all clinics and practitioners providing ART services in future reports.

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 that the tabulated success rates are accurate. After the data have been verified, a quality control process called validation begins. This year, 30 of the 335 reporting clinics were randomly selected for site visits. Two members of the SART Validation Committee visited these clinics and compared medical records data on 50 randomly selected cycles with the data submitted for the report. In almost all cases, data on pregnancies and births in the medical records were consistent with reported data. Validation primarily helps to 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.

Although SART compares medical records with data submitted for this report, the validation process does not include any assessment of clinical practice or overall record keeping.

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

A small number of ART cycles are not included in the national data. These cycles are mainly in one of the following two categories:

- Surrogate or gestational carrier cycles, in which a woman other than the intended mother received the embryo transfer. In 1997, 600 such cycles were reported to CDC; the overall success rate of cycles using gestational carriers was 31.2%.
- Cycles in which a new treatment procedure (e.g., cytoplasmic egg transfer) was being evaluated. Only 40 ART cycles fell into this category in 1997.

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 1997 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.

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, broken down by the age of the woman who received the eggs or embryos.

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

This year, CDC held focus groups of people who are either considering or undergoing ART in four cities in different areas of the country. The groups generally were happy with both the format and content of the report. They suggested specific ways to improve the report and additional information to include. Because of our publication schedule, we were able to use only some of the suggestions in this year's report. However, we hope to incorporate suggestions for additional figures and other improvements in future years.

How can I get information about costs and insurance coverage of ART?

RESOLVE, a major national consumer group supporting people dealing with infertility, provides current information on insurance coverage in each state and guidance on affording treatment. This information is available on RESOLVE's Web site (http://www.resolve.org) and from its national HelpLine (1-617-623-0744).

What information should I ask for when I go to an ART clinic?

For a list of some of the questions you may want to ask when you meet with an ART practitioner, visit RESOLVE's Web site at http://www.resolve.org or contact its HelpLine at 1-617-623-0744.

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).


1997
National
Report

Introduction to the 1997 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 and 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 335 fertility clinics in operation in 1997 that provided and verified data on the outcomes of all ART cycles started in their clinics. ART cycles performed at the reporting clinics in 1997 resulted in 17,054 deliveries of one or more living infants and 24,582 babies.

The national report consists of graphs and charts that use 1997 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 may also be either from a woman's partner or from a sperm donor, this report is organized according to the source of the egg.) In some procedures, the embryos that develop are transferred back to the woman (fresh 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 1997.

The national report has four sections:

- Section 1 (Figures 1 and 2) presents information from all ART procedures reported.
- Section 2 (Figures 3 through 17) presents information on the 55,002 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 (Figure 18) presents information on the ART cycles that used only frozen embryos (10,181 cycles resulting in 9,165 transfers).
- Section 4 (Figures 19 and 20) presents information on the ART cycles that used only donated eggs or embryos (6,643 cycles resulting in 5,980 transfers).

The 1997 national summary table, which is based on data from all clinics included in this report, is on page 41, immediately preceding the individual clinic tables. An explanation of how to read these tables is on page 37.

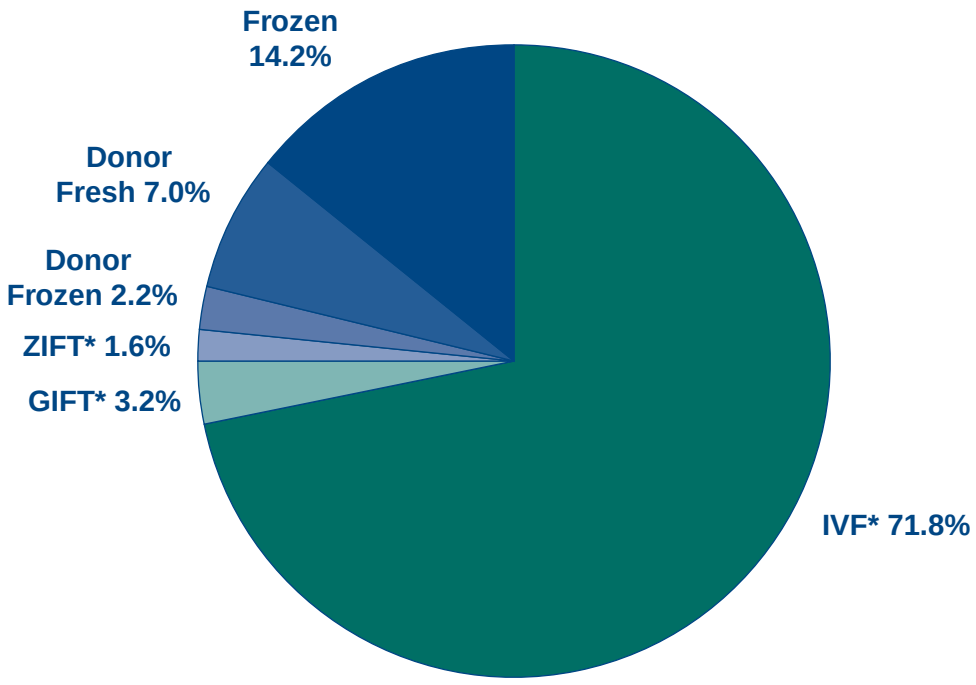
What types of ART procedures were used in the United States in 1997?

A total of 71,826 ART cycles were carried out in 1997 using one of the following procedures:

- **IVF (in vitro fertilization)** involves extracting a woman's eggs, fertilizing the eggs in the laboratory, and then transferring the resulting embryo(s) into the woman's uterus through the cervix.
- **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.

Most IVF, GIFT, and ZIFT cycles used fresh, nondonor eggs or embryos.

Figure 1
Types of ART Procedures — United States, 1997

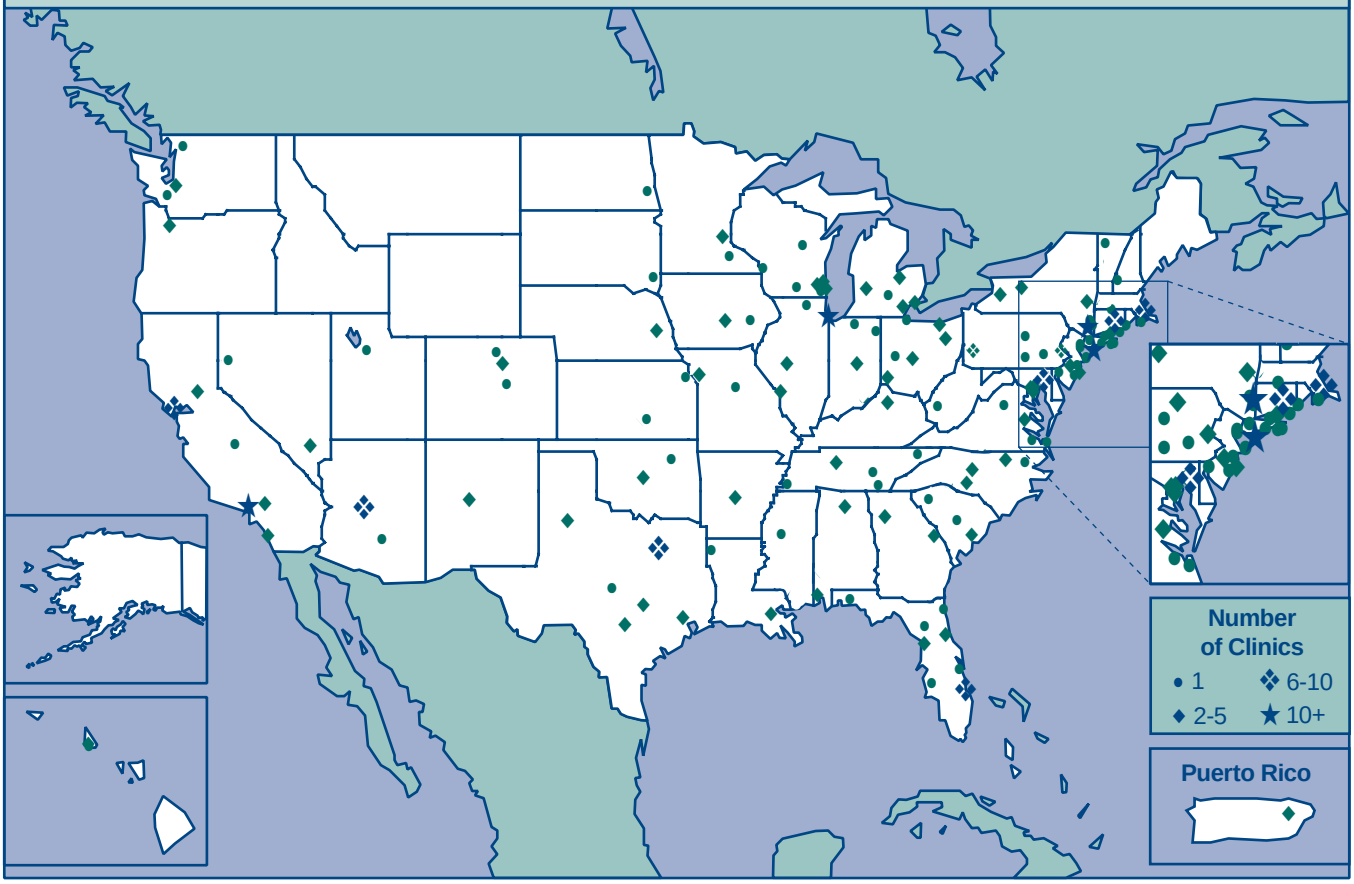


*Fresh, nondonor cycles. IVF, GIFT, and ZIFT cycles using donor eggs or frozen embryos are included in "donor" or "frozen" categories.

Where are ART clinics located?

Although ART clinics are located throughout the United States, the greatest number of clinics is in the eastern United States. Most clinics are in or near major cities. Figure 2 shows the location of the 335 reporting clinics. The fertility clinic section of this report, arranged in alphabetical order by state, city, and clinic, provides specific information on each of these clinics.

Figure 2
Location of ART Clinics in the United States and Puerto Rico, 1997



SECTION 2: ART CYCLES USING FRESH, NONDONOR EGGS OR EMBRYOS

What are the steps for a fresh, nondonor ART procedure?

