1996 Assisted Reproductive Technology Success Rates

National Summary and Fertility Clinic Reports

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

1996 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
Somerville, Massachusetts

December 1998

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion

This publication was developed and produced by the National Center for Chronic Disease Prevention and Health Promotion of the Centers for Disease Control and Prevention in collaboration with the American Society for Reproductive Medicine; the Society for Assisted Reproductive Technology; and RESOLVE, a national consumer group.

Centers for Disease Control and Prevention

National Center for Chronic Disease Prevention and Health Promotion	James S. Marks, M.D., M.P.H., Director
Technical Information and Editorial Services Branch	Christine Fralish, M.L.I.S., Branch Chief Phyllis Moir, M.A.
Division of Reproductive Health	Lynne S. Wilcox, M.D., M.P.H., Director
Women's Health and Fertility Branch	Herbert B. Peterson, M.D., M.P.H., Branch Chief Susan F. Meikle, M.D., M.S.P.H. Gary Jeng, Ph.D. Nancy M. Burnett Laura A. Schieve, Ph.D. Isabella A. Danel, M.D., M.S.
American Society for Reproductive Medicine	J. Benjamin Younger, M.D., Executive Director
Society for Assisted Reproductive Technology	G. David Adamson, M.D., President Maria Bustillo, M.D. Bill Yee, M.D. Jacob F. Mayer, Ph.D. Joyce G. Zeitz
Registry Committee	James A. Grifo, M.D., Ph.D., Chairman Robert Brzyski, M.D., Ph.D. James P. Toner, M.D., Ph.D.
The November Group, Inc.	C. Martin Beaird
Redshift Technology, Inc.	Matthew Scott
RESOLVE	Diane D. Aronson, Executive Director Margaret R. Hollister Diane Clapp

Publication support was provided by Palladian Partners, Inc., under Contract No. 200-98-0415 for the National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services.

Table of Contents

Introduction

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 achieve pregnancy, 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 provide some of the information potential ART users need to make informed decisions. Information in this report can assist potential ART users in answering the following commonly asked 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 fertility clinics in the United States.

The 1996 report of pregnancy success rates is the second to be issued under the law. It is coauthored by CDC, SART/ASRM, and RESOLVE, a large national consumer organization that helps infertile couples and individuals. This report is based on data collected by SART on the number and outcome of ART cycles performed at U.S. clinics in 1996. The report includes

- A national report that uses information from 300 U.S. fertility clinics to provide an in-depth national picture of ART.
- Fertility clinic tables that provide ART success rates for each clinic that submitted and verified its 1996 data in accordance with federal law.
- An appendix containing a glossary of terms used in the national and clinic reports and lists of reporting and nonreporting clinics in the United States.

Many factors can influence a woman's chances of having a child by using ART. 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 data from all the clinics that reported, it can give people considering ART a good idea of what the average chances are of having a child by using ART. 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 tabulated results of success rates for ART procedures at individual U.S. fertility clinics in operation in 1996.

For a clinic's success rates to be published in this report, its data had to be submitted on time, and the clinic's medical director subsequently had to verify the tabulations. The data in both the national report and the individual fertility clinic tables come from the 300 fertility clinics that provided and verified information about the outcomes of all ART cycles started in their clinics in

1996. A few clinics were operating as part of other clinics in 1996 and accordingly are not listed separately in the report.

Although we believe that almost all clinics providing ART services in the United States that were in operation throughout 1996 are represented in this report, it is possible that some are not. We will continue to make every effort to include all clinics and practitioners providing ART services in future reports. Clinics and practitioners that did not report and verify their data are listed in this report, as required by law. (See Appendix, Nonreporting ART Clinics for 1996, by State, page 359.)

We began establishing a validation process on the 1996 data as a quality control measure. Eight percent of the clinics that reported were randomly selected for validation after the data were submitted. Two-member teams from a SART committee visited these clinics and compared a portion of the data in the clinic records with the data submitted for the report; CDC staff accompanied the SART team on some visits to provide technical assistance. The process of validation helps to ensure that clinics are submitting complete and accurate data. Validation also helps to identify any data items that may not be recorded consistently or ascertained completely. As another quality control measure, work is continuing on standardizing the definitions of diagnostic categories used in this report and the way the diagnoses are documented and reported.

Success rates can be reported in a variety of ways and 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. More detailed statistical analyses will be available in future scientific publications.

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.


1996
National
Report

Introduction to 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 provides an overall national picture that could not be obtained by examining data from an individual clinic. The 1996 national summary table, which is based on data from all clinics included in this report, is on page 35, immediately preceding the individual clinic tables. An explanation of how to read these tables is on pages 31–34.

A woman's chances of having a pregnancy and a live birth by using ART are related to a variety of factors outside a clinic's control. Some of the factors covered in this report include the woman's age, the cause of infertility, and the number of children that the woman has already had. Other important information, such as the length of time that infertility has been a problem and the number of previous unsuccessful ART attempts, was not available for this report.

The national data are useful because they 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 300 fertility clinics in operation in 1996 that provided and verified data on the outcomes of all ART cycles started in their clinics in 1996. Most of these clinics are members of the Society for Assisted Reproductive Technology (SART). Although we believe that these 300 clinics represent almost all clinics in the United States that use ART, data for a few clinics or practitioners have not been included in this report because they either were not in operation throughout 1996 or did not report as required.

The national report consists of graphs and charts that answer specific questions related to ART procedures performed in 1996. These figures are organized according to the type of ART procedure used. Some ART procedures use a couple's own gametes (nondonor eggs and sperm), and others use eggs or sperm donated by another person (donor eggs or sperm). In some procedures, the embryos that develop are transferred back to the woman within one or two days of fertilization (fresh transfer); in others, the embryos are frozen (cryopreserved) for transfer at a later date. The national report has four sections:

- Section 1 (Figures 1 and 2) presents information from all ART procedures reported.
- Section 2 (Figures 3 through 15) presents information on the 49,584 ART cycles that used only fresh embryos from nondonor eggs, the type of treatment first-time clinic patients are most likely to receive. In a few cases, fresh, nondonor cycles included a mixture of fresh and frozen embryos from nondonor eggs.
- Sections 3 and 4 (Figures 16 through 18) present information on the ART cycles that used only frozen embryos (9,290 cycles) or only donated eggs (5,162 cycles).

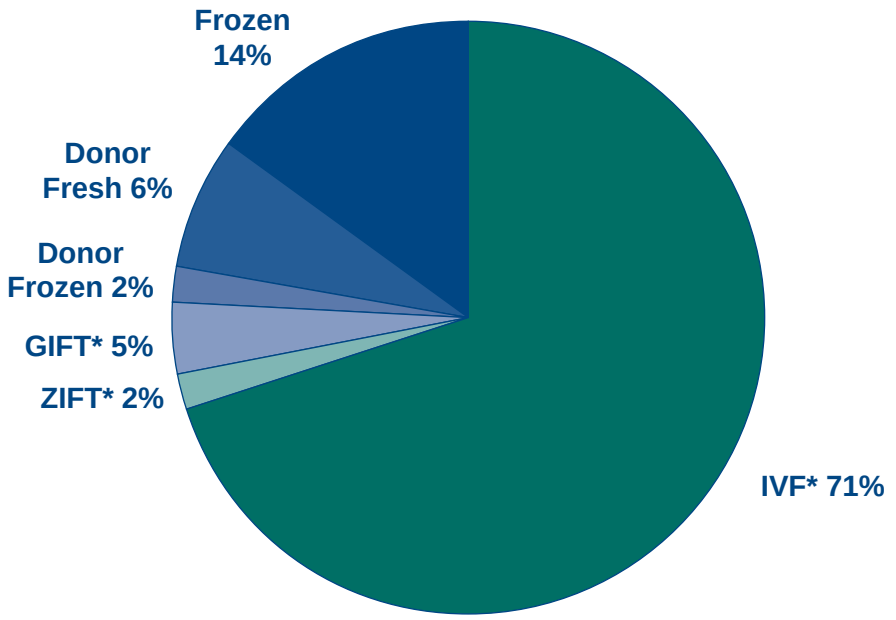
Technical terms are defined in the glossary.

What types of ART procedures were used in the United States in 1996?

A total of 20,659 babies were born as a result of the 64,036 ART cycles carried out in 1996 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. As Figure 1 shows, most ART cycles (71%) were IVF cycles that used fresh embryos developed from the woman's own eggs.
- **GIFT (gamete intrafallopian transfer)** was used in 5% of procedures. In GIFT, a fiber-optic instrument called a laparoscope is used to help place the unfertilized eggs and sperm (gametes) into the woman's fallopian tubes through small incisions in her abdomen.
- **ZIFT (zygote intrafallopian transfer)**, used in only 2% of procedures in 1996, involves fertilizing a woman's eggs in the laboratory and then using a laparoscope to help transfer the fertilized eggs (zygotes) into her fallopian tubes.

