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THE FERTILITY SOCIETY OF AUSTRALIA

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Assisted reproductive technology in Australia and New Zealand 2002

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AIHW National Perinatal Statistics Unit
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Preface

This is the first report using data from the Australian and New Zealand Assisted Reproduction Database (ANZARD). ANZARD was introduced at the beginning of 2002, replacing the previous Assisted Conception data collection. ANZARD data are provided to the AIHW National Perinatal Statistics Unit (NPSU) by all fertility centres operating in Australia and New Zealand. Unlike the previous collection, data are provided on a per cycle basis in electronic format. ANZARD allows improved consistency in data definitions, robust linkage of pregnancy outcomes to treatment characteristics, and more efficient collection and transfer of data from fertility centres to the NPSU. ANZARD was commissioned by the Fertility Society of Australia. Its implementation was managed by the NPSU.

This report presents data on all assisted reproductive technology (ART) treatments that took place in 2002 and their resulting pregnancies and births. This is a different format from that of previous reports in this series in which the treatment cycles from a select year were reported along with the babies born in the prior year. ANZARD permits the linkage of treatment cycles to pregnancies and births and, thus, allows the description of a single group: the treatment cycles from a select year and their resulting pregnancies and births. Accordingly, the babies discussed here were conceived in 2002 but born in either 2002 or 2003.

The new format of this report has been designed to provide information that is accessible to the broad audience interested in ART in Australia and New Zealand, including consumers of ART services, government, researchers, students, members of the media and health professionals.

I want to place on record the thanks of the Australian Institute of Health and Welfare to the Fertility Society of Australia and all fertility centres that have participated in the redeveloped data collection. As a result, the NPSU has been able to prepare an expert report on this important topic of assisted conception in Australia and New Zealand.

Richard Madden

Director

Australian Institute of Health and Welfare

Acknowledgments

The Australian and New Zealand Assisted Reproduction Database (ANZARD) is a collaborative effort between the NPSU and the fertility centres in Australia and New Zealand. We recognise and thank all staff in the fertility centres for their efforts in compiling and checking the electronic spreadsheets and providing additional information when requested.

We thank the members of the ANZARD Working Group Committee and their chair, Associate Professor Peter Illingworth, for their leadership and enthusiasm in coordinating the immense project of implementing a new international data collection.

We thank Professor Michael Chapman, Professor Douglas Saunders, Associate Professor Peter Illingworth, Dr Adrienne Pope, Ms Sandra Dill and Dr David Molloy for reviewing the report and providing valuable suggestions.

We acknowledge the Centers for Disease Control and Prevention, Atlanta, Georgia, USA and their annual published report 'Assisted Reproductive Technology Success Rates' which provided a background for the development of this new report format. We also thank the staff of fertility centres who offered comment on the draft outline of the new report format.

The AIHW National Perinatal Statistics Unit is a formally affiliated institution of the University of New South Wales and is linked to the School of Women's and Children's Health. We would like to acknowledge the support of the NPSU by the School of Women's and Children's Health, UNSW and the Sydney Children's Hospital.

Following is a list of the fertility centres and their directors who contributed data for this report:

New South Wales

IVF Australia

- North Shore, Chatswood (Dr Frank Quinn)
- Central Coast, Gosford (Dr Malcolm Tucker)
- Western Sydney, Westmead (Dr Geoffrey L Driscoll)
- South, Kogarah (Professor Michael Chapman)
- East, Randwick (Dr Graham Hughes)

Sydney IVF

- City, Sydney (Professor Robert PS Jansen)
- Newcastle (Dr Robert Woolcott)
- Royal Prince Alfred Hospital, Camperdown (Dr Mark Bowman)
- Illawarra, Wollongong (Dr Chris James)
- Liverpool (Dr Derek Lok)

Westmead Fertility Centre, Westmead (Associate Professor Peter Illingworth)

IVF NSW, Bondi Junction (Dr Trevor Johnson)

Albury Reproductive Medicine Centre, Albury (Dr Scott Giltrap)

Fertility First, Hurstville (Dr Anne Clark)
Hunter IVF, New Lambton Heights (Dr Steven Raymond, Dr Andrew Hedges)

Queensland

Queensland Fertility Group
- Watkins Medical Centre, Brisbane (Dr David Molloy)
- Gold Coast, Benowa (Dr Andrew Cary)
- Mackay (Dr Lance Herron)