Figure 3 presents the steps for a fresh, nondonor ART cycle and shows how ART users progressed through these steps in 1997.

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.

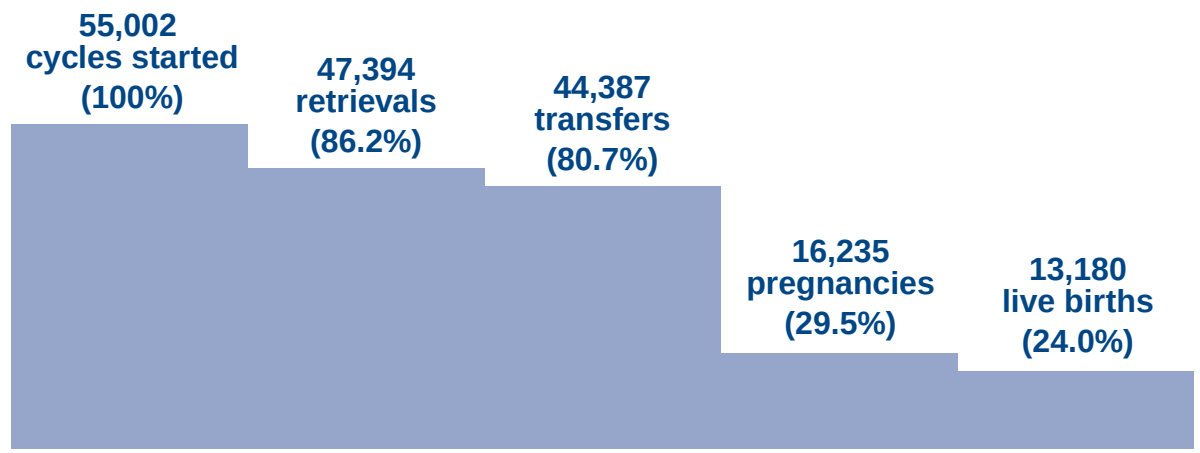
Once retrieved, eggs are combined with sperm in the laboratory. If fertilization is successful, one or more of the resulting embryos are selected for **transfer**, most often into a woman's uterus through the cervix (IVF).

If one or more of the transferred embryos implants 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. (A multiple birth—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 or the embryo transfer was not successful) or by patient choice.

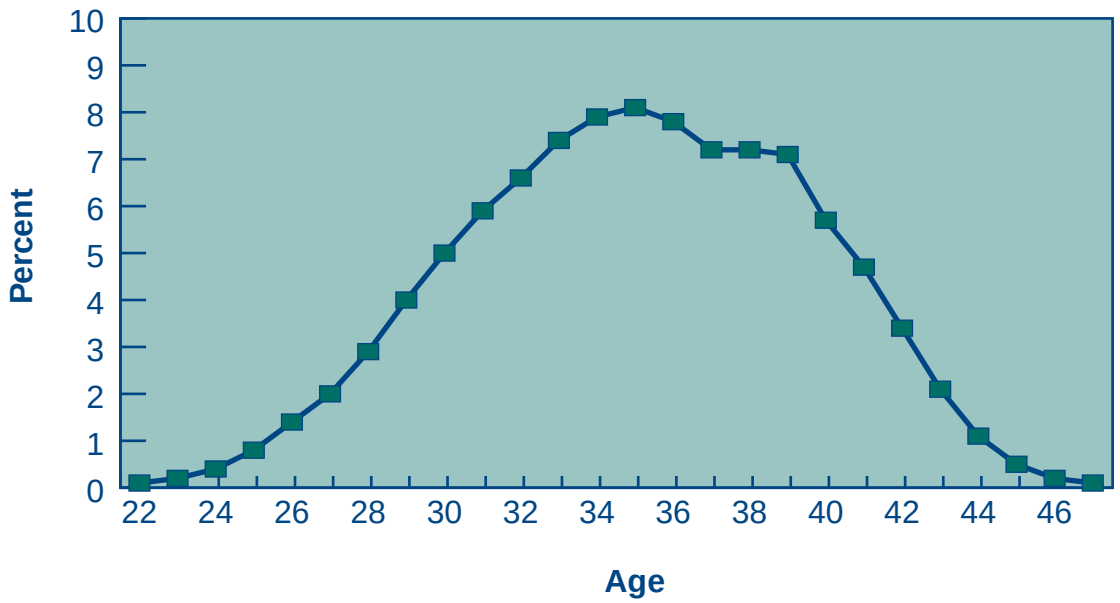
Figure 3
Outcome of Fresh, Nondonor ART Cycles, by Stage, 1997



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

Figure 4 presents 1997 ART cycles using fresh, nondonor eggs or embryos according to the age of the woman who had the procedure. About 70% 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 47 used ART with their own eggs, those cycles are not included in the figure.

Figure 4
Percentage of Fresh, Nondonor ART Cycles, by Age of Woman, 1997

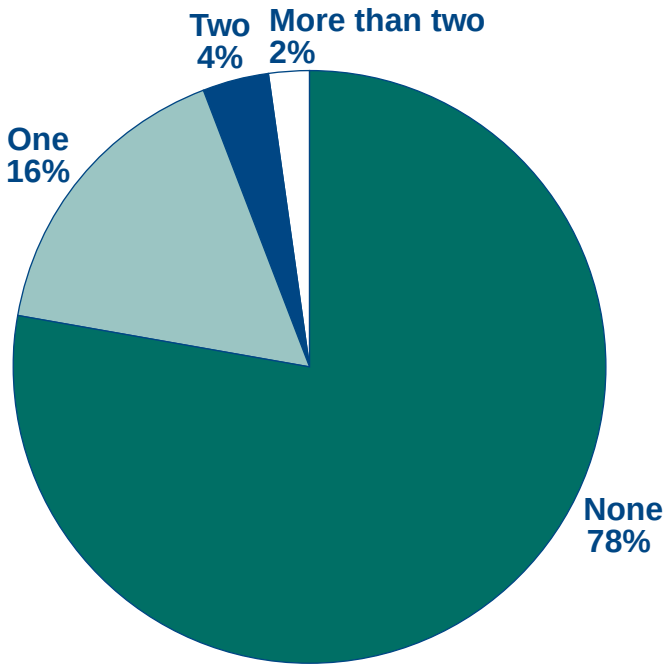


Have many women who used ART previously given birth?

Figure 5 shows the number of previous children born to women who had an ART procedure in 1997.

Most of these women (78%) had no previous births; however, they may have had a pregnancy that resulted in a miscarriage or a therapeutic abortion. Sixteen percent reported one previous birth, and 6% reported two or more. However, we do not know how many of these children were conceived naturally and how many by an ART procedure. These data nonetheless point out that women who have previously had children can face infertility problems. These infertility problems can include infertility of a new partner.

Figure 5
Number of Previous Births Among Women Who Had Fresh, Nondonor ART Cycles, 1997

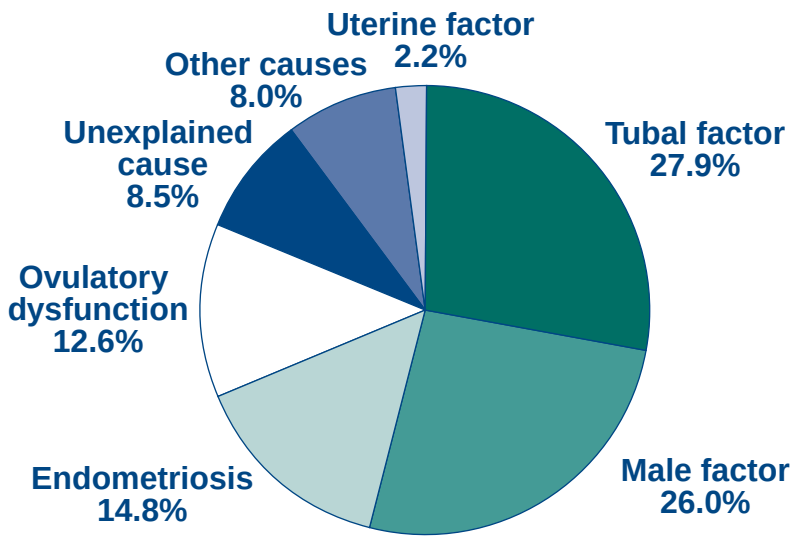


What are the causes of infertility among couples who use ART?

Figure 6 shows the primary diagnoses reported for infertility among couples who had an ART procedure in 1997. Although some couples have more than one cause of infertility, only one is reported as primary. In addition, diagnostic procedures and categories may vary from one clinic to another, so the categorization may be inexact.

- **Tubal factor** usually 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.
- **Male factor** usually 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.
- **Endometriosis** involves the presence of tissue similar to the uterine lining in abnormal locations. This condition can affect both egg fertilization and embryo implantation.
- **Ovulatory dysfunction** means that the ovaries are not producing eggs normally or that egg production has diminished with age.
- **Unexplained cause** means that no cause of infertility was found in either the woman or the man.
- **Other causes** of infertility include immunological problems, chromosomal abnormalities, cancer chemotherapy, and serious illnesses.
- **Uterine factor** means a disorder of the uterus that results in reduced fertility.

Figure 6
Primary Diagnoses Among Couples Who Had Fresh, Nondonor ART Cycles, 1997

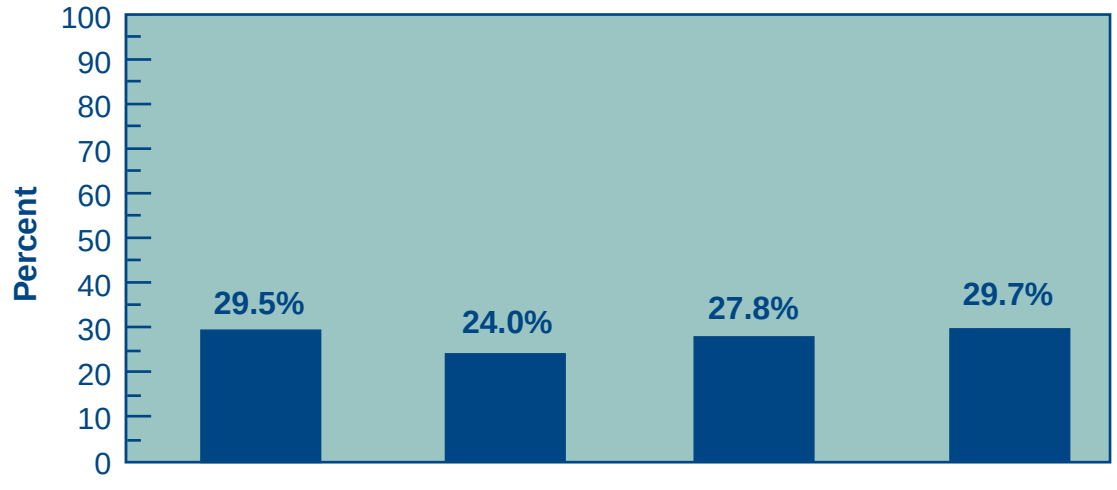


How is the success of an ART procedure measured?