Figure 1
Types of ART Procedures — United States, 1996

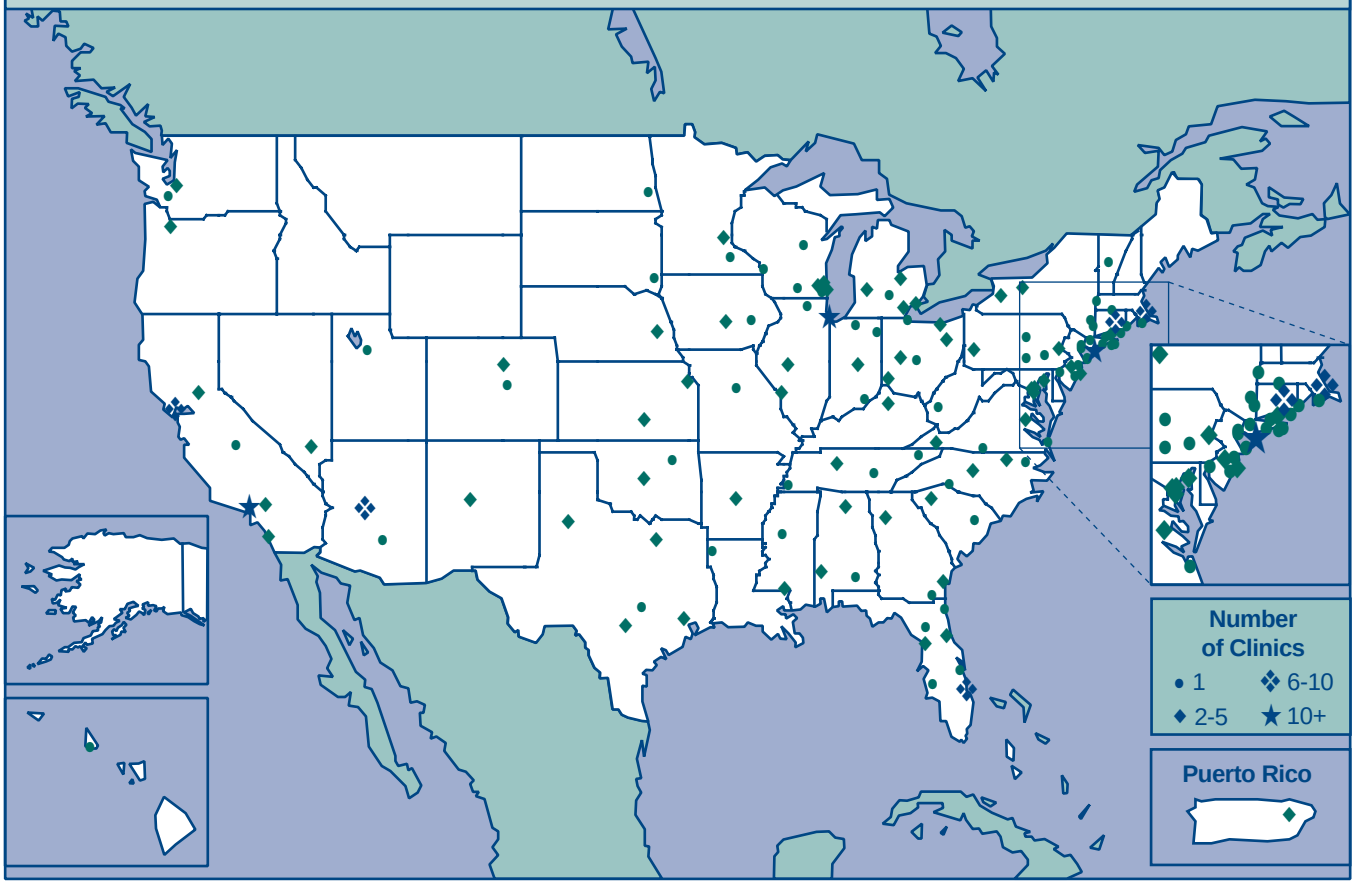


*Fresh, nondonor cycles. IVF, ZIFT, and GIFT cycles using donor eggs or frozen embryos are included in "donor" or "frozen" categories.

Where are ART clinics located?

Although ART clinics are spread 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 300 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, 1996

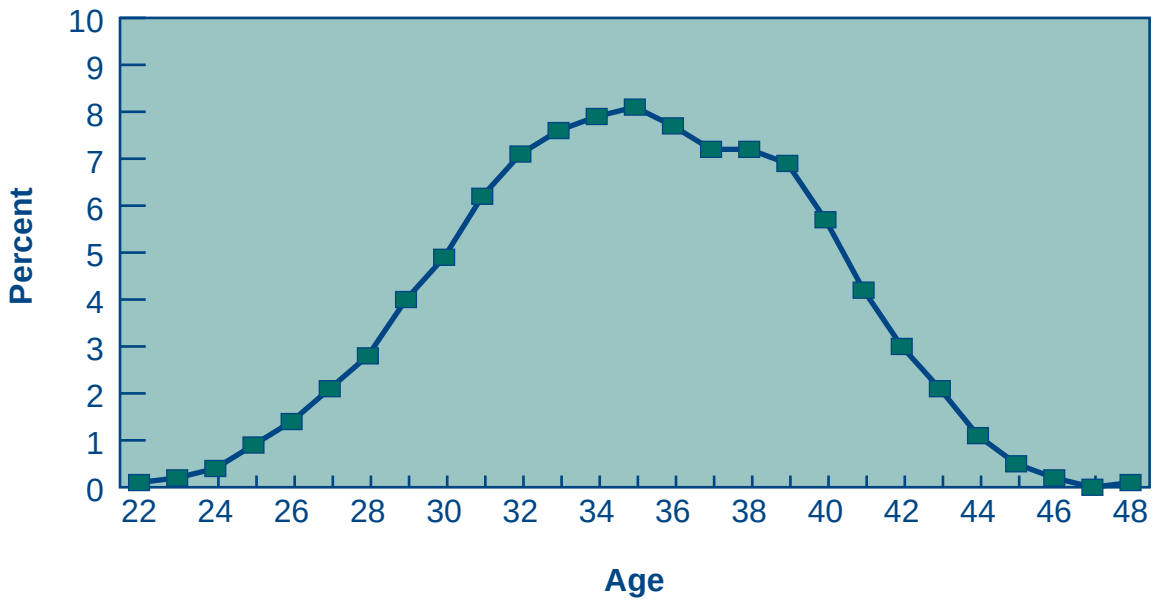


SECTION 2: ART CYCLES USING FRESH, NONDONOR EGGS OR EMBRYOS

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

Figure 3 presents ART cycles according to the age of the woman who had the procedure. For example, 8% of the 49,399 fresh, nondonor ART cycles carried out in women between the ages of 22 and 48 were in women 35 years old. Very few women under age 25 used ART, and very few women older than age 45 used ART with their own eggs. In 1996, 71% of ART cycles using fresh, nondonor eggs were in women 30 to 39 years old.

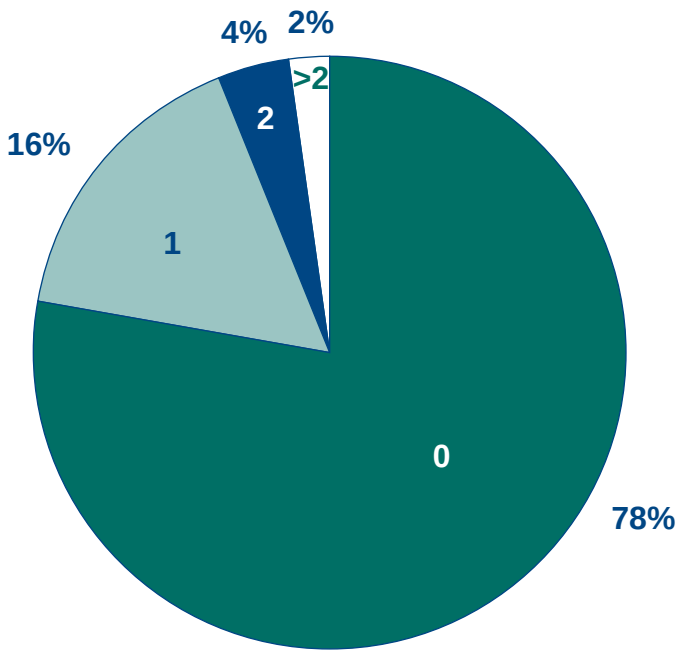
Figure 3
Percentage of Fresh, Nondonor ART Cycles, by Age of Woman, 1996



Have many women who use ART previously given birth?

Figure 4 shows the number of previous children born to women who had an ART procedure in 1996. 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, nor do we have any information concerning previous partners. Nonetheless, these data point out that women who have previously had children can face infertility problems, which may include the infertility of a new partner.

Figure 4
Number of Previous Births Among Women Who Had Fresh, Nondonor ART Cycles, 1996

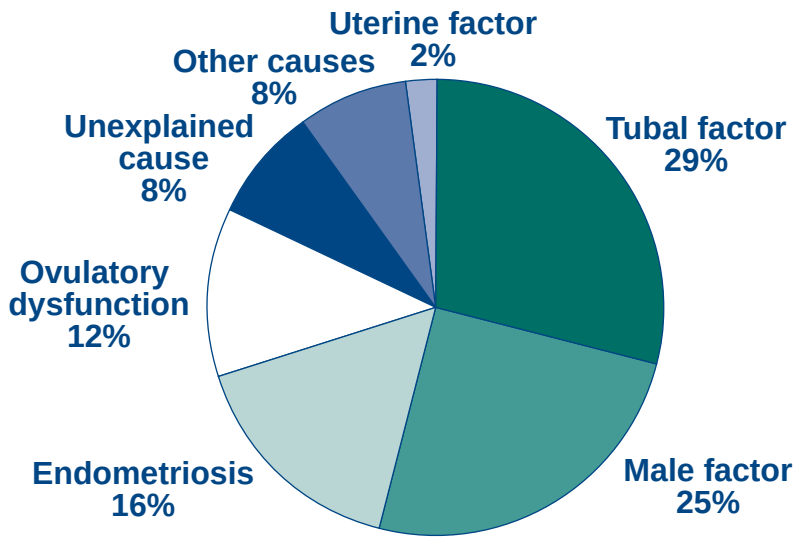


What are the causes of infertility among couples who use ART?