Queensland Fertility Group North Queensland
- Cairns IVF (Dr Bob Miller)
- Townsville IVF, Hyde Park (Dr Ron Chang)
- Toowoomba IVF, Toowoomba (Dr John Esler)

Monash IVF
- Gold Coast Fertility Centre, Southport (Dr Irving T Korman)
- IVF Queensland, Sunnybank (Dr Kevin Forbes)
- Rockhampton (Professor Gab Kovacs)

The Wesley IVF Services, Auchenflower (Dr John Allan)
IVF Queensland Sunshine Coast, Nambour (Dr James Moir)
Coastal IVF Fertility Services, Maroochydore (Dr Paul Stokes)
City Fertility Centre, Brisbane (Dr Glenn Sterling)

Victoria

Melbourne IVF, East Melbourne and Royal Women's Hospital (Dr John McBain)
Monash IVF
- Epworth Hospital, Richmond (Professor Gab Kovacs)
- Monash Private Hospital, Clayton (Professor Gab Kovacs)
- Bendigo (Dr Nick Lolatgis)
- Sandringham (Dr Peter Lutjen)
- Casterton (Professor David Healy)
- Bairnsdale (Dr Mac Talbot)
- Sale (Dr Mac Talbot)
- Geelong (Professor Gab Kovacs)
- Northern, Broadmeadows (Dr Mac Talbot)

Melbourne Assisted Conception Centre, East Melbourne (Dr Mac Talbot)
REPROMED Mildura (Dr John Bowditch)
Ballarat IVF, Wendouree (Dr Russell Dalton)

Western Australia

PIVET Medical Centre, Leederville (Dr John L Yovich)
Concept Fertility Centre, Subiaco (Dr Graeme Thompson)

Fertility North, Joondalup (Dr Vince Chapple)
Hollywood IVF, Nedlands (Dr Simon Turner)

South Australia

REPROMED Reproductive Medicine Unit, Adelaide (Professor Rob Norman)
Flinders Reproductive Medicine, Adelaide (Associate Professor Stephen J Judd)

Tasmania

Tasmanian IVF, Hobart (Dr Bill Watkins)
Sydney IVF, Launceston (Dr Sue James)

Australian Capital Territory

Canberra Fertility Centre, Canberra (Dr Martyn A Stafford-Bell)
Sydney IVF, Canberra (Dr Janelle McDonald)

Northern Territory

REPROMED Reproductive Medicine Unit, Darwin (Dr Ossie Petrucco)

New Zealand

Fertility Associates
- Ascot Integrated Hospital, Auckland (Dr Richard Fisher)
- Adelaide Clinic, Wellington (Professor John Hutton)
- Waikato Hospital, Hamilton (Dr Richard Fisher)

Otago Fertility Services, Dunedin (Associate Professor Wayne Gillett)
The New Zealand Centre for Reproductive Medicine, Christchurch (Dr Peter Benny)
Fertility Plus, Auckland (Dr Guy Gudex)

Financial support

We gratefully acknowledge financial support from the Fertility Society of Australia. The AIHW National Perinatal Statistics Unit is funded by a grant from the Australian Institute of Health and Welfare to the University of New South Wales.

Requests for data

Enquiries about data for individual fertility centres should be directed to the centre concerned. Other enquiries should be made to the AIHW National Perinatal Statistics Unit. Information on the NPSU's Information Consultancy Service can be found at the NPSU website <http://www.npsu.unsw.edu.au>.

Abbreviations

ACT	Australian Capital Territory
AIHW	Australian Institute of Health and Welfare
ANZARD	Australian and New Zealand Assisted Reproduction Database
ART	Assisted reproductive technology
BESST	Birth emphasising successful singleton at term
DI	donor insemination
ET	embryo transfer
FET	frozen embryo transfer
GIFT	gamete intrafallopian transfer
ICSI	intracytoplasmic sperm injection
IVF	in-vitro fertilisation
LMP	last menstrual period
n.a.	not available
n.p.	not published
NPSU	National Perinatal Statistics Unit
NSW	New South Wales
NT	Northern Territory
NZ	New Zealand
OHSS	ovarian hyperstimulation syndrome
OPU	oocyte pick-up
PESA	percutaneous epididymal sperm aspiration
PGD	preimplantation genetic diagnosis
Qld	Queensland
RTAC	Reproductive Technology Accreditation Committee
SA	South Australia
SUZI	subzonal insemination
Tas	Tasmania
Vic	Victoria
WA	Western Australia

Summary

Assisted Reproductive Technology in Australia and New Zealand 2002 is the eighth annual report on the use of assisted reproduction technology (ART) in Australia and New Zealand. This year, the introduction of a new and more robust data collection allows us to feature a more comprehensive description of ART treatment success as well pregnancy and birth outcomes.