Several measures can be used to assess ART success rates. Each provides slightly different information about this complex process. Figure 7 shows ART success rates using four different ways of measuring ART success. Age-specific success rates using each of these measures are in the National Table on page 41.

- The **pregnancy per cycle rate** refers to the percentage of ART cycles that produced a pregnancy. This rate is higher than the live birth per cycle rate because some pregnancies end in miscarriage, therapeutic abortion, or stillbirth (see Figure 10, p. 19).
- The **live birth per cycle rate** shows the percentage of 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 when considering ART because it represents the average chances of having a live-born infant by using ART. **In the graphs and charts in this report, live birth rate means live birth per cycle rate unless otherwise specified.**
- The **live birth per egg retrieval rate** is the percentage of 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 those cycles that were canceled before egg retrieval was carried out. In 1997, approximately 14% of all fresh, nondonor cycles were canceled. Cycles are canceled for many reasons: eggs may not develop, the patient may become ill, or the patient may choose to stop treatment.
- The **live birth per transfer rate** includes only those cycles in which an embryo or egg and sperm were transferred back to the woman. It excludes cycles in which the egg was not fertilized or the embryos formed were abnormal and thus no transfer could occur. This rate is generally the highest of the four measures of ART success.

Figure 7
Success Rates for Fresh, Nondonor ART Cycles Using Different Measures, 1997

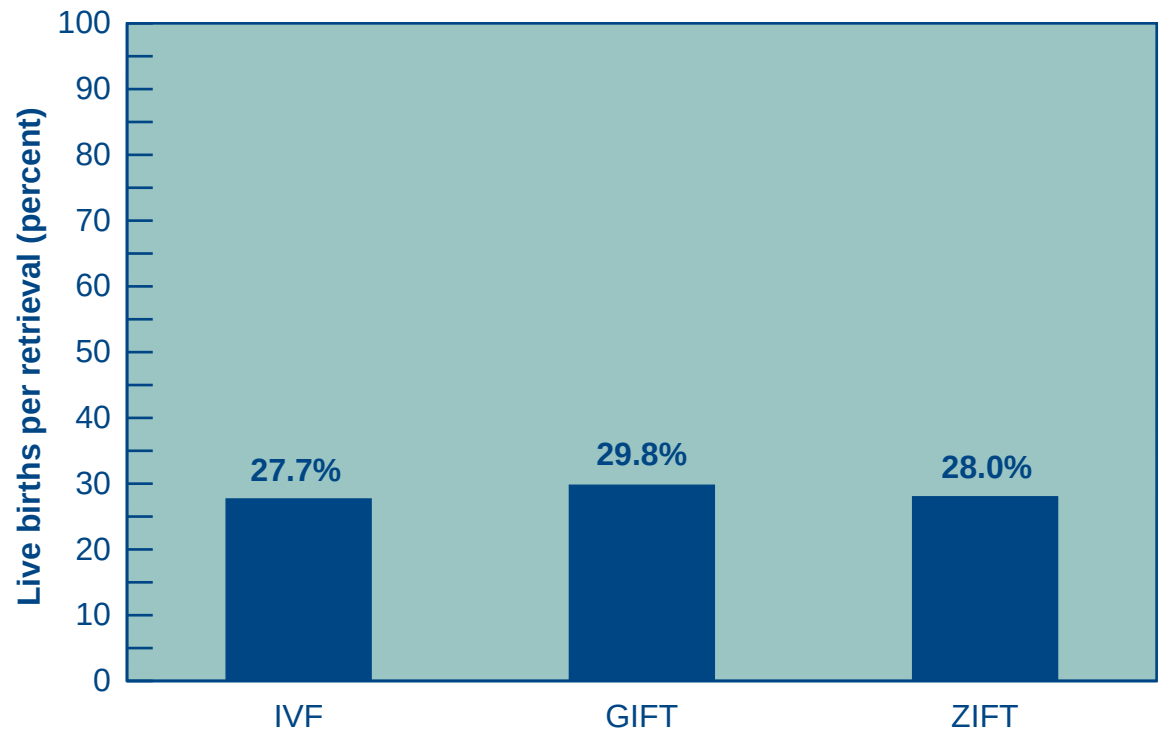


What are the live birth rates for different types of ART procedures?

Live birth rates vary by type of ART procedure used. Figure 8 shows the percentage of egg retrievals in 1997 that used a particular type of ART procedure and resulted in a live birth. Because the same patterns were seen among all age groups, results are given for all age groups combined. GIFT had a slightly higher success rate than IVF. However, some women with tubal infertility are not suitable candidates for GIFT and ZIFT. In addition, 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 into a woman's uterus through the cervix without surgery.

Figures 9 through 17 present results of all ART (IVF, GIFT, and ZIFT) procedures from fresh, nondonor cycles together because the numbers of ZIFT and GIFT procedures are relatively small.

Figure 8
Live Births per Retrieval Rates for Different Types of ART Procedures (Fresh, Nondonor Cycles), 1997



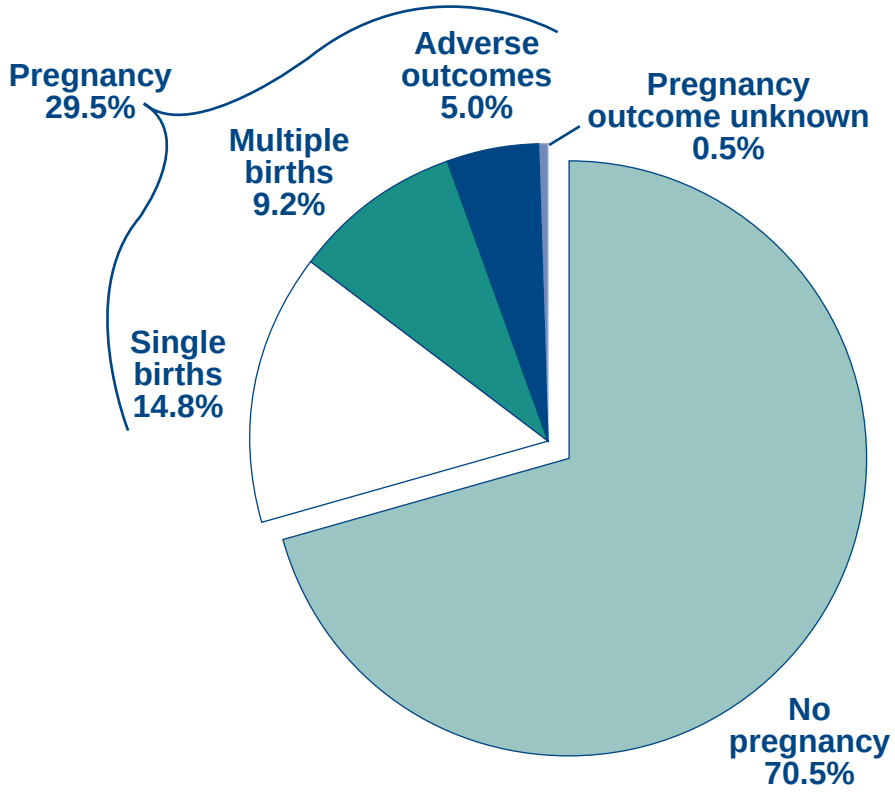
What percentage of ART cycles results in a pregnancy?

Most ART cycles performed in 1997 (70.5%) did not produce a pregnancy. Figure 9 shows the results of the 1997 fresh, nondonor cycles. Of all ART cycles, 29.5% resulted in a pregnancy. More specifically,

- 14.8% produced a single live birth.
- 9.2% resulted in a multiple birth.*
- 5.0% had an adverse outcome (ectopic pregnancy, miscarriage, induced abortion, or stillbirth).

Although a multiple birth is counted as one live birth, multiple births are presented here as a separate category because they are often associated with adverse outcomes or other problems. Newborn deaths and birth defects are not included as adverse outcomes because the available information for these outcomes is incomplete. Information on multifetal pregnancy reductions is also incomplete and thus not provided.

Figure 9
Results of Fresh, Nondonor ART Cycles, 1997

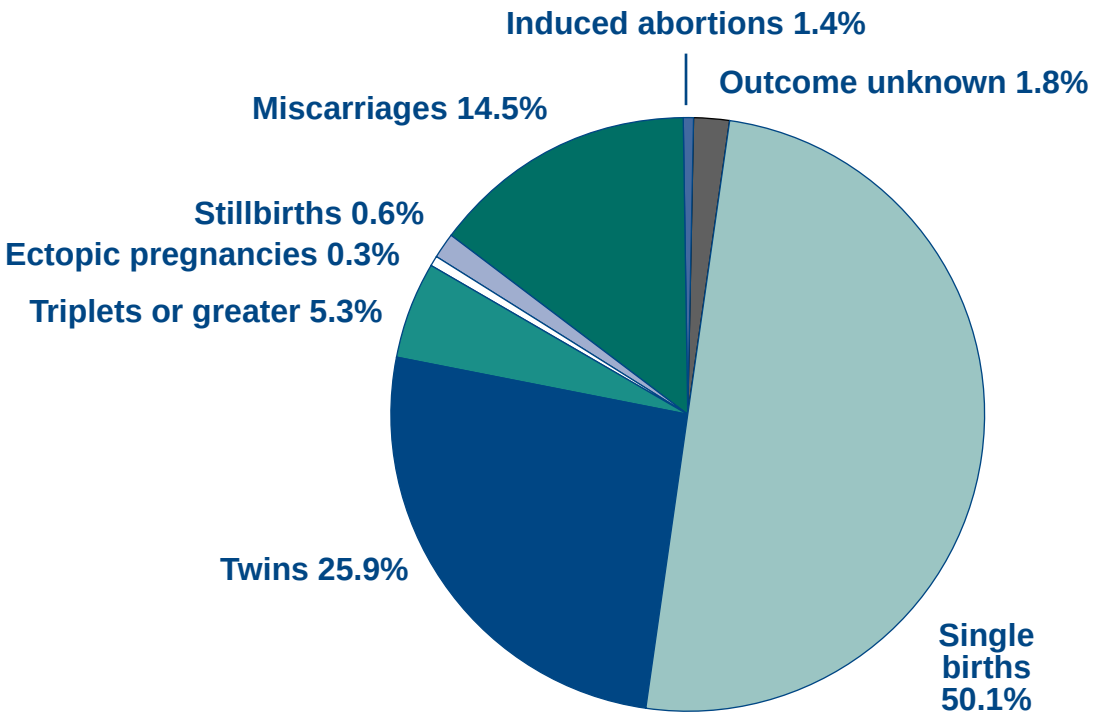


*A multiple birth is counted as one live birth because it is a single delivery. The total live birth rate (single and multiple) was 24%.