Figure 5 shows the primary diagnoses responsible for infertility among couples who had an ART procedure in 1996. Some couples have more than one cause of infertility, although only one is reported as primary. In addition, diagnostic definitions and categories vary somewhat from clinic to clinic, and the procedures used to diagnose the cause of infertility may vary from one woman or couple to another.

- **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 or motility (ability to move) 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 an abnormal location. 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 and exposure to diethylstilbestrol (DES) as a fetus. (In the 1950s and 1960s, DES was given to some women to prevent miscarriages.)
- **Uterine factor** refers to disorders of the uterus that impair fertility.

Figure 5
Primary Diagnoses Among Women Who Had Fresh, Nondonor ART Cycles, 1996

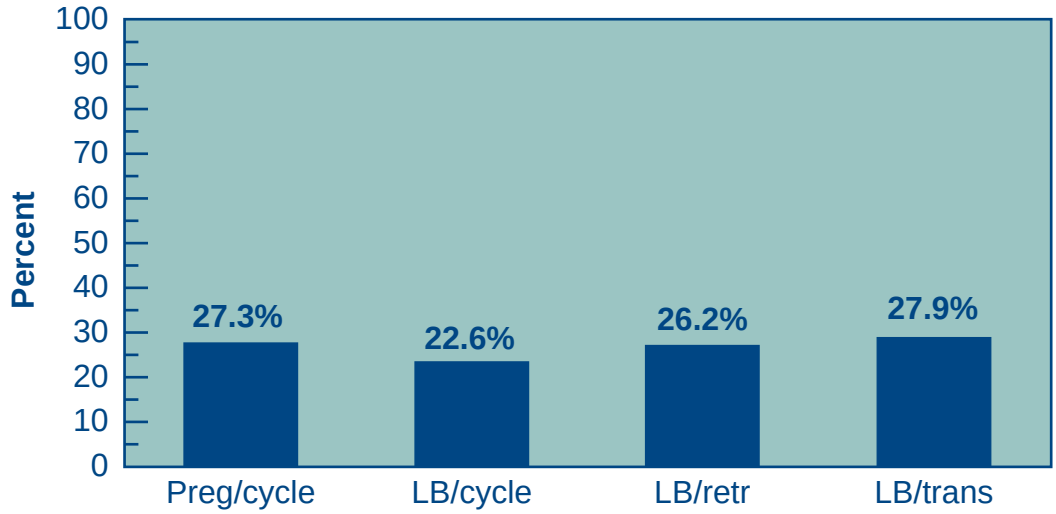


How is the success of an ART procedure measured?

Several measures can be used to assess ART success rates. Each provides slightly different information about this complex process. Figure 6 shows ART success rates using four different measurements:

- The **pregnancy per cycle rate** (Preg/cycle) refers to the percentage of ART cycles started that resulted in a pregnancy. This rate is higher than the live birth per cycle rate because some pregnancies are lost through miscarriage or therapeutic abortion, and a small percentage end in a stillbirth.
- The **live birth per cycle rate** (LB/cycle) shows the percentage of cycles started that resulted in the delivery of one or more live infants. This rate is the one many people considering ART are most interested in. **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** (LB/retr) is generally higher than the live birth per cycle rate because it excludes those cycles that are canceled (i.e., stopped before eggs were retrieved). In 1996, approximately 14% of all fresh, nondonor cycles were canceled, most commonly because too few (egg) follicles developed. Illness unrelated to the ART procedure may also lead to cancellation. In general, cycles are canceled when chances of success are poor or risks are unacceptably high.
- The **live birth per embryo transfer rate** (LB/trans) includes only those cycles in which an embryo or egg and sperm were transferred back to the woman. It excludes cycles in which no transfer occurred because the egg was not fertilized or the embryos formed were abnormal. As a result, it is generally higher than the live birth per egg retrieval rate.

Figure 6
Success Rates for Fresh, Nondonor ART Cycles Using Different Measures, 1996

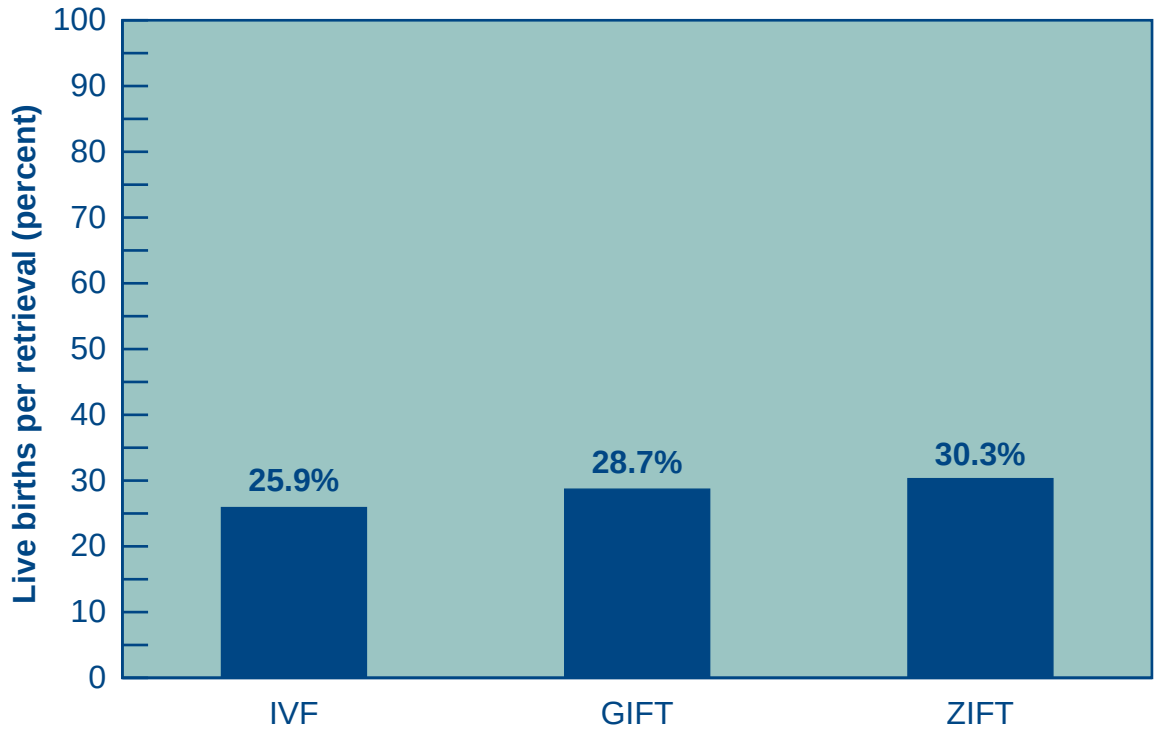


What are the live birth rates for different types of ART procedures?

Live birth rates vary by type of ART procedure used. Figure 7 shows the percentage of egg retrievals in 1996 that used a particular type of ART procedure and resulted in a live birth. IVF had a slightly lower success rate than GIFT or ZIFT. However, these rates do not take into consideration patient and diagnostic factors that may account for the differences in success; these factors include patient age, diagnosis, length of infertility, and number of previous ART attempts. Many women are not suitable candidates for GIFT and ZIFT. It should also be noted that GIFT and ZIFT are more invasive procedures than IVF because they involve inserting a laparoscope into a woman's abdomen to guide the transfer of embryos or gametes into the fallopian tubes. In contrast, IVF involves transferring embryos into a woman's uterus through the cervix without surgery.

Figures 8 through 14 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.

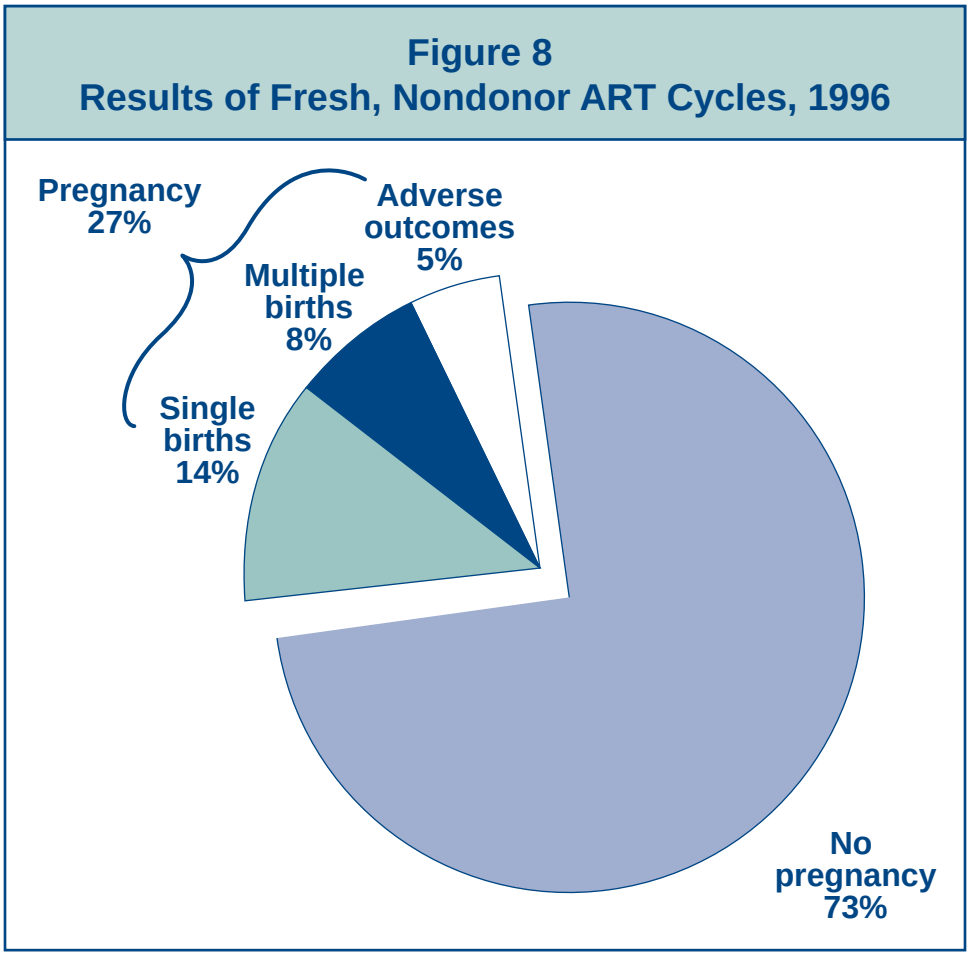
Figure 7
Live Birth per Retrieval Rates for Different Types of ART Procedures (Fresh, Nondonor Cycles), 1996



What percentage of ART cycles results in a pregnancy?