Treatment characteristics

- During 2002, 36,483 treatment cycles were attempted in Australia and New Zealand. Of these, 90.3% (32,958) took place in Australia and 9.7% (3,524) in New Zealand.
- In Australia, there were 8.0 treatment cycles per 1,000 women of reproductive age (15–44 years). Correspondingly, in New Zealand, there were 4.2 cycles per 1,000 women of reproductive age (15–44 years).
- More than half (54.5%) of cycles involved fresh, non donor oocytes or embryos, a third (31.1%) used frozen, non donor oocytes or embryos and 4.8% used oocytes or embryos received from a donor. The remaining 9.4% of cycles were artificial insemination using donated sperm.
- The average age of women undergoing treatment in 2002 was 35.2 years. Their partners were aged on average 37.6 years. This was the first year in which national data were available on the age of consumers of assisted reproduction treatment.
- For fresh, non donor cycles, 18.3% of all cycles started resulted in the delivery of at least one live baby. For frozen, non donor cycles, 13.7% of all cycles in which embryos were thawed resulted in the delivery of at least one live baby. The success of fresh, non donor treatment varied among fertility centres. The highest ranked group of fertility centres achieved live delivery in at least 21.8% of treatment attempts. The lowest ranked group of fertility centres achieved live delivery in less than 14.8% of treatment attempts.
- In 2002, the majority (94.2%) of treatment cycles transferred one or two embryos. This represents a considerable change in treatment protocol from 1993 in which less than half of cycles (44.6%) transferred one or two embryos.
- The success of fresh, non donor treatment varied by women's age. Women aged 25–29 years achieved the greatest success, with 25.9% of initiated cycles achieving a live delivery. Women aged 40–44 years had a success rate of 6.1%.

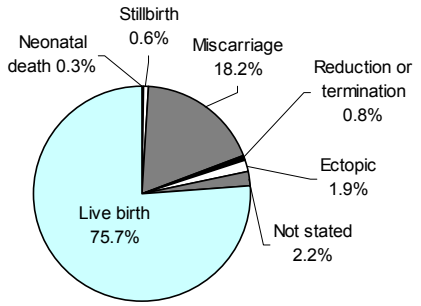
Live delivery per cycle started by women's age for fresh, non donor ART treatment, 2002

Pregnancies and births

- Overall, there were 7,577 pregnancies reported in the 2002 cohort, resulting in 6,816 live born babies.
- Of all pregnancies, 88% (6,675) were reported from fertility centres in Australia, resulting in 5,953 live born

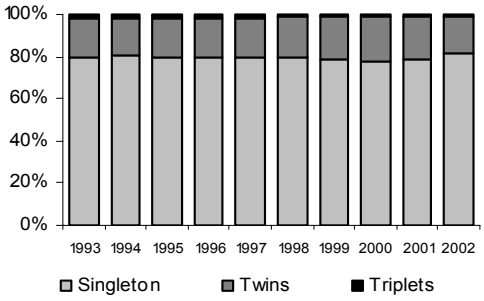
babies. Fertility centres in New Zealand reported 12% (902) of all pregnancies, resulting in 863 live born babies.

- Three-quarters (75.7%) of all pregnancies resulted in the delivery of one or more live babies.



Outcome of ART pregnancies conceived in 2002

- There were 1,103 (18.9%) multiple deliveries in the 2002 cohort. Most (1,070) were deliveries of twins and a small proportion (33) were triplets. There were no quadruplet deliveries. The 2002 multiple pregnancy (twin and triplet) rate (18.9%) decreased from that reported in 2000 (22.1%). However, in the previous 10 years, the proportion of twin deliveries has remained relatively steady between 18.0% and 21.0%.