What percentage of pregnancies results in a live birth or multiple birth?

Figure 10 shows the outcomes of the ART cycles that resulted in pregnancies in 1997 (see Figure 9). Approximately 81% resulted in a live birth (50.1% in a single birth and 31.2% in a multiple birth). Thus, 38% of all ART births were multiple births, compared with less than 3% of births in the general population. Multiple births are associated with greater problems for both mothers and infants. Approximately 17% of pregnancies resulted in an adverse outcome (miscarriage, ectopic pregnancy, induced abortion, or stillbirth), and the outcomes of about 2% of pregnancies were unknown.

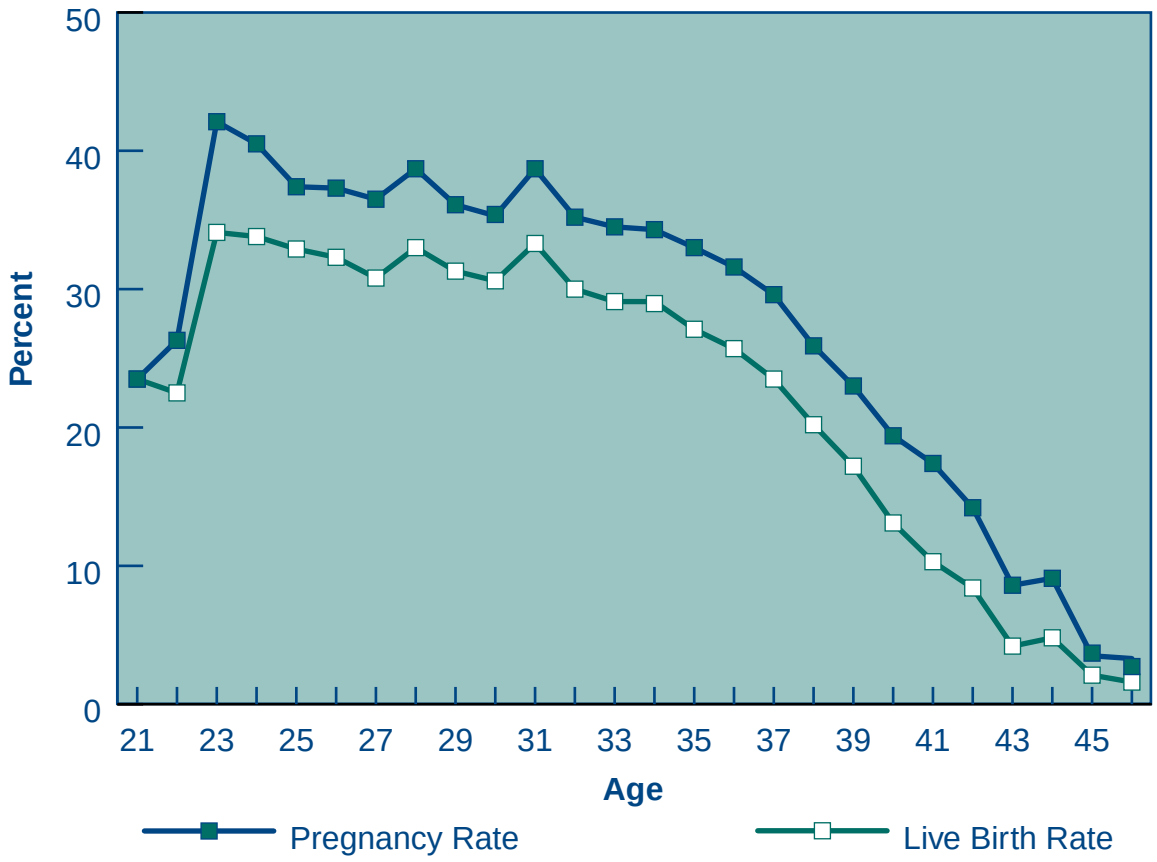
Figure 10
Outcomes of Pregnancies Resulting From Fresh, Nondonor ART Cycles, 1997



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 11 shows both the pregnancy and live birth rates for women of different ages who had ART procedures in 1997. Among women in their twenties, both pregnancy and live birth rates were relatively stable; however, both rates declined sharply from the mid-thirties onward as fertility declined with age.

Figure 11
Pregnancy and Live Birth Rates for Fresh, Nondonor ART Cycles, by Age of Woman, 1997



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

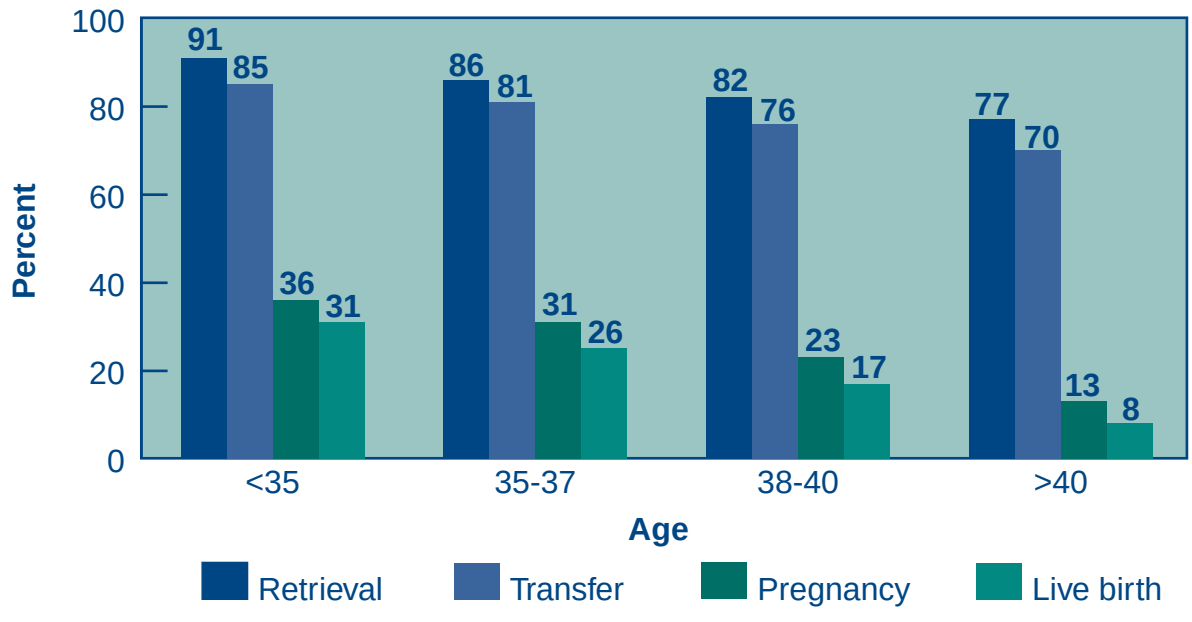
Figure 12 shows that a woman's chances of success using ART (with her own eggs) *decrease* at **every stage** of ART as her age *increases*.

- 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**. Thus, as women get older, the overall likelihood of cycles progressing from start to transfer decreases.
- The percentage of cycles that progress from transfer to **pregnancy** also decreases as women get older. This decrease contributes to the overall decrease in the likelihood of a cycle progressing from start to pregnancy as women get older.
- As women get older, cycles that have progressed to pregnancy are less likely to result in a **live birth**. Cumulatively, live births occurred in 31% of cycles started in 1997 among women younger than 35, 26% among women aged 35-37, 17% among women aged 38-40, and 8% among women older than 40.

In 1997, a total of 55,002 fresh, nondonor cycles were started:

- 24,581 among women under 35.
- 12,733 among women 35-37.
- 10,997 among women 38-40.
- 6,691 among women over 40.