Figure 8 shows the results of ART cycles performed in 1996. Most of these cycles (73%) did not produce a pregnancy. The 27% of cycles that resulted in a pregnancy comprise the 14% of all cycles that produced a single live birth, the 8% that resulted in a multiple birth,* and the 5% that had an adverse outcome (ectopic pregnancy, spontaneous abortion [miscarriage], induced abortion, or stillbirth). Multiple births, which may be associated with adverse outcomes or other problems, are presented as a discrete category to provide additional information. Newborn deaths and birth defects are not included as adverse outcomes because the available information for these categories is incomplete. Data for multifetal pregnancy reductions also are incomplete, and thus are not included. See Figure 9 for more detailed information on ART pregnancy outcomes.

Figure 8
Results of Fresh, Nondonor ART Cycles, 1996

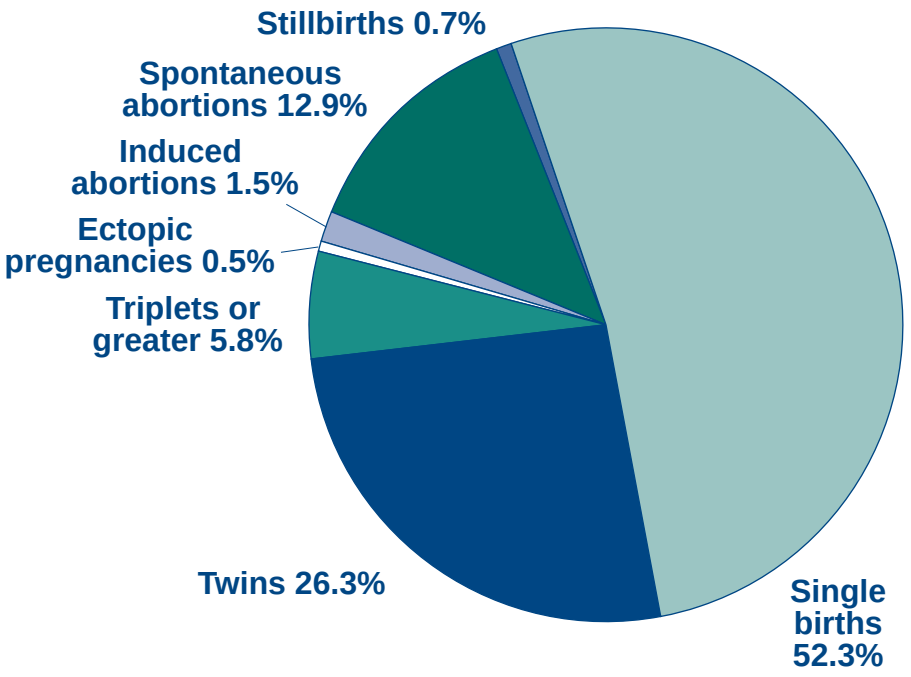


*A multiple birth is counted as one live birth. The total live birth rate (single and multiple births) was 22.6%

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

Figure 9 shows the outcomes of the 27% of ART cycles (from Figure 8) that resulted in a pregnancy. Approximately 84% resulted in a live birth, and 16% resulted in an adverse outcome. Of the 84% that resulted in a live birth, 52% resulted in a single birth and 32% in a multiple birth.* Thus, 38% of all ART births were multiple births, compared with 2.7% of births in the general population. Multiple births are associated with greater problems, including medical complications and higher caesarean-section rates among mothers, and prematurity, low birth weight, and developmental disabilities among infants. The pregnancies with adverse outcomes included ectopic (tubal) pregnancies, induced abortions, spontaneous abortions, and stillbirths.

Figure 9
Outcomes of Pregnancies Resulting From Fresh, Nondonor ART Cycles, 1996

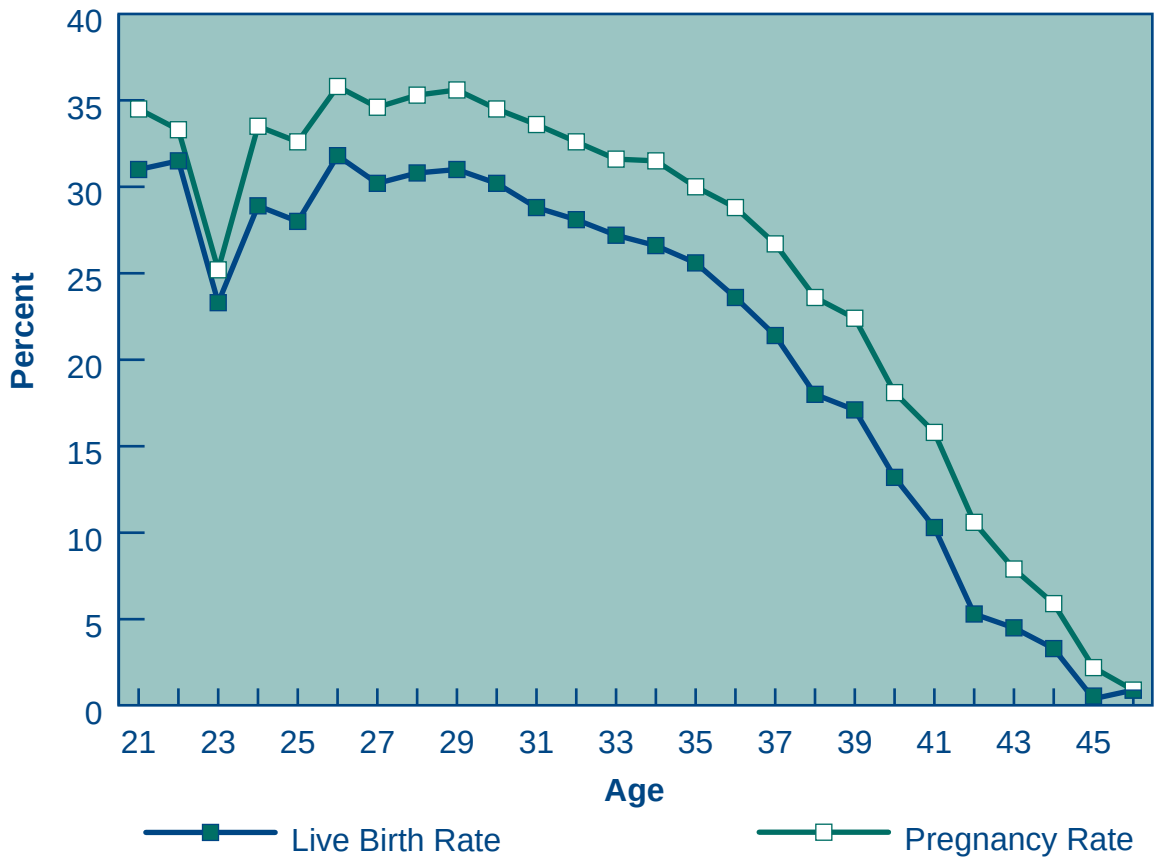


*A multiple birth is counted as one live birth.

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 the woman's own eggs are used. Figure 10 shows both the pregnancy and live birth rates for women of a given age who had an ART procedure in 1996. Among women in their twenties, rates were relatively high for both pregnancies and live births; however, both rates began to decline among women in their early thirties and declined more sharply from the mid-thirties onward.