Proportion of singleton, twin and higher order deliveries all babies ≥ 20 weeks gestation, 1993–2002

- Almost half (48.0%, 2,807) of deliveries were by Caesarean section, twice the proportion reported for all Australian births in 2001 (25.4%). While 46.0% of ART mothers aged younger than 38 years delivered by Caesarean section, only 24.5% of mothers in this age group in the Australian population did so. Likewise, 55.7% of ART mothers aged 38 years or older delivered by Caesarean section, compared to only 37.5% of same aged mothers in the Australian population.
- The average age of women giving birth was 34.4 years, 5.2 years older than the average age of Australian mothers in 2001 (29.2 years). Women giving birth in the 2002 cohort were also slightly older than their 2000 predecessors who were aged, on average, 33.6 years.
- The average gestational age of all babies was 37.2 weeks. More than a quarter (27.3%) of babies were born preterm with a gestational age of less than 37 weeks. This is a lower proportion than that reported in 2000 (32.6%), suggesting improved outcomes for babies following assisted reproduction.
- The average birthweight of all babies was 2,985 grams. Babies born with low birthweight (<2,500 g) made up 21.7% of all babies, which is less than the 26.4% of babies with low birthweight in 2000. However, babies born following assisted reproduction in 2002 had a lower average birthweight than that reported for the Australian population in 2001 (3,362 g).
- There were 121 reported perinatal deaths in the 2002 cohort. This represents a decline in the perinatal mortality rate from 20.7 deaths per 1,000 births in 2000 to 17.3 deaths per 1,000 births in 2002.
- Overall, babies conceived following assisted reproduction in 2002 appear to have better outcomes than their predecessors, with longer gestational ages, higher birthweights and fewer perinatal deaths.

1 Introduction

Assisted reproductive technology (ART) methods are used by medical professionals to help couples with fertility problems achieve pregnancy. The main ART methods reported here include:

- in-vitro fertilisation (IVF), where eggs and sperm are combined in the laboratory for fertilisation outside the body and replaced in the uterus;
- intracytoplasmic sperm injection (ICSI), where a single sperm is injected into an egg for fertilisation outside the body and replaced in the uterus; and
- gamete intrafallopian transfer (GIFT), where eggs and sperm are placed in the fallopian tubes for fertilisation inside the body.

The embryos arising from the IVF and ICSI method can be frozen and used in subsequent ART treatment where they are thawed and transferred to the uterus.

The first ART method used in Australia was IVF in 1979. This was followed by the first Australian-born IVF baby in 1980. In New Zealand, the first IVF baby was born in 1983. GIFT was introduced in Australia in 1985 but its use has been in sharp decline in recent years and now accounts for only a small proportion of ART treatment cycles. The first microinsemination technique for treating male infertility, subzonal insemination (SUZI), was introduced in 1990. However, lately this has been superseded by the more successful ICSI technique.

The main purposes of this report are to place in the public domain:

- information on ART treatment cycles and the resulting pregnancy outcomes in Australia and New Zealand;
- evidence of quality improvement through monitoring ART treatment practices, success rates and perinatal outcomes; and
- information for national and international comparisons.

Data source

Data used in this report come from the Australian and New Zealand Assisted Reproduction Database. ANZARD includes information about the treatment methods of IVF, ICSI and GIFT. It also includes information about: treatment via the cryopreservation and thaw of embryos; donor insemination; treatment involving donated gametes or embryos; and the use of technologies such as assisted hatching, preimplantation genetic diagnosis and blastocyst culture. ANZARD contains details of all pregnancy and birth outcomes, including mode of delivery, birth status, birthweight, gestational age, plurality, perinatal mortality, congenital malformation and maternal morbidity. ANZARD does not contain information about artificial insemination using partner's sperm.

Data on treatment cycles are collected at each fertility centre at the time of treatment and provided to the NPSU within 6 months. Fertility centre staff follow up patients for data on their pregnancy and birth outcomes, which is provided to the NPSU within 6–12 months. There are 25 fertility centres in Australia and 4 in New Zealand. Each provides data for ANZARD.

Report cohort

This report presents information on all treatment cycles that took place in 2002 and the resulting pregnancies and births. The babies discussed in this report were conceived in 2002 and born in either 2002 or 2003. The report also includes data from 1993 to 2002 where acknowledged.

Data accuracy

Most fertility centres have advanced data management systems and are able to provide the NPSU with high quality data. The NPSU subjects all data to an extensive process of validation. Inaccuracies are followed up with fertility centre staff. For 2002, less than 1% of treatment data and approximately 2% of pregnancy outcomes are not stated. The Reproductive Technology Accreditation Committee (RTAC) plays a role in ensuring the quality of ANZARD data by validating random data records against clinic files in their triennial inspections.