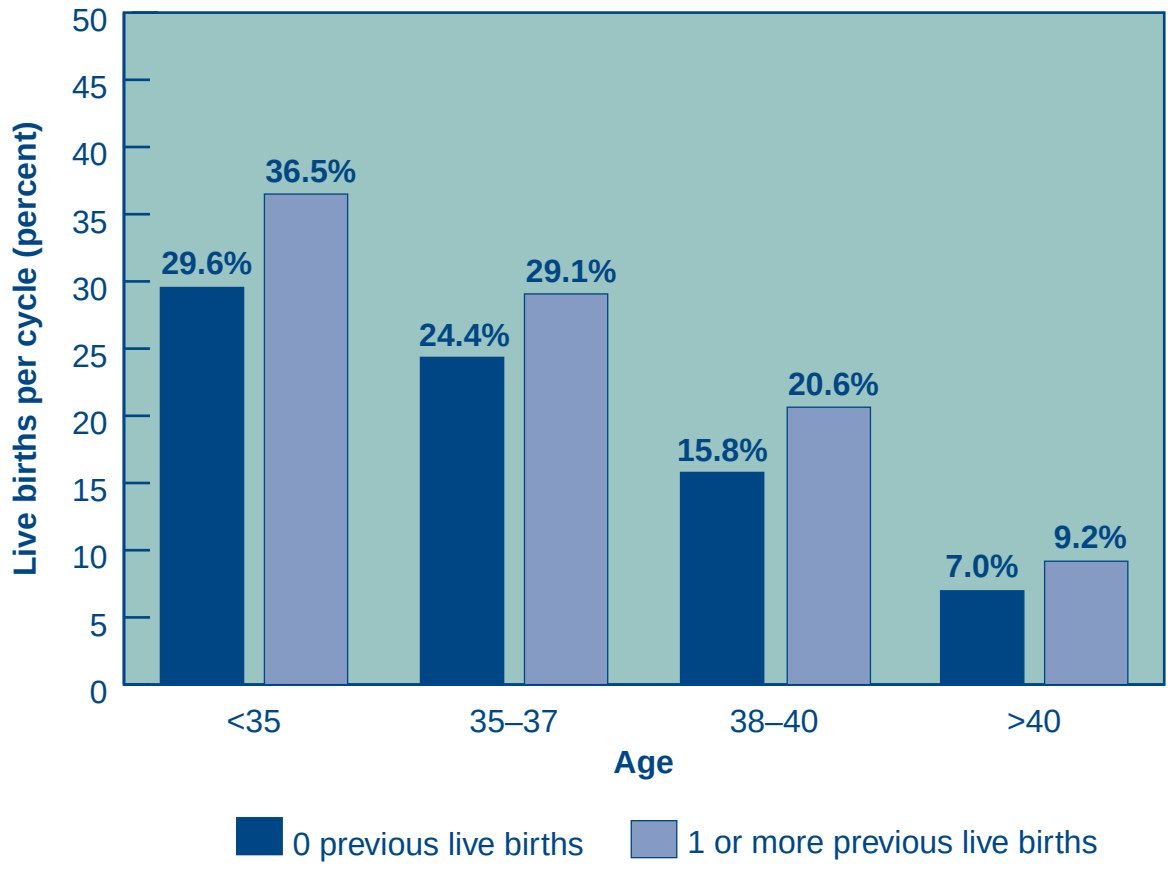
Figure 12
Outcomes of Fresh, Nondonor ART Cycles, by Stage and Age Group, 1997



How do the chances of success using ART compare for women who have previously given birth and women who have not?

Figure 13 shows the relationship between the success of an ART cycle performed in 1997 and the history of previous births to the woman who had the treatment. Previous live births were conceived naturally in some cases and through ART in others. In all age groups, women who had not had a previous live birth were less likely to have a live birth by using ART.

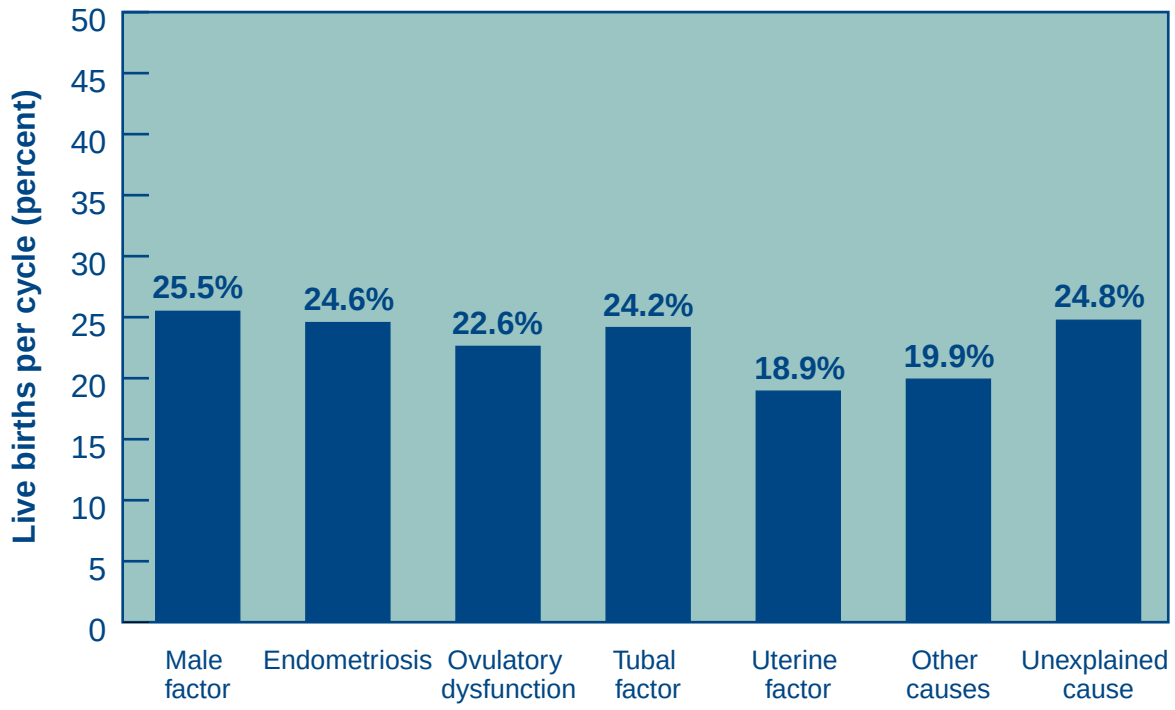
Figure 13
Live Birth Rates for Fresh, Nondonor ART Cycles, by Woman's Age and Number of Previous Live Births, 1997



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

Figure 14 shows the percentage of live births after an ART procedure according to the primary cause of infertility. (See the glossary for an explanation of the diagnoses.) The success rates varied little among most of the different diagnoses; most were near the overall national success rate of 24.0%. However, the use of these diagnostic categories may vary from clinic to clinic, and the definitions are imprecise.

Figure 14
Live Birth Rates Among Users of Fresh, Nondonor ART Cycles, by Primary Diagnosis, 1997

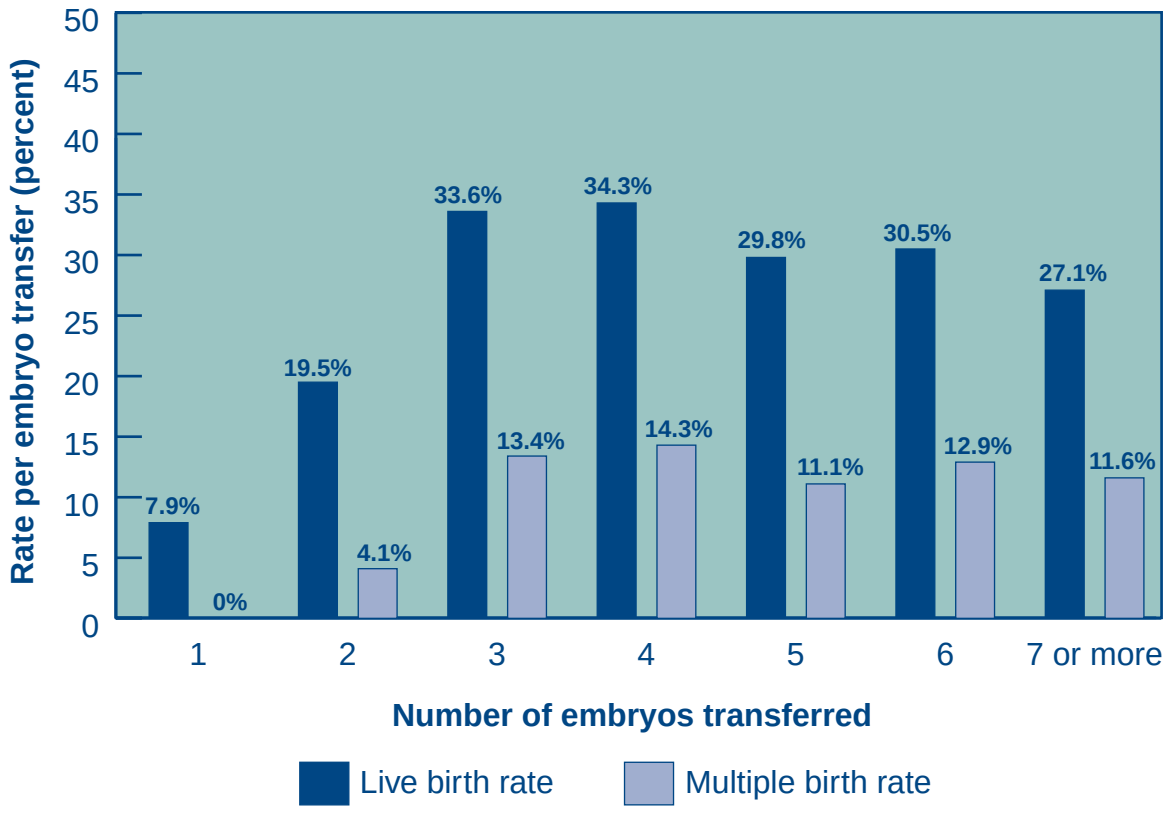


Is an ART cycle more likely to be successful when more embryos are transferred?

Figure 15 shows the relationship between the number of embryos transferred during an ART procedure in 1997 and the number of infants born alive as a result of that procedure. In general, transferring multiple embryos during an ART cycle improves the chances for a live birth but also increases the possibility of a multiple birth. Multiple births are of concern because of the additional health risks they create for both mothers and infants (e.g., higher rates of caesarean-section, prematurity, low birth weight, and infant death and disability).

The relationships between number of embryos transferred, success rates, and multiple births are complicated by several factors. Thus, the relationships shown in this figure do not hold for all women. A more detailed CDC report that discusses how age and embryo quality may affect the relationships between the number of embryos transferred, live birth rates, and multiple birth rates has been published in a separate journal article [Journal of the American Medical Association 1999;282(19):1832-1838.]