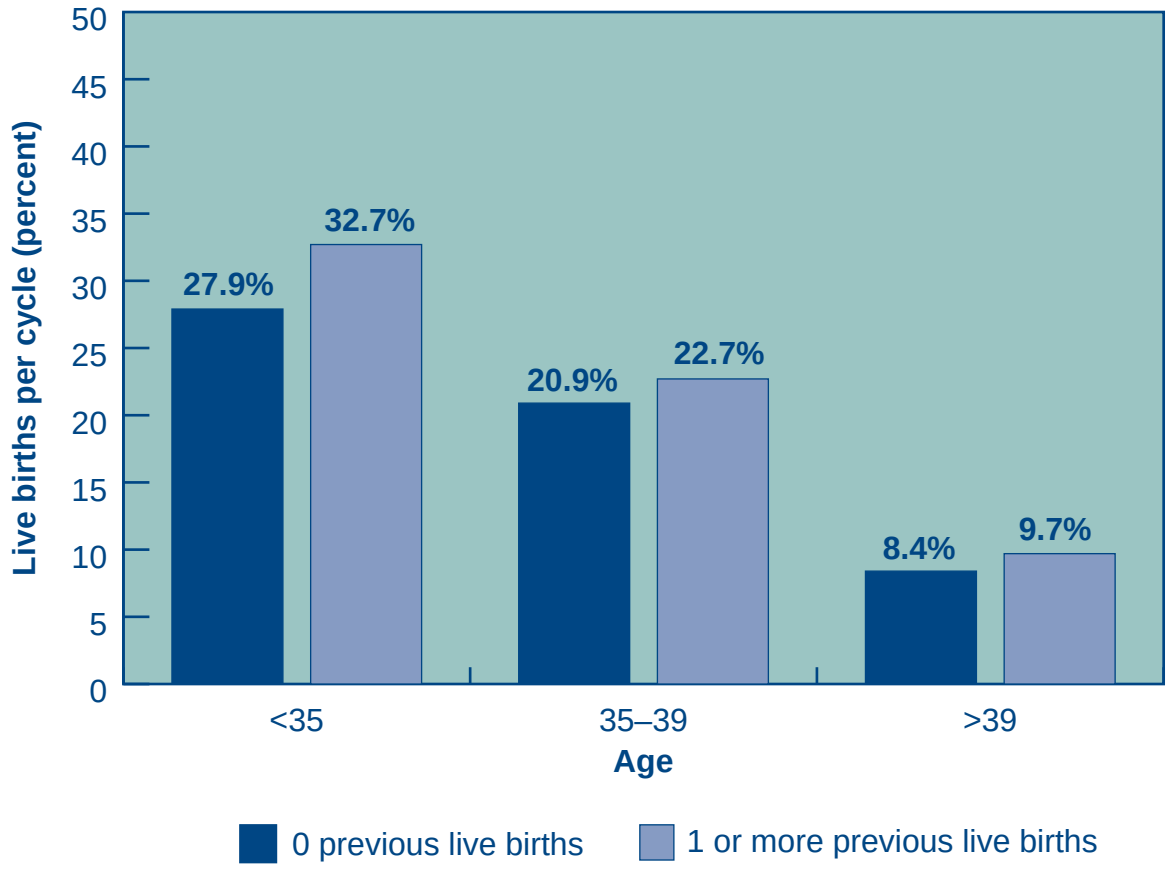
Figure 10
Pregnancy and Live Birth Rates for Fresh, Nondonor ART Cycles, by Age of Woman, 1996



Do the chances of success using ART differ between women who have previously given birth and women who have not?

Figure 11 shows the relationship between the success of an ART cycle performed in 1996 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.

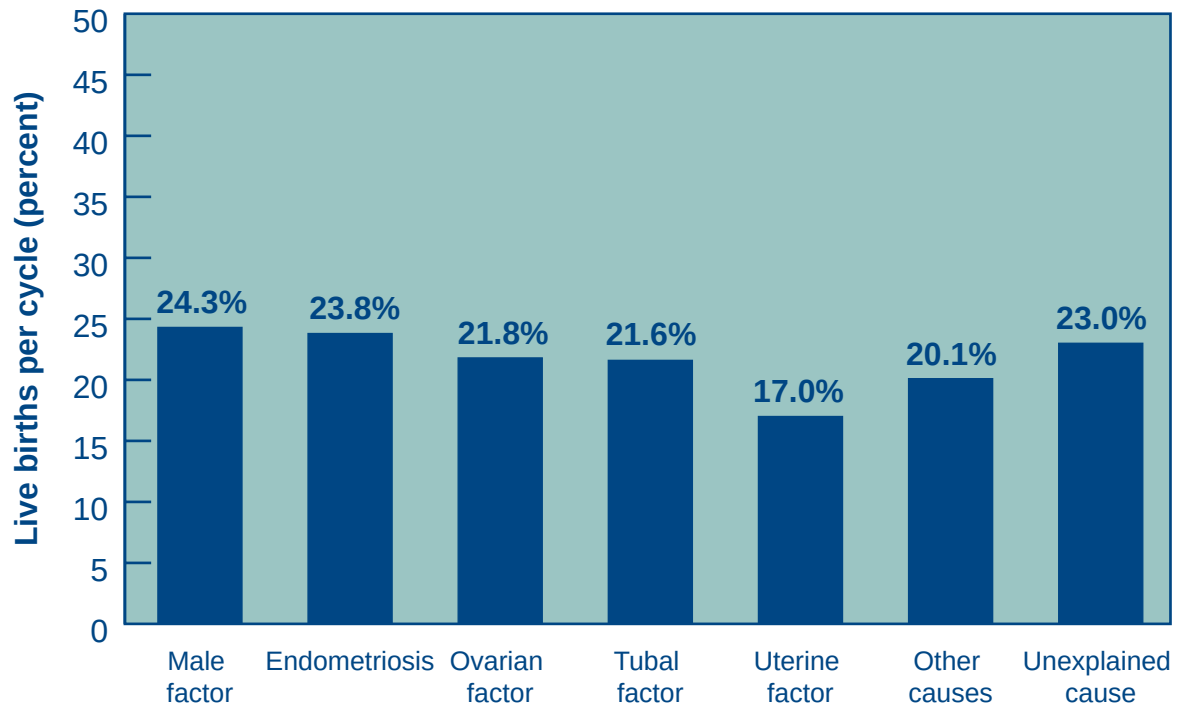
Figure 11
Live Birth Rates for Fresh, Nondonor ART Cycles, by Woman's Age and Number of Previous Live Births, 1996



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

Figure 12 shows the percentage of live births after an ART procedure according to the primary cause of infertility. (See page 10 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 22.6%. Moreover, because the diagnostic categories are imprecisely defined and inconsistently applied, the differences that exist may not be meaningful.

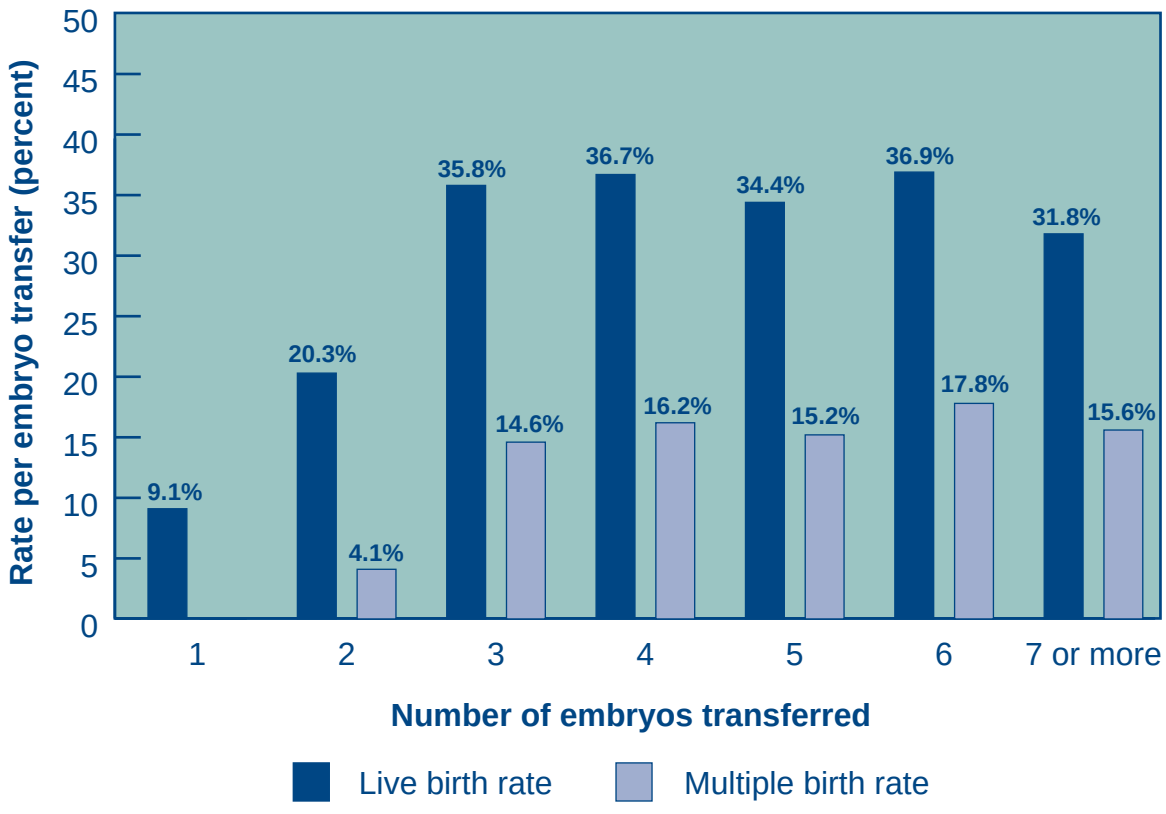
Figure 12
Live Birth Rates Among Users of Fresh, Nondonor ART Cycles, by Primary Diagnosis, 1996



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

Figure 13 shows the relationship between the number of embryos transferred during an ART procedure in 1996 and the number of infants born alive as a result of that procedure. As women get older, success rates decrease and the number of embryos transferred increases. Therefore, to show more clearly the relationship between success rates and numbers of embryos transferred, Figure 13 presents results only for women younger than age 35. However, the trends are the same for all age groups. In 1996, the chance of both a live birth and a multiple birth increased with each embryo transferred up to three. Beyond three embryos, the live birth rate changed very little, but the multiple birth rate was slightly higher overall.