Data presentation

Each data case represents a treatment cycle and not a patient. Thus, it is possible that an individual woman can undergo more than one treatment in an annual cohort or experience more than one pregnancy. This also means that information reported about patient characteristics, such as age, parity, and cause of infertility, are based on calculations in which individuals may be counted several times.

For multiple pregnancies, mother items which may be different for each baby, such as gestational age and method of birth, are classified according to the features of the first born baby.

Where applicable, percentages in tables have been calculated including the Not stated category. Cell sizes of three or less have not been published, in accordance with the AIHW's policy on the reporting of small numbers. Exceptions to this are small numbers in Other and Not stated categories.

Data limitations

Follow-up of pregnancy information is limited because the ongoing care of pregnant patients is often carried out by non ART practitioners. Usually, the fertility centre follows up the outcome of the pregnancy with either the patient or her clinician. In a small proportion of cases this information is not available.

For pregnancies in which there is successful follow-up, data are limited by the self-reported nature of the information. These data include pregnancy complications, complications of fertility treatment, and infant morbidity (including birth anomaly). Fertility centre staff invest enormous effort into validating such information by obtaining medical records from clinicians or hospitals. Similarly, data about previous ART treatment and history of pregnancies are, in some cases, self-reported.

Structure of 2002 data presentation

ART data for 2002 are presented in two parts:

(1) This report, which provide data on select treatment characteristics, pregnancy and birth outcomes for 2002, and summary trends since 1993.

(2) Web-based tabulations, which provide data on trends, treatment characteristics and pregnancy and birth outcomes for 2002. These are available only in electronic format from the NPSU's website.

The 2002 data presentation may be viewed online as PDF files at the NPSU website: <http://www.npsu.unsw.edu.au>.

Terms used in this report

This report categorises ART treatments according to whether the patient is using her own oocytes and embryos (*non donor*) or oocytes and embryos donated by another woman (*donor*) and whether the embryos are transferred soon after fertilisation (*fresh*) or following cryopreservation and thaw (*frozen*).

Other important terms include:

ART treatment cycle—all ART cycles initiated with the intention to treat a patient. These include cycles with: (1) attempted or successful oocyte retrieval (stimulated or unstimulated); (2) thawing of cryopreserved embryos; (3) artificial insemination using donated sperm; and (4) cancellation where follicle stimulating hormone (FSH) has been administered.

Pregnancy—a pregnancy in which at least one of the following criteria are met: (1) known to be ongoing at 20 weeks; (2) evidence by ultrasound of an intrauterine sac (with or without a foetal heart); (3) examination of products of conception reveal chorionic villi; or (4) a definite ectopic pregnancy that has been diagnosed laproscopically or by ultrasound.

2002 conception cohort—the group of patients that received ART treatment between 1 January 2002 and 31 December 2002.

Delivery—a birth event in which one or more babies are born.

Live delivery—a birth event in which one or more live babies are born.

Gestational age—completed weeks of gestation of foetus at the time of delivery. This is calculated as follows:

- OPU and FET cycles: (pregnancy end date – embryo transfer date) + 16 days.
- GIFT cycles: (pregnancy end date – OPU date) +14 days.
- Donor insemination cycles: (pregnancy end date – date of insemination) + 14 days.

OPU—oocyte pick-up, refers to the procedure in which oocytes are collected from the ovaries via ultrasound-guided, fine-needle aspiration.

IVF—refers to all treatment cycles in which embryos were fertilised via IVF; mixed IVF–ICSI cycles are excluded.

ICSI—refers to all treatment cycles in which embryos were fertilised via ICSI; mixed IVF–ICSI cycles are excluded.

Mixed IVF–ICSI —refers to a treatment cycle in which some oocytes are subjected to IVF and others to ICSI.

GIFT—refers to any cycle involving GIFT, including GIFT combined with IVF or ICSI.

FET—treatment by frozen embryo transfer.

Ful- term gestation—gestation of at least 37 weeks.

Preterm gestation—gestation of at least 20 weeks but less than 37 weeks.

Very preterm gestation—gestation of at least 20 weeks but less than 32 weeks.

Normal birthweight—birthweight of at least 2,500 grams.

Low birthweight—birthweight of less than 2,500 grams.
Very low birthweight—birthweight of less than 1,500 grams.

2 Assisted reproductive technology treatment in 2002

2.1 Ten-year trends (1993–2002)

Has the use of ART changed since 1993?