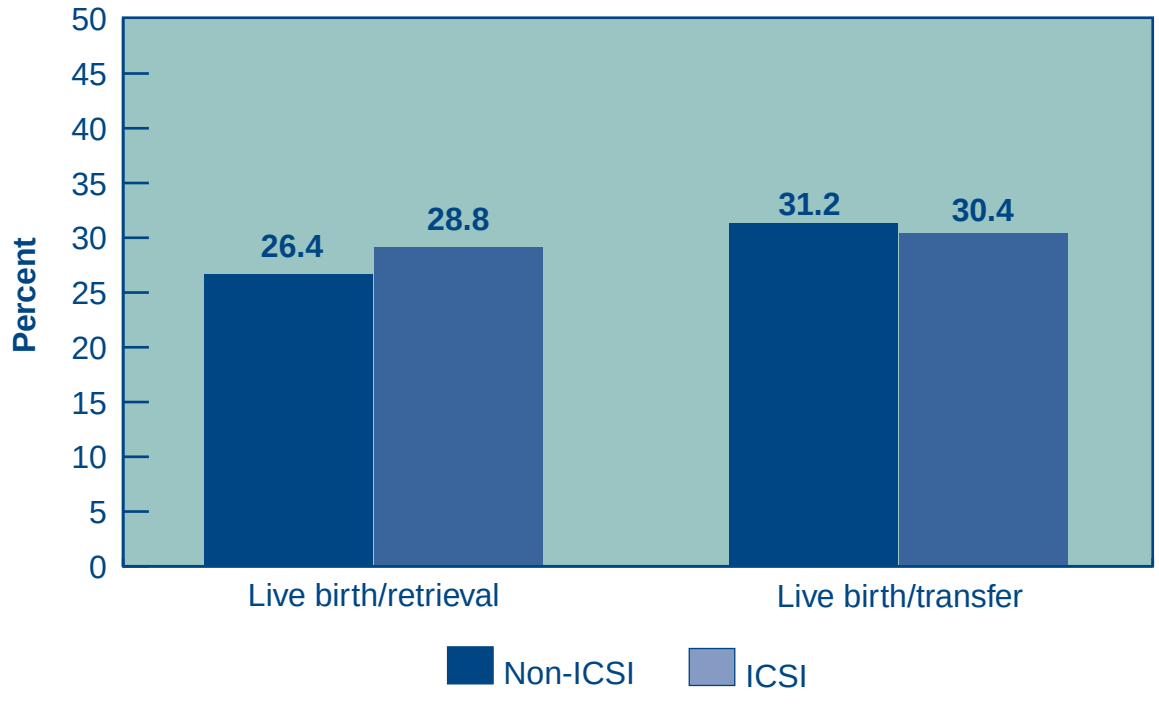
Figure 15
Live Birth and Multiple Birth Rates for Fresh, Nondonor ART Cycles, by Number of Embryos Transferred, 1997



Is an ART cycle more likely to be successful for couples with male factor infertility when ICSI is used?

In 1997, approximately 30% of fresh, nondonor ART cycles used ICSI (intracytoplasmic sperm injection, a procedure in which a single sperm is injected directly into an egg), most often to overcome problems with sperm function or motility. Figure 16 compares the success rates for ART procedures involving ICSI with those not involving ICSI among couples with male factor infertility as the primary diagnosis. Because ICSI can be performed only when at least one egg has been retrieved, only the live birth per retrieval rate and the live birth per transfer rate are compared. In 1997, success rates per retrieval were slightly higher when ICSI was used, indicating that ICSI may improve the chances of fertilization among couples with male factor infertility. The similarity in success rates for live births per transfer with and without ICSI shows that once the egg was fertilized, ICSI did not affect the success rate.

Figure 16
Success Rates for Fresh, Nondonor ART Cycles Including and Not Including ICSI Among Couples With Male Factor Infertility,* 1997

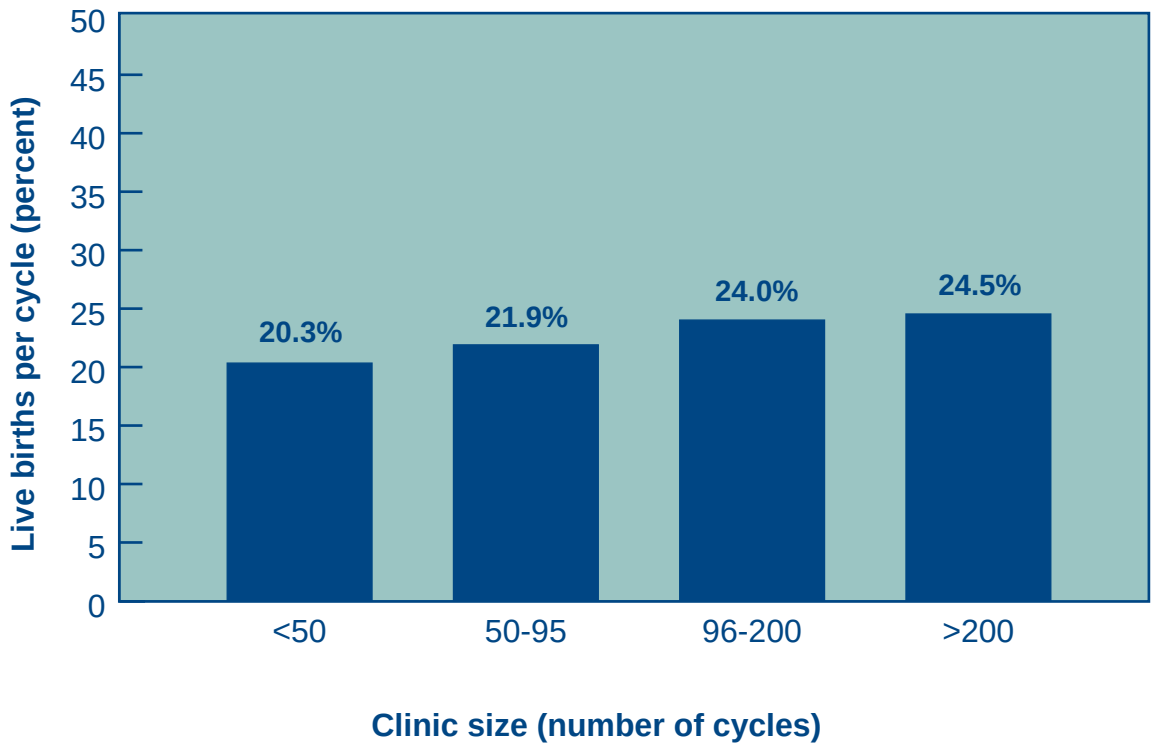


*As the primary diagnosis.

Does the size of the clinic affect its success rate?

Fertility clinics in the United States vary in the number of ART procedures that they carry out every year. In 1997, success rates tended to be slightly higher among clinics that performed more cycles. In Figure 17, clinics are divided into four equal groups (called quartiles) based on the size of the clinic as determined by the number of cycles it carried out. The percentages for each quartile represent the average success rates 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 17
Live Birth Rates for Fresh, Nondonor ART Cycles, by Clinic Size, 1997

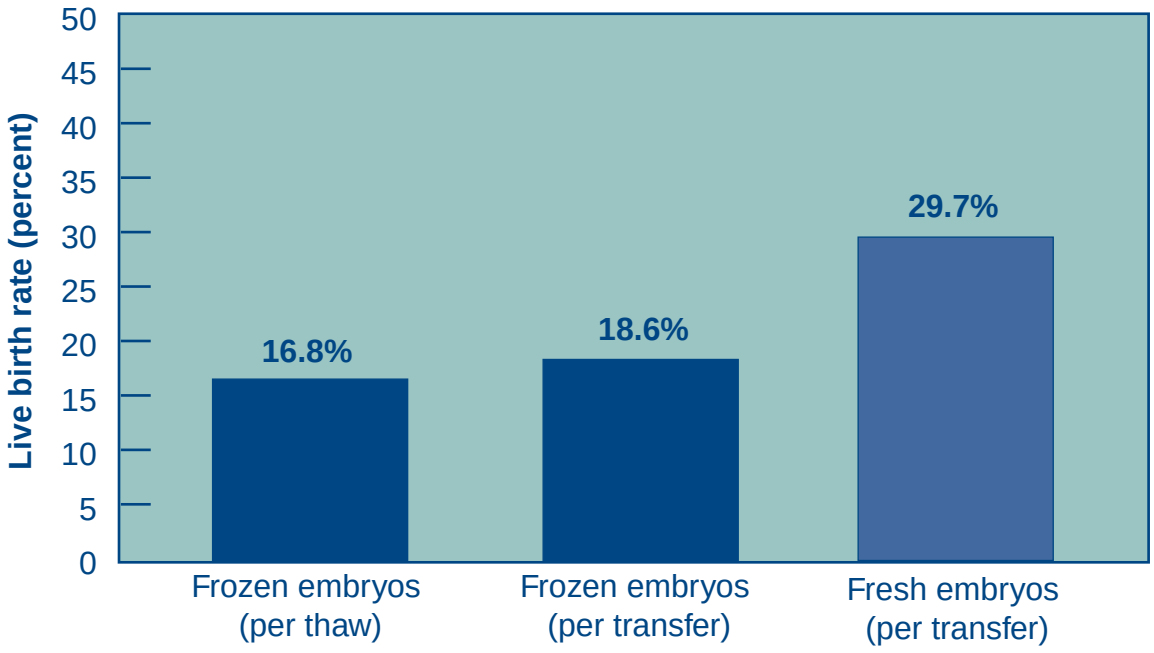


SECTION 3: ART CYCLES USING ONLY FROZEN EMBRYOS

What are the success rates for ART using frozen embryos?

Approximately 14% of all ART cycles performed in 1997, or 10,181 cycles, used only frozen embryos. Figure 18 compares the success rates for frozen embryos with the rate for fresh embryos. Some embryos do not survive the freezing or thawing process. Thus, the live birth per thaw rate, which takes into account all embryos frozen, is usually lower than the live birth per transfer rate. In 1997, the live birth per thaw and live birth per transfer rates for frozen embryos were lower than the live birth per transfer rate for fresh embryos. However, cycles that use frozen embryos are both less expensive and less invasive than fresh cycles because the woman does not have to go through the fertility drug stimulation and egg retrieval process again.