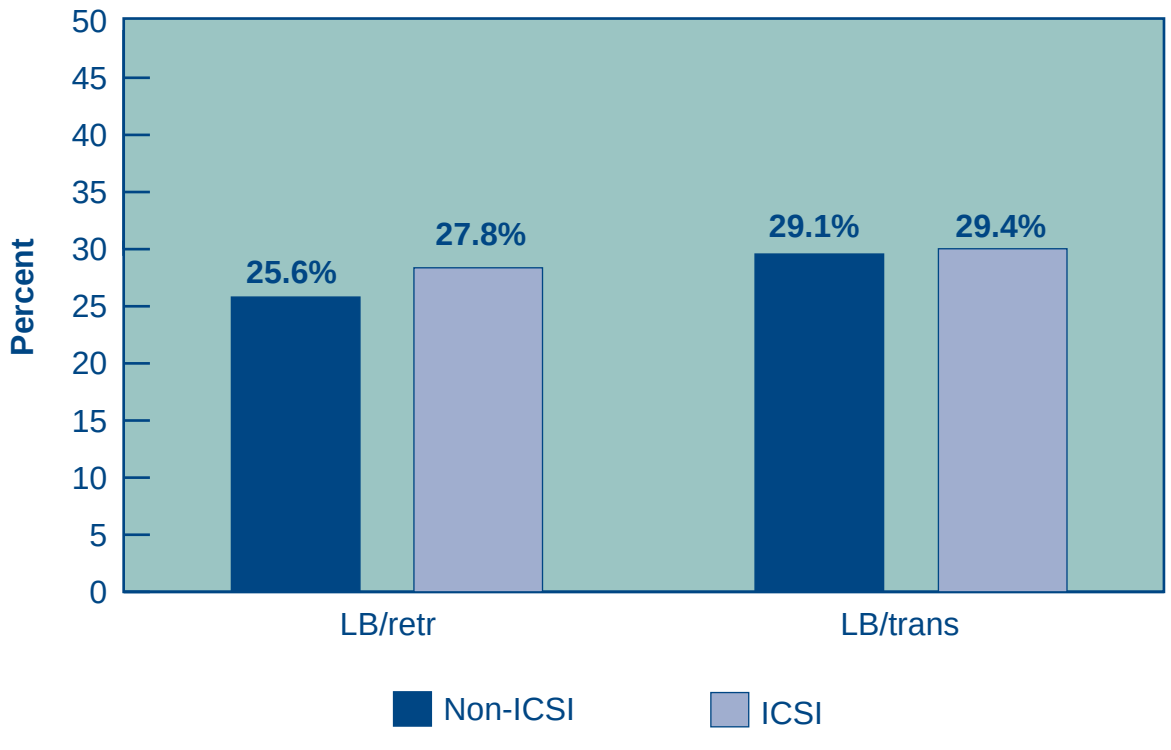
Figure 13
Live Birth and Multiple Birth Rates for Fresh, Nondonor ART Cycles Among Women Younger than Age 35, by Number of Embryos Transferred, 1996



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

In 1996, 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 14 compares the success rates for ART procedures involving ICSI with those not involving ICSI among couples with male factor as the primary diagnosis. Because ICSI can be performed only when at least one egg has been retrieved, only the live birth per retrieval (LB/retr) rate and the live birth per transfer (LB/trans) rate are compared. In 1996, success rates per retrieval were higher when ICSI was used, indicating that ICSI improves 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 14
Success Rates for Fresh, Nondonor ART Cycles Including and Not Including ICSI Among Couples With Male Factor Infertility,* 1996

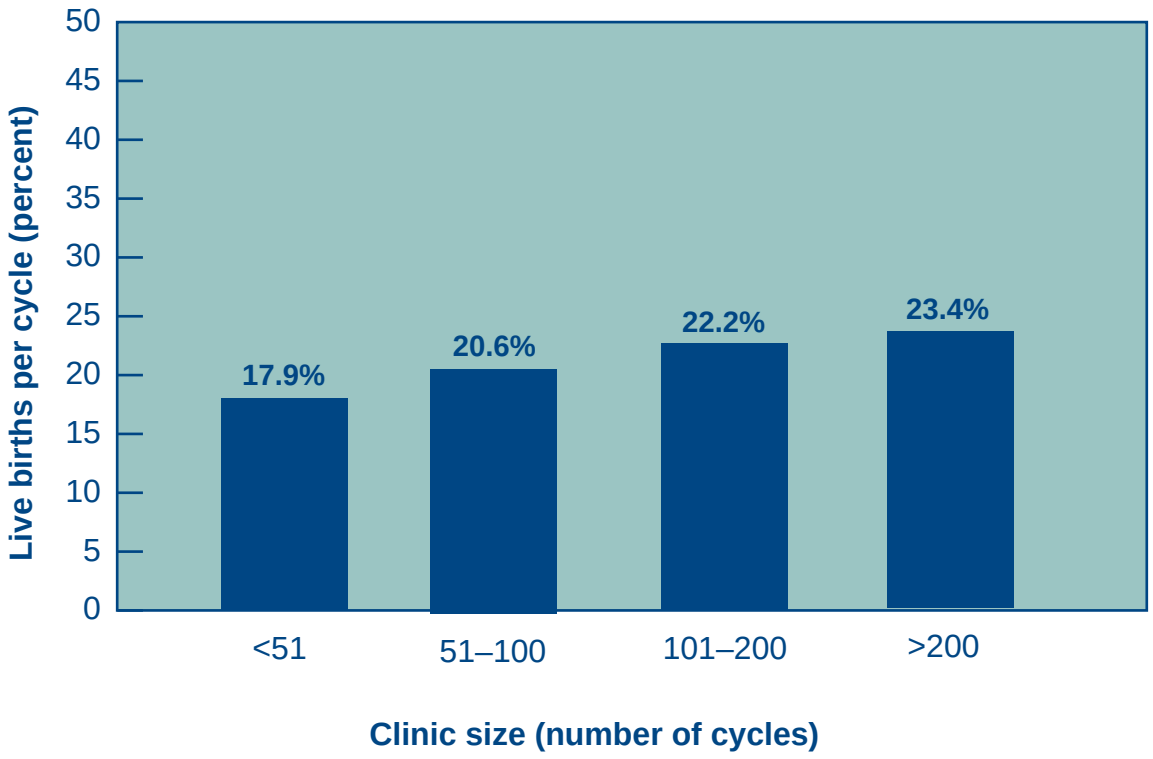


*As the primary diagnosis.

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 Figure 15, clinics are divided into four equal groups based on the number of cycles they carried out. In 1996, there was an overall trend toward an increase in success rates as the number of cycles performed increased. It will take several years to determine whether this trend persists. The clinics with fewer cycles probably included a larger proportion of new clinics.

Figure 15
Live Birth Rates for Fresh, Nondonor ART Cycles, by Clinic Size, 1996

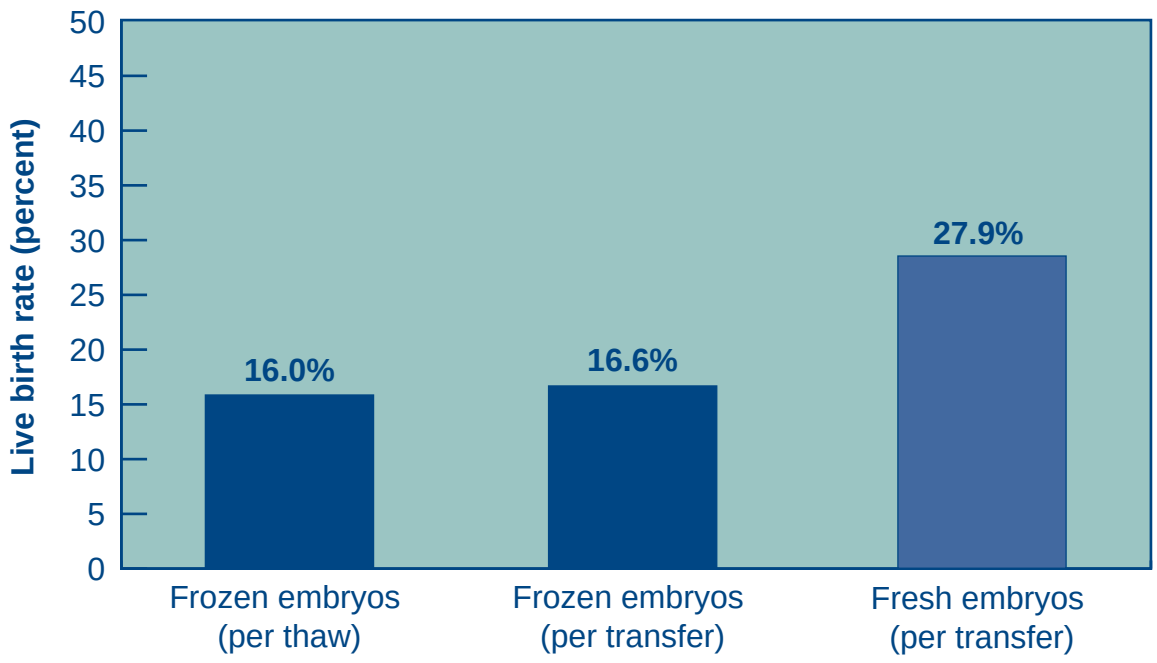


SECTION 3: ART CYCLES USING ONLY FROZEN EMBRYOS

What are the success rates for ART using frozen embryos?

Approximately 15% of all ART cycles performed in 1996, or 9,290 cycles, used only frozen embryos. Figure 16 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 1996, 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 can be considered a bonus because the woman does not have to go through the stimulation and retrieval process again. The cost of a frozen cycle is thus lower than the cost of a fresh cycle.