Figure 1 demonstrates the steady increase in the use of ART treatment in Australia and New Zealand since 1993. In 2002, 30,119 treatment cycles occurred in Australia and New Zealand, which is almost a two-fold increase on the 16,999 that took place in 1993 (Table R1). The number of pregnancies and deliveries has correspondingly increased, with 5,737 live deliveries in 2002. This is an almost three-fold increase on the 2,064 live deliveries reported for 1993 (Table R1).

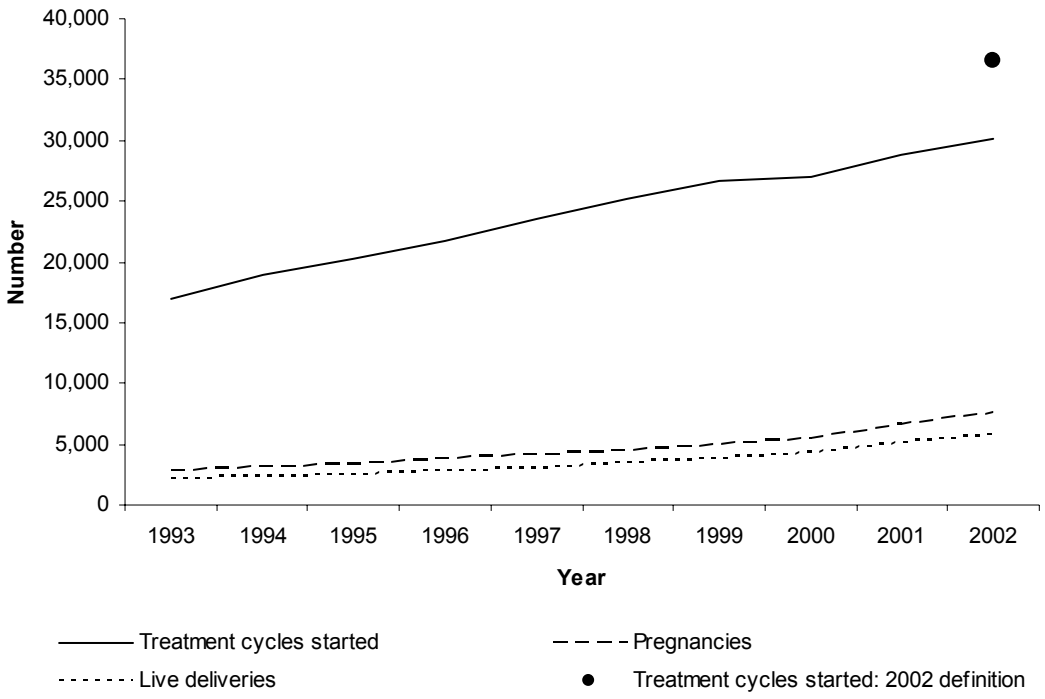


Figure 1: Treatment cycles started, pregnancies and live deliveries, Australia and New Zealand, 1993–2002

Note that the new data collection allows us to broaden the definition of a treatment cycle. ANZARD permits the inclusion of donor insemination cycles, cancelled ART cycles and unsuccessful OPUs and embryo thaws. This is a more accurate assessment of the total

number of treatment cycles attempted, which allows better appraisal of ART success. The dot in Figure 1 represents the total number of attempted treatments using the ANZARD definition. By this definition, there were 33,064 attempted ART treatment cycles and 3,419 donor insemination cycles, producing a total of 36,483 treatments in Australia and New Zealand in 2002 (Table R1). Trend data in future reports will follow from this data point.

Has the use of different ART methods changed since 1993?

Figure 2 demonstrates the changes that have occurred in the types of ART treatment methods used in Australia and New Zealand since 1993. Most notably, the use of ICSI has increased more than eight-fold since 1993 and now surpasses IVF treatment by approximately 25% (Table R2). Treatment by GIFT has also changed dramatically, representing 36% of treatments in 1993 but only 1% of treatments in 2002 (Table R2).