Figure 18
Live Birth Rates for Frozen Embryos and Fresh Embryos, 1997

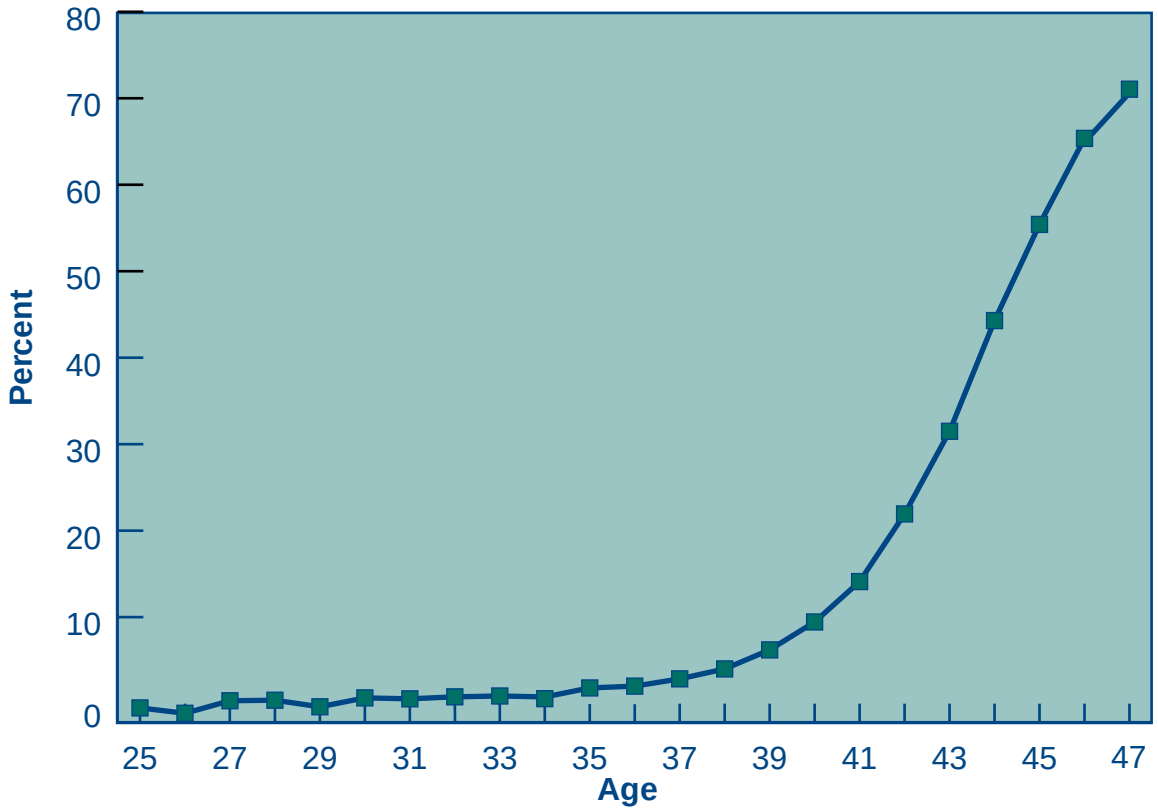


SECTION 4: ART CYCLES USING DONOR EGGS

Are older women more likely to have ART using donor eggs?

As shown in Figure 12, eggs produced by women in older age groups form embryos that are less likely to implant and more likely to miscarry if they do implant. As a result, ART using donor eggs is much more common among older women than among younger women. Donor eggs were used in approximately 9% of all ART cycles carried out in 1997, or 6,643 cycles. Figure 19 shows the percentage of ART cycles using donor eggs in 1997 according to the woman's age. Donor eggs were used in less than 5% of cycles among women younger than age 37. The percentage of cycles carried out with donor eggs then increased sharply. Among women older than age 46, more than 70% of all ART cycles used donor eggs.

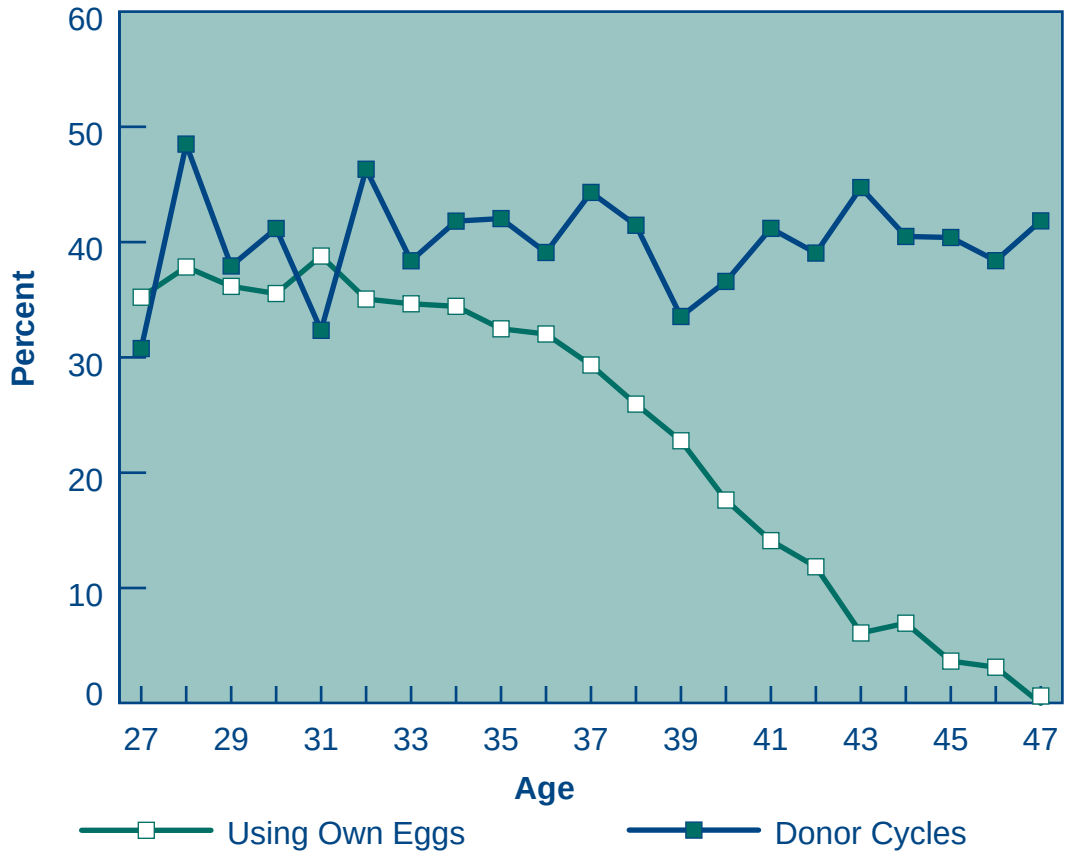
Figure 19
Percentage of ART Cycles Using Donor Eggs, by Age of Recipient, 1997



What are the success rates for ART when donor eggs are used?

Figure 20 compares success rates for ART using donor eggs with those for ART 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 twenties or early thirties. Thus, the live birth per transfer rate for cycles using embryos from donor eggs varies only slightly across all age groups. In contrast, this rate for cycles using embryos from the woman's own eggs declines steadily as women get older.

Figure 20
Live Births per Transfer for Fresh Embryos From Own and Donor Eggs, by Age of Recipient, 1997



1997 Fertility Clinic Tables

Introduction to Fertility Clinic Tables

In this section, each clinic's data are presented in a one-page table that includes individual program characteristics, the types of ART used, patient diagnoses, and success rates that each clinic reported and verified for 1997. Clinics are listed in alphabetical order by state, city, and clinic. The first table in this section is the national summary of data from all clinics.

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 different 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 1997.* Data for cycles started in 1997 could not be published until 1999 because the final outcomes of pregnancies conceived in December 1997 were not known until October 1998. 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 1997 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 page 381.

- *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 have had multiple previous unsuccessful ART cycles will generally have lower success rates than clinics that do not. In contrast, clinics that offer ART procedures to patients who might have become pregnant with less technologically advanced treatment will have higher success rates than clinics that do not.

  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 1997 are represented in multiple cycles. If a woman who received 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.* Some clinics are more likely than others to cancel a cycle if a woman produces only a small number of eggs. Cancellation rates for fresh, nondonor cycles vary among clinics from less than 1% to approximately 30%. A high cancellation rate tends to lower the live birth per cycle rate but may increase the live birth per retrieval and live birth per transfer rates.

- *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 required by 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 have lower success rates, and clinics that carry out a relatively high proportion of unstimulated cycles will have lower success rates than those that do not. Nationally, fewer than 1% of ART cycles in 1997 were unstimulated. However, in a very few clinics, more than 25% of cycles were unstimulated.

- *Success rates for GIFT and ZIFT are reported together with those for IVF.* Because success rates for GIFT may be higher than rates for IVF, clinics that do more GIFT procedures will have higher success rates. However, many women are not suitable candidates for GIFT or ZIFT. As mentioned on page 10, GIFT and ZIFT are more invasive than IVF, and many clinics perform very few GIFT and ZIFT procedures.

- *Live births resulting from extra embryos from a stimulated cycle that were frozen and transferred at a later date are counted only under frozen cycles.* Clinics that have very good live birth rates with frozen embryos would have higher ART success rates if live births from frozen embryos were included as a success for the original stimulated cycle. Consumers should look at rates for both fresh and frozen cycles when assessing a clinic's success rates.

- *The number of embryos transferred varies from clinic to clinic.* In 1997, the average number of embryos that a clinic transferred to women younger than age 35 ranged from 1.0 to 6.2 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

- The quality of eggs.
- The quality of sperm (including motility and ability to penetrate the egg).
- The skill and competence of the treatment team.
- The general health of the woman.
- Genetic factors.

We encourage consumers considering ART to contact clinics to discuss their specific medical situation and their potential for success using ART. Because clinics did not have the opportunity to

provide a narrative to explain their data, such a conversation could provide additional information to help people decide whether or not 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 will also want to consider the location of the clinic, the counseling and support services available, and the rapport that staff have with their patients.

An explanation of how to read a fertility clinic table begins on page 37.

SAMPLE CLINIC

1997 PROGRAM PROFILE

1 Program Characteristics		2 Type of ART[a]		3 ART Patient Diagnosis	
SART member?	Yes	IVF	72%	Tubal factor	37%
Single women?	Yes	GIFT	28%	Endometriosis	18%
Gestational carriers?	No	ZIFT	0%	Uterine factor	0%
Donor egg program?	Yes	Combination[b]	0%	Ovulatory dysfunction	18%
Sharing of donor eggs?	No			Male factor	13%
		With ICSI	16%	Other factors	13%
		Unstimulated	1%	Unexplained	2%

A comparison of clinic success rates may not be meaningful because patient medical characteristics and treatment approaches vary from clinic to clinic. (See pp. 33–35.)