Figure 16
Live Birth Rates for Frozen Embryos and Fresh Embryos, 1996

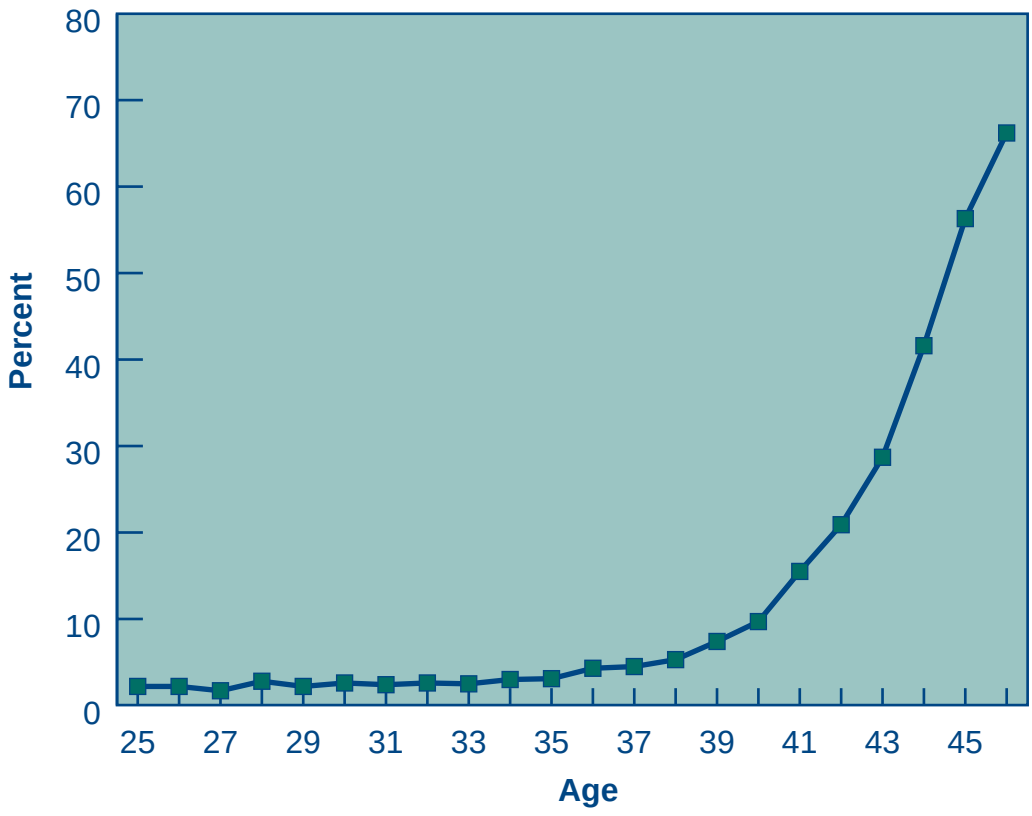


SECTION 4: ART CYCLES USING DONOR EGGS

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

As women age, the eggs that they produce 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 8% of all ART cycles carried out in 1996, or 5,162 cycles; 6% used fresh embryos formed from donor eggs, and 2% used frozen embryos. Figure 17 shows the percentage of ART cycles using donor eggs in 1996 according to the woman's age. On average, donor eggs were used in less than 5% of cycles among women younger than age 38. 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.

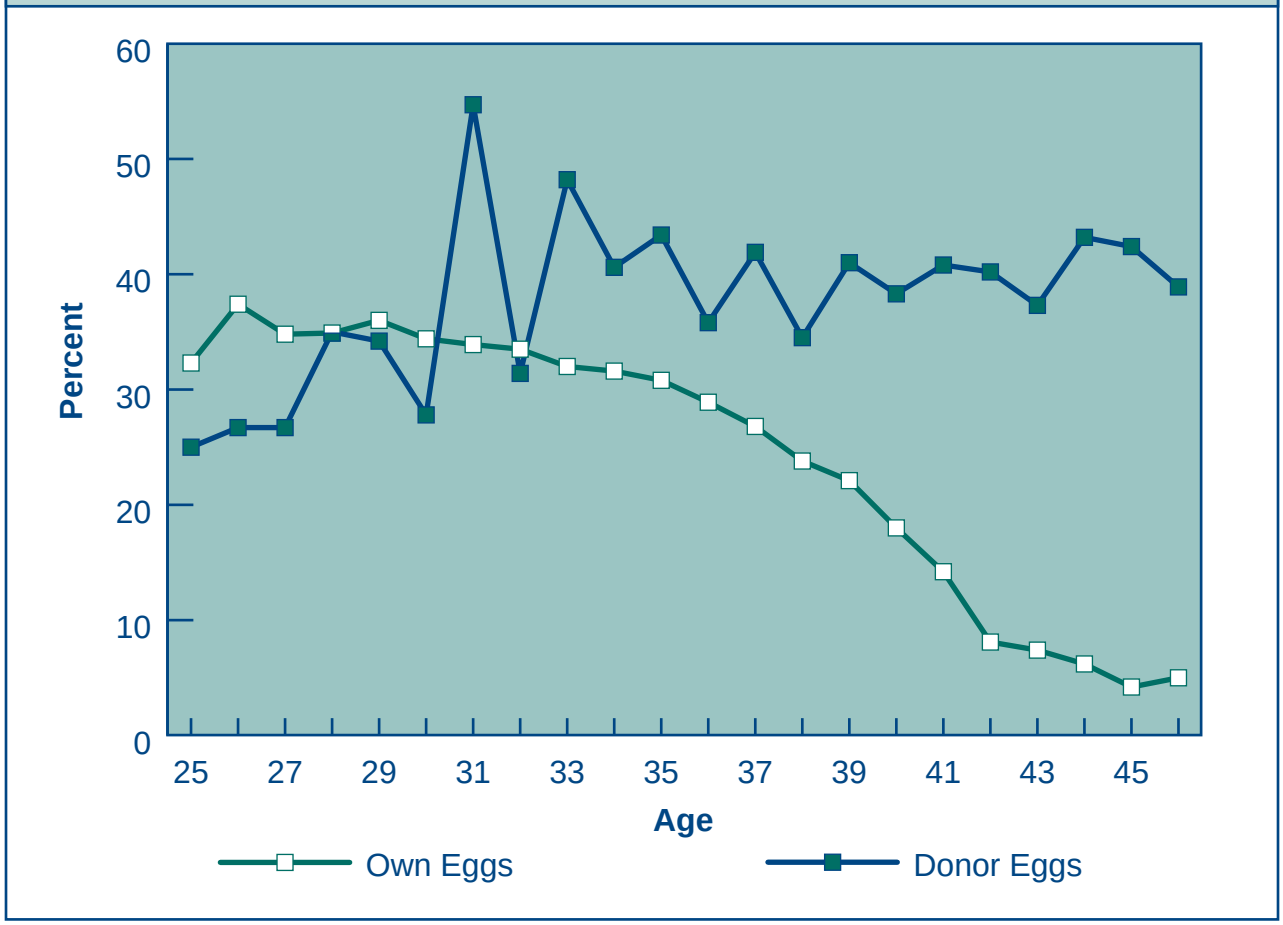
Figure 17
Percentage of ART Cycles Using Donor Eggs, by Age of Recipient, 1996



How do success rates for ART using donor eggs differ from those for ART using nondonor eggs among women of different ages?

Figure 18 shows that when donor eggs are used, the age of the woman undergoing ART treatment does not affect success as it does when a woman's own eggs are used. The likelihood of an egg being fertilized or implanting is related to the age of the woman who produced the egg. As a result, the live birth per transfer rate for cycles using embryos from donor eggs varies only slightly across all age groups, whereas this rate declines steadily with age for cycles using embryos from the woman's own eggs.

Figure 18
Live Births per Transfer for Fresh Embryos From Own and Donor Eggs, by Age of Recipient, 1996



1996 Fertility Clinic Tables

Introduction to Fertility Clinic Tables

The fertility clinic tables display information on individual program characteristics, the types of ART used, patient diagnoses, and success rates that each clinic reported and verified for 1996. Each clinic's data are presented in a one-page table, and 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 cycles started in 1996.* Data for cycles started in 1996 could not be tabulated until 1998 because the final outcomes of pregnancies conceived in December 1996 were not known until October 1997. 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, since 1996. Personnel may be different. Equipment and training may or may not have been updated. As a result, success rates for 1996 may not reflect those today.

- *No reported success rate is absolute.* Every success rate has a margin of error, or range within which it is likely to be correct. Therefore, a clinic's success rates will vary from year to year even if all other factors remain the same. The larger the number of cycles that a clinic carries out, the less its rates are likely to vary. Conversely, the smaller the number of cycles, the greater the margin of error and the 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%. Thus, rates derived from a small number of cases are almost certain to vary considerably from year to year. For further detail, see the explanation of confidence intervals on pages 33–34.

- *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, which result in higher success rates among older women. Some clinics have an age cut-off for nondonor ART. 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. Conversely, clinics that offer ART procedures to patients who might have become pregnant with less technologically advanced treatment will have higher success rates.

Another related issue is that success rates shown in this report are presented in terms of cycles, not women. If a woman who receives several ART cycles at a given clinic either never has a successful cycle or has a successful cycle only after numerous attempts, the clinic's success rates will be lowered.

- *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 1996 were unstimulated. However, in a very few clinics, 25% or more of cycles were unstimulated.

- *Success rates for GIFT and ZIFT are reported together with those for IVF.* Because success rates for GIFT and ZIFT are higher than rates for IVF, clinics that do more GIFT and ZIFT procedures will have higher success rates. However, many women are not suitable candidates for GIFT or ZIFT. As mentioned on page 12, GIFT and ZIFT are more invasive than IVF, and many clinics now perform very few GIFT and ZIFT procedures.

- *Cycles with extra embryos that were frozen and transferred at a later date and then resulted in a live birth 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. Cycles in which all embryos were frozen for transfer at a later date (embryo banking cycles) are not included in the tables.

- *The number of embryos transferred varies from clinic to clinic.* In 1996, the average number of embryos that a clinic transferred to women younger than 35 years old ranged from 1.0 to 5.9. The American Society for Reproductive Medicine discourages the transfer of a large number of embryos because it increases the likelihood of multiple gestations. Multiple gestations, in turn, increase the probability of premature birth and its related problems and the potential for multifetal pregnancy reduction.

- *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 follicles. Cancellation rates for fresh, nondonor cycles vary among clinics from zero to approximately 40%. A high cancellation rate tends to lower the live birth per cycle rate but increase the live birth per retrieval and live birth per transfer rates.