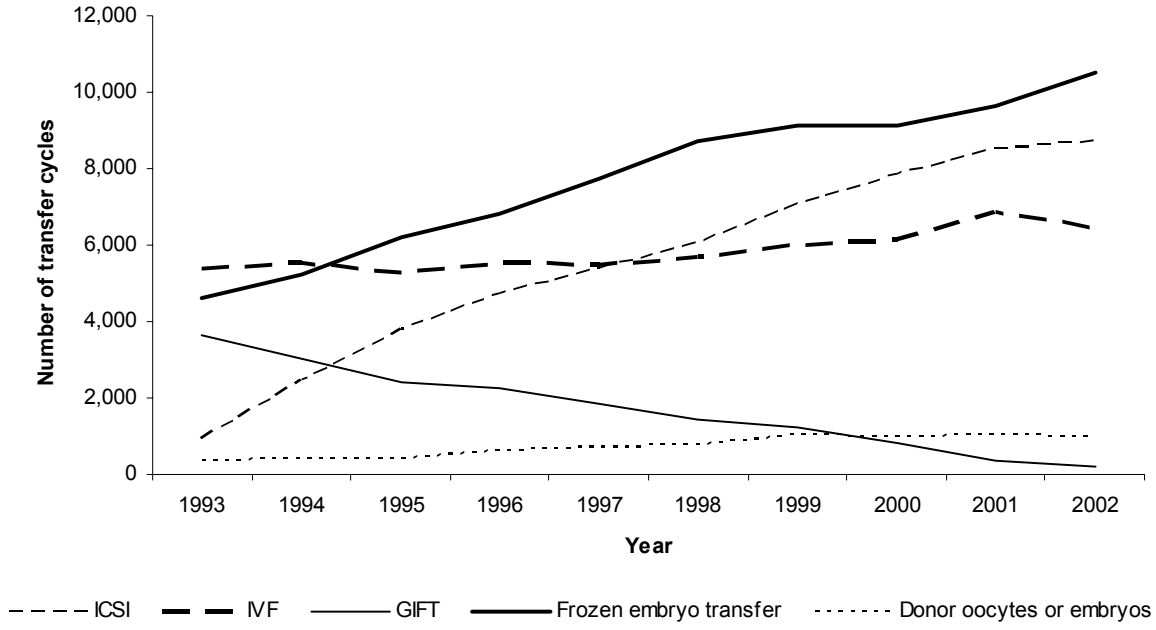


Figure 2: Number of transfer cycles by ART treatment type, Australia and New Zealand, 1993–2002

Has the number of embryos transferred per treatment cycle changed since 1993?

Figure 3 demonstrates the decline in the number of treatment cycles transferring three or more embryos. While 55.3% of treatment cycles in 1993 transferred three or more embryos, this decreased to 5.8% of cycles in 2002 (Table R3). This trend has been motivated by concerns about the poorer outcomes associated with multiple pregnancies such as preterm birth, low birthweight and increased rates of perinatal mortality. These data demonstrate that it is now common practice in Australia and New Zealand to transfer no more than two embryos per embryo transfer cycle.