1997 ART PREGNANCY SUCCESS RATES[c]

4 Type of Cycle	5 Age of Woman <35	35-37	38-40	>40
4A Fresh Embryos From Nondonor Eggs				
Number of cycles	83	41	19	10
Pregnancies per 100 cycles	34.9	26.8	3/19	2/10
Live births per 100 cycles[d]	27.7	22.0	1/19	1/10
6 (95% confidence interval)	(18.1 - 37.3)	(9.3 - 34.6)		
Live births per 100 retrievals[d]	28.4	23.1	1/15	1/8
Live births per 100 transfers[d]	28.8	25.0	1/14	1/8
Cancellations per 100 cycles	2.4	4.9	4/19	2/10
Average number embryos transferred	5.2	5.6	6.8	7.5
Twin gestations per 100 pregnancies	27.6	1/11	1/3	0/2
Triplet or more gestations per 100 pregnancies	20.7	1/11	0/3	0/2
Multiple births per 100 live births[d]	44.8	2/9	1/1	0/1
4B Frozen Embryos From Nondonor Eggs				
Number of transfers	4	3	0	0
Live births per 100 transfers[d]	1/4	0/3		
Average number embryos transferred	1.0	1.7		
4C Donor Eggs				
Number of fresh transfers	1	0	1	5
Live births per 100 fresh transfers[d]	0/1		0/1	3/5
Number of frozen transfers	0	0	0	0
Live births per 100 frozen transfers[d]				
Average number embryos transferred (fresh and frozen)	5.0		4.0	5.6

[a] Includes only fresh, nondonor egg cycles.
[b] Combination of fresh, nondonor IVF, GIFT, and ZIFT procedures.
[c] When fewer than 20 cycles are reported in any one category, rates are shown as fractions.
[d] A multiple birth is counted as one live birth.

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 in the appendix.

1. Program Characteristics

- **SART member**—323 of the 335 clinics reporting data from 1997 are SART members.
- **Single women and gestational carriers**—Clinics have varying policies regarding ART services for single (unmarried) women and gestational carriers (women who carry a child for another woman; sometimes referred to as *gestational surrogates*).
- **Donor egg program**— Some clinics have programs for ART using donor eggs.
- **Sharing of donor eggs**— Sharing of donor eggs refers to donor cycles in which eggs from a single donor are given to more than one woman. Policies regarding sharing of donor eggs vary from clinic to clinic.

2. Type of ART Used

In the fertility clinic tables, ART success rates are not broken down into IVF, GIFT, and ZIFT. (See glossary for definitions.) Because the percentages of GIFT and ZIFT are usually small, these three types of ART are combined. However, knowing the percentage of each type of procedure performed can be useful because carrying out a higher percentage of GIFT procedures may increase a clinic's success rate. This section also indicates the percentage of procedures that involved intracytoplasmic sperm injection (ICSI), which not all clinics performed in 1997, and the percentage of cycles that were unstimulated.

3. ART Patient Diagnosis

Consumers may want to know what percentage of a particular clinic's patients have the same diagnosis as they do. (See the 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 from clinic to clinic, and the definitions are imprecise. Thus, these statistics should be applied with caution.

4. Success Rates by Type of Cycle

Success rates are given for the three types 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 success rates indicate the average chance of success for the given procedure at the clinic in 1997 for each of four age groups. Success rates are calculated as either the number of pregnancies or the number of live births from ART for every hundred cycles started, egg retrievals, or embryo transfers at the clinic in 1997. For example, if a clinic started a total of 50 cycles in 1997, and 15 live births resulted, the average success rate for cycles started at that clinic per 100 cycles would be

$$\frac{\text{15 live births}}{\text{50 cycles}} = \frac{\text{30 live births}}{\text{100 cycles}}$$

Thus, the success rate for live births per 100 cycles is 30.

When fewer than 20 cycles are reported in a given category, the rates are shown as fractions rather than in terms of 100 cycles. For example, the sample clinic carried out only four frozen cycles using donor eggs among women younger than age 35. Of these four cycles, two—or 50 per 100 cycles—were successful. However, because of the small number of cycles, 50 live births per 100 cycles is not a reliable success rate, so the success rate is presented as 2/4.

When no cycles were performed in a category, no rates or embryo transfer averages could be calculated, so these spaces are blank. (For an example, see frozen embryo cycles among women aged 38–40 and older than 40 in the sample clinic table.)

4A. Cycles Using Fresh Embryos From Nondonor Eggs
This section includes IVF, GIFT, and ZIFT cycles that used a woman's own eggs. Cycles that used frozen embryos or donor eggs are not included here.

- **Pregnancies per 100 cycles**
  (Number of pregnancies divided by number of cycles started, expressed in terms of 100 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.

- **Live births per 100 cycles**
  (Number of live births divided by number of cycles started, expressed in terms of 100 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 (i.e., a multiple birth is counted as one live birth).

- **Live births per 100 retrievals**
  (Number of live births divided by number of egg retrievals, expressed in terms of 100 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 is often 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 birth per cycle started rate.

- **Live births per 100 transfers**
  (Number of live births divided by number of embryo transfers, expressed in terms of 100 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 fertil-

ization and embryo transfer. For this reason, live birth rates based on transfers will be higher than those reported for egg retrievals and for cycles started.

- **Cancellations per 100 cycles**
  (Number of cycles canceled divided by the total number of cycles, expressed in terms of 100 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 produce an insufficient number of follicles. Cycles are also 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 and the Society for Assisted Reproductive Technology have practice guidelines that address this issue.

- **Twin gestations per 100 pregnancies**
  (Number of pregnancies with two fetuses divided by the total number of pregnancies, expressed in terms of 100 pregnancies)

  A gestation with two or more fetuses is counted as one pregnancy.

- **Triplet or greater gestations per 100 pregnancies**
  (Number of pregnancies with three or more fetuses divided by the total number of pregnancies, expressed in terms of 100 pregnancies)

  Multiple gestations can be associated with increased risk for mothers and babies (e.g., higher caesarean-section rates, prematurity, and low birth weight) and the possibility for multifetal reduction.

  A gestation with two or more fetuses is counted as one pregnancy.

- **Multiple live births per 100 live births**
  (Number of deliveries resulting in the birth of more than one living baby divided by the total number of live births, expressed in terms of 100 live births)

  A delivery of one or more living babies is counted as one live birth.

4B. Cycles Using Frozen Embryos From Nondonor Eggs

Frozen (cryopreserved) cycles are those in which previously frozen embryos are thawed and then transferred. Because frozen cycles use embryos formed from a previous stimulated cycle, no stimulation or retrieval is involved. As a result, these cycles are usually 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

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 and healthy woman. Embryos donated by couples who previously had ART may also be available. Many clinics provide services for donor egg and embryo cycles. Live birth rates do not vary much by the recipient's age when donor eggs or embryos are used. (See Figure 20 on page 29.)

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 are reported separately for women younger than age 35, for women aged 35–37 years, for women aged 38–40 years, and for women older than age 40. The sample clinic profile illustrates the decline in ART success rates among older women: 100 cycles started at this clinic in women younger than age 35 resulted in 24.6 live births, whereas 100 cycles in women older than age 40 resulted in only 6.9 live births.

6. 95% Confidence Interval

The tables show 95% confidence intervals for live births per 100 cycles unless fewer than 20 cycles are reported in an age category. The 95% confidence interval tells us how reliable a clinic's success rate is. In general, the more cycles that a clinic performs, the narrower the range of its confidence interval and the more likely the clinic would be to have the same success rate if it treated other similar groups of patients under similar clinical conditions.

Even though one clinic's success rate may appear higher than another's based on the confidence intervals, ***confidence intervals are only one indication that the success rate may be better. Other factors must also be considered*** when comparing rates from two clinics. For example, some clinics see more than the average number of patients with difficult infertility problems, while 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 33 to 35.

For a more detailed explanation and examples of confidence intervals, see page 381 in the Appendix.

1997 National Summary

1997 PROGRAM PROFILE

Program Characteristics		Type of ART[a]		ART Patient Diagnosis	
Total clinics	335	IVF	93%	Tubal factor	27%
SART member?	96%	GIFT	4%	Endometriosis	14%
Single women?	76%	ZIFT	2%	Uterine factor	2%
Gestational carriers?	37%	Combination[b]	1%	Ovulatory dysfunction	23%
Donor egg program?	78%			Male factor	16%
Sharing of donor eggs?	23%	With ICSI	35%	Other factors	10%
		Unstimulated	<1%	Unexplained	8%

A comparison of clinic success rates may not be meaningful because patient medical characteristics and treatment approaches vary from clinic to clinic. (See pp. 33–35.)

1997 ART PREGNANCY SUCCESS RATES

Type of Cycle	Age of Woman			
	<35	35-37	38-40	>40
Fresh Embryos From Nondonor Eggs				
Number of cycles	24,581	12,733	10,997	6,691
Pregnancies per 100 cycles	35.7	31.3	22.8	13.2
Live births per 100 cycles[c]	30.7	25.5	17.1	7.6
Live births per 100 retrievals[c]	33.8	29.6	20.9	9.9
Live births per 100 transfers[c]	35.9	31.4	22.5	10.9
Cancellations per 100 cycles	9.3	14.0	18.3	22.9
Average number embryos transferred	3.7	3.8	3.9	4.0
Twin gestations per 100 pregnancies	30.7	26.4	21.8	15.3
Triplet or more gestations per 100 pregnancies	13.7	11.3	6.8	2.8
Multiple births per 100 live births[c]	43.0	36.8	28.4	19.0
Frozen Embryos From Nondonor Eggs				
Number of transfers	4,862	2,144	1,385	774
Live births per 100 transfers[c]	21.3	18.6	14.5	10.0
Average number embryos transferred	3.5	3.4	3.5	3.6
Donor Eggs				
Number of fresh transfers	547	480	846	2,625
Live births per 100 fresh transfers[c]	40.8	41.9	36.6	40.2
Number of frozen transfers	177	134	213	958
Live births per 100 frozen transfers[c]	16.4	22.4	19.3	23.6
Average number embryos transferred (fresh and frozen)	3.5	3.6	3.7	3.7

[a] Includes only fresh, nondonor egg cycles.
[b] Combination of fresh, nondonor IVF, GIFT, and ZIFT procedures.
[c] A multiple birth is counted as one live birth.