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

- The quality of eggs (largely related to the woman's age).
- 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 discussion 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 31.

SAMPLE CLINIC

1996 PROGRAM PROFILE

1 Program Characteristics

SART member?	Yes
Single women?	Yes
Gestational carriers?	Yes
Donor egg program?	Yes
Sharing of donor eggs?	Yes

2 Type of ART[a]

IVF	97%
GIFT	3%
ZIFT	0%
With ICSI	24%
Unstimulated	0%

3 ART Patient Diagnosis

Tubal factor	23%
Endometriosis	18%
Uterine factor	2%
Male factor	31%
Ovulatory dysfunction	16%
Other factors	9%
Unexplained	1%

A comparison of clinic success rates may not be meaningful because patient medical characteristics and treatment approaches vary from clinic to clinic. (See pp. 31-34.)

1996 ART PREGNANCY SUCCESS RATES

4 Type of Cycle	5 Age of Woman <35	35-39	>39
4A Fresh Embryos From Nondonor Eggs			
Number of cycles	194	230	187
Pregnancies per 100 cycles[c]	32.5	22.2	10.7
Live births per 100 cycles[b,c]	27.3	14.8	7.0
6 (95% confidence intervals)	(21.0 - 33.6)	(10.2 - 19.4)	(3.3 - 10.6)
Live births per 100 retrievals[b,c]	29.3	17.9	8.3
Live births per 100 transfers[b,c]	31.5	20.5	10.0
Cancellations per 100 cycles[c]	6.7	17.4	16.0
Average number embryos transferred	4.3	4.5	4.0
Multiple gestations per 100 pregnancies[c]	42.9	35.3	20.0
Multiple live births per 100 live births[b,c]	37.7	32.4	2/13
4B Frozen Embryos From Nondonor Eggs			
Number of transfers	22	25	11
Live births per 100 transfers[b,c]	22.7	28.0	0/11
Average number embryos transferred	4.4	3.4	3.7
4C Donor Eggs			
Number of fresh transfers	5	11	53
Live births per 100 fresh transfers[b,c]	3/5	2/11	30.2
Number of frozen transfers	0	0	12
Live births per 100 frozen transfers[b,c]	0	0	4/12
Average number embryos transferred (fresh and frozen)	3.8	3.8	4.0

[a] Includes only fresh nondonor egg cycles.
[b] A multiple birth is counted as one live birth.
[c] When fewer than 20 cycles are reported in an age category, rates are shown as fractions.

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.

1. Program Characteristics

- **SART member**—297 of the 300 clinics reporting data from 1996 are members of the Society for Assisted Reproductive Technology (SART).
- **Single women and gestational carriers**—Clinics have varying policies regarding ART services for single women and gestational carriers (women who carry a child for another woman).
- **Sharing of donor eggs**— Clinics have varying policies regarding the sharing of donor eggs, which involves giving eggs from a single donor to more than one woman.

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 that a clinic performs can be useful because carrying out a higher percentage of GIFT and ZIFT 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 1996, 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 primary diagnosis as they do. (See the glossary for definitions of diagnoses.) In addition, patients' diagnoses can affect a clinic's success rates. However, the use of these diagnostic categories may vary from clinic to clinic, and the definitions are imprecise. As a result, diagnosis information is of limited value.

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 1996 for each of three age groups. Success rates are calculated as either the number of pregnancies or the number of live births from ART divided by the number of cycles started, egg retrievals, or embryo transfers at the clinic in 1996, expressed in terms of 100 cycles, retrievals, or transfers. For example, if a clinic started a total of 50 cycles in 1996 and 15 live births resulted, the average success rate for cycles started at that clinic per 100 cycles would be

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

Thus, X = 30 (15/50x100), the success rate for live births per 100 cycles.

When fewer than 20 cycles are reported in a given category, the rates are shown as fractions rather than in terms of 100 cycles because rates calculated from such small numbers have a large margin of error. For example, the sample clinic carried out only five cycles using donor eggs among women younger than age 35. Of these five cycles, three, or 60%, were successful. However, because of the small number of cycles, 60% is not a reliable success rate and so the success rate is presented as 3/5.

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 Started**
  (Number of pregnancies divided by the number of cycles started, expressed in terms of 100 cycles)

  A cycle is started when a woman begins taking fertility drugs or 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. Some pregnancies end in a spontaneous abortion (miscarriage), induced abortion, or stillbirth. Because not all pregnancies result in a live birth, this rate is usually higher than the live birth per 100 cycles started rate.

- **Live Births Per 100 Cycles Started**
  (Number of pregnancies resulting in a live birth divided by the 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 Egg Retrievals**
  (Number of pregnancies resulting in a live birth divided by the 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 100 cycles started rate.

- **Live Births Per 100 Embryo Transfers**
  (Number of live births divided by the 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 a woman's uterus, or in the case of GIFT and ZIFT, egg and sperm or embryos were transferred into a woman's fallopian tubes. The number of embryo transfers a clinic carries out may be smaller than its number of egg retrievals because not every retrieval results in egg fertilization and embryo transfer. For this reason, live birth rates based on transfers will be higher than those based on egg retrievals and cycles started.

- **Cancellations** refer to the cycles that are stopped before an egg is 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.

- **Average Number of Embryos Transferred**
  (Average number of embryos per embryo transfer procedure)

- **Multiple Gestations per 100 Pregnancies**
  (Number of multiple pregnancies divided by the total number of pregnancies, expressed in terms of 100 pregnancies)

  A multiple pregnancy is always counted as one, regardless of the number of fetuses.

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 than cycles using fresh embryos. In addition, freezing some of the embryos from a retrieval increases a woman's overall chances of having a child from a single retrieval procedure.

4C. Cycles Using Donor Eggs

Older women, women with premature ovarian failure (early menopause), and women with a genetic concern about using their own eggs may consider using eggs that are donated by a young and healthy woman. Many clinics provide services for donor egg cycles. Note that live birth rates do not vary much by the recipient's age when donor eggs are used. (See Figure 18 on page 23.)

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 35, for women between the ages of 35 and 39, and for women older than 39. The sample clinic profile illustrates the decline in ART success rates among older women: 100 cycles started at this clinic in women younger than 35 years of age resulted in 27.3 live births, whereas 100 cycles started in women older than 39 resulted in only 7.0 live births.

6. 95% Confidence Interval

95% confidence intervals are shown for live births per 100 cycles unless fewer than 20 cycles are reported in an age category. Confidence intervals provide a range of values for the success rate that are consistent with the data we have available. Simply speaking, confidence intervals are a useful way to consider margin of error. A familiar example of the use of margin of error is in voter polls. In these polls, margin of error—that is, the range (e.g., ±3.5%) within which the number is likely to be correct—is reported to take into account that the poll only covers a sample of voters, not all voters. Like margin of error, confidence intervals allow us to take into account that our data are only for the group, or sample, of women who actually used a given clinic's services in a given year.

The confidence interval provides a range that we can be quite (95%) confident contains the success rate for a particular clinic during a particular time period (1996). Confidence intervals allow us to make certain comparisons. Confidence intervals could be used, for example, to compare

the success rates for two (or more) clinics if all factors except the number of procedures done were equal. In such a situation, if Clinic A had a 20% success rate and Clinic B had a 25% success rate, we might be tempted to say that Clinic B had a better rate. However, if the 95% confidence interval was 14%–26% for Clinic A and 21%–29% for Clinic B, then their confidence intervals would overlap. When the confidence intervals for two rates overlap, the rates may be different by chance alone. Thus, in this example, we could not be sure that the rates of Clinics A and B were truly different.

In general, the larger the number of cycles at a given clinic, the smaller the span of the confidence interval because we have more information (i.e., from a larger sample) on which to base the calculation.

1996 National Summary

1996 PROGRAM PROFILE

Program Characteristics		Type of ART[a]		ART Patient Diagnosis	
Total clinics	300	IVF	92%	Tubal factor	28%
SART member?	99%	GIFT	6%	Endometriosis	15%
Single women?	76%	ZIFT	2%	Uterine factor	2%
Gestational carriers?	37%			Male factor	23%
Donor egg program?	74%	With ICSI	30%	Ovulatory dysfunction	14%
Sharing of donor eggs?	21%	Unstimulated	< 1%	Other factors	11%
				Unexplained	7%

1996 ART PREGNANCY SUCCESS RATES

Type of Cycle	Age of Woman		
	<35	35-39	>39
Fresh Embryos From Nondonor Eggs			
Number of cycles	22,811	18,361	8,412
Pregnancies per 100 cycles	33.4	26.7	13.4
Live births per 100 cycles[b]	28.7	21.3	8.7
Live births per 100 retrievals[b]	31.6	25.2	11.3
Live births per 100 transfers[b]	33.6	26.8	12.4
Cancellations per 100 cycles	9.4	15.3	22.3
Average number embryos transferred	3.9	4.0	4.1
Multiple gestations per 100 pregnancies	42.9	34.7	20.7
Multiple live births per 100 live births[b]	42.1	34.2	21.2
Frozen Embryos From Nondonor Eggs			
Number of transfers	4,602	2,982	1,077
Live births per 100 transfers[b]	18.2	16.5	10.5
Average number embryos transferred	3.5	3.5	3.4
Donor Eggs			
Number of fresh transfers	534	816	2,472
Live births per 100 fresh transfers[b]	39.3	39.2	38.9
Number of frozen transfers	158	207	674
Live births per 100 frozen transfers[b]	22.8	19.8	20.6
Average number embryos transferred (fresh and frozen)	3.8	3.8	4.0

[a] Includes only fresh nondonor egg cycles.
[b] A multiple birth is counted as one live birth.