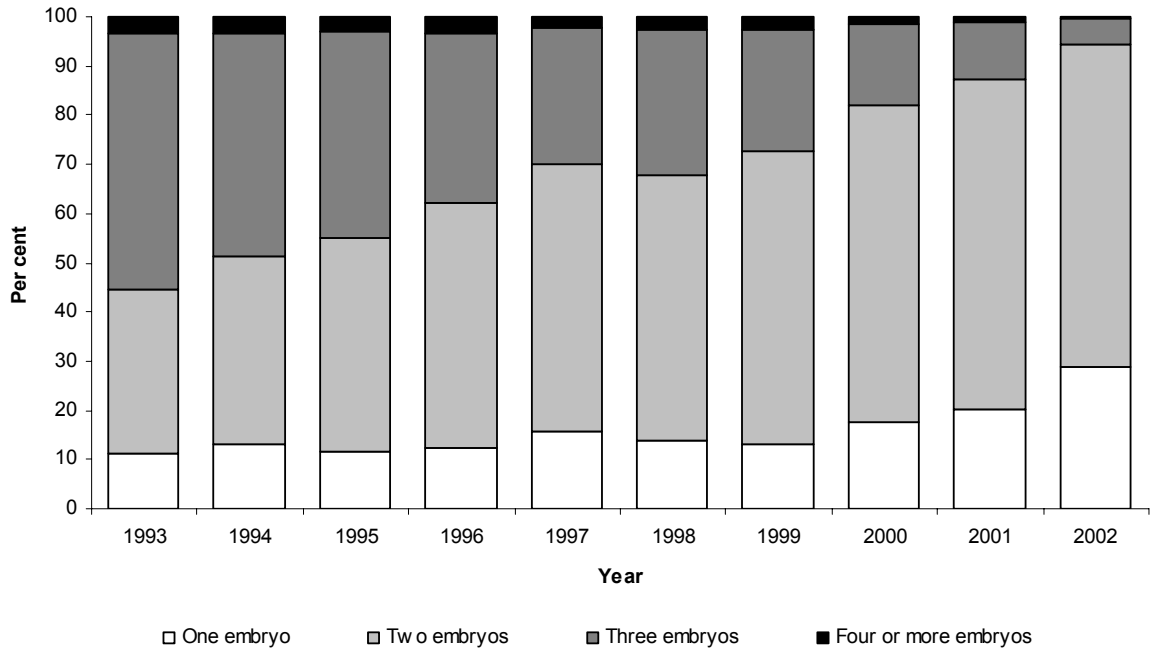


Figure 3: Proportion of fresh and frozen embryo transfer cycles transferring one, two, three or more embryos, Australia and New Zealand, 1993–2002

Has the success of ART treatment improved since 1993?

Figure 4 presents the steadily increasing success of ART treatment over the previous 10 years. ART treatment using fresh embryos demonstrates the greatest increase, with the success rate in 2002 (30.5 pregnancies per 100 embryo transfer cycles) being almost twice what it was in 1993 (16.3 pregnancies per 100 embryo transfer cycles) (Table R4). Likewise, the success of ART using frozen embryos has increased from 13.5% in 1993 to 19.9% in 2002 (Table R4).

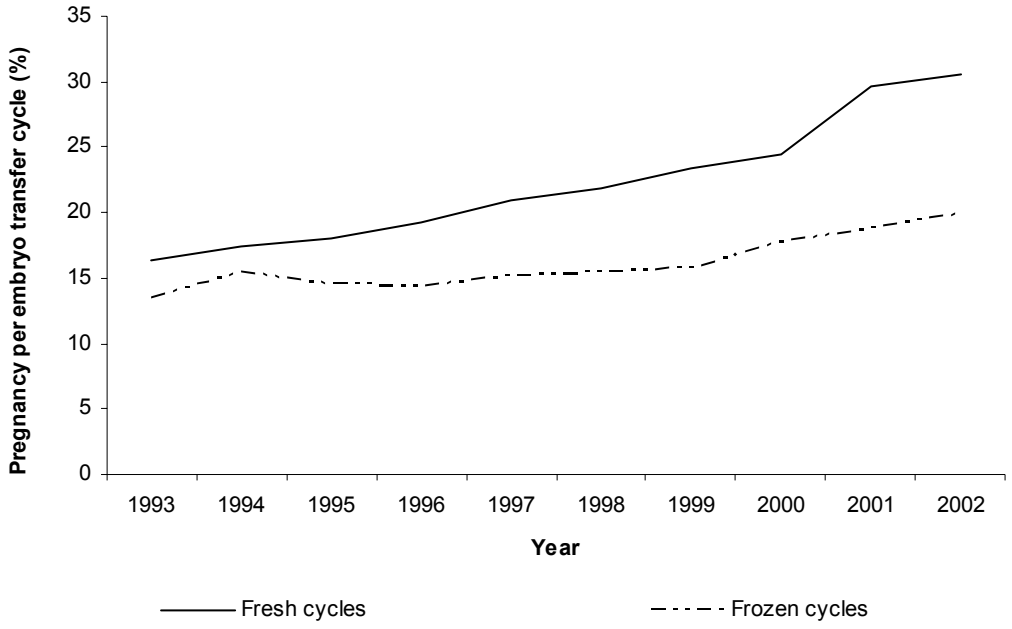


Figure 4: Rate of pregnancy per embryo transfer cycle, Australia and New Zealand, 1993–2002

2.2 ART treatment in 2002

A total of 36,483 ART treatment cycles took place in Australia and New Zealand in 2002. Of these, 90.3% (N=32,958) occurred in Australia and 9.7% (N=3,524) in New Zealand. In Australia there were 8.0 cycles per 1,000 women of reproductive age (15–44 years) and in New Zealand there were 4.2 cycles. Figure 5 depicts the number of treatment cycles by location for 2002. Fertility centres in Sydney and Melbourne accounted for half of all the treatment cycles that took place in 2002, with more than 9,000 cycles performed in each city. Fertility centres in other capital cities conducted considerably fewer cycles.

Note that the location of a fertility centre does not necessarily translate into the patient's place of residence since patients move between clinics and travel from overseas to receive treatment in Australia or New Zealand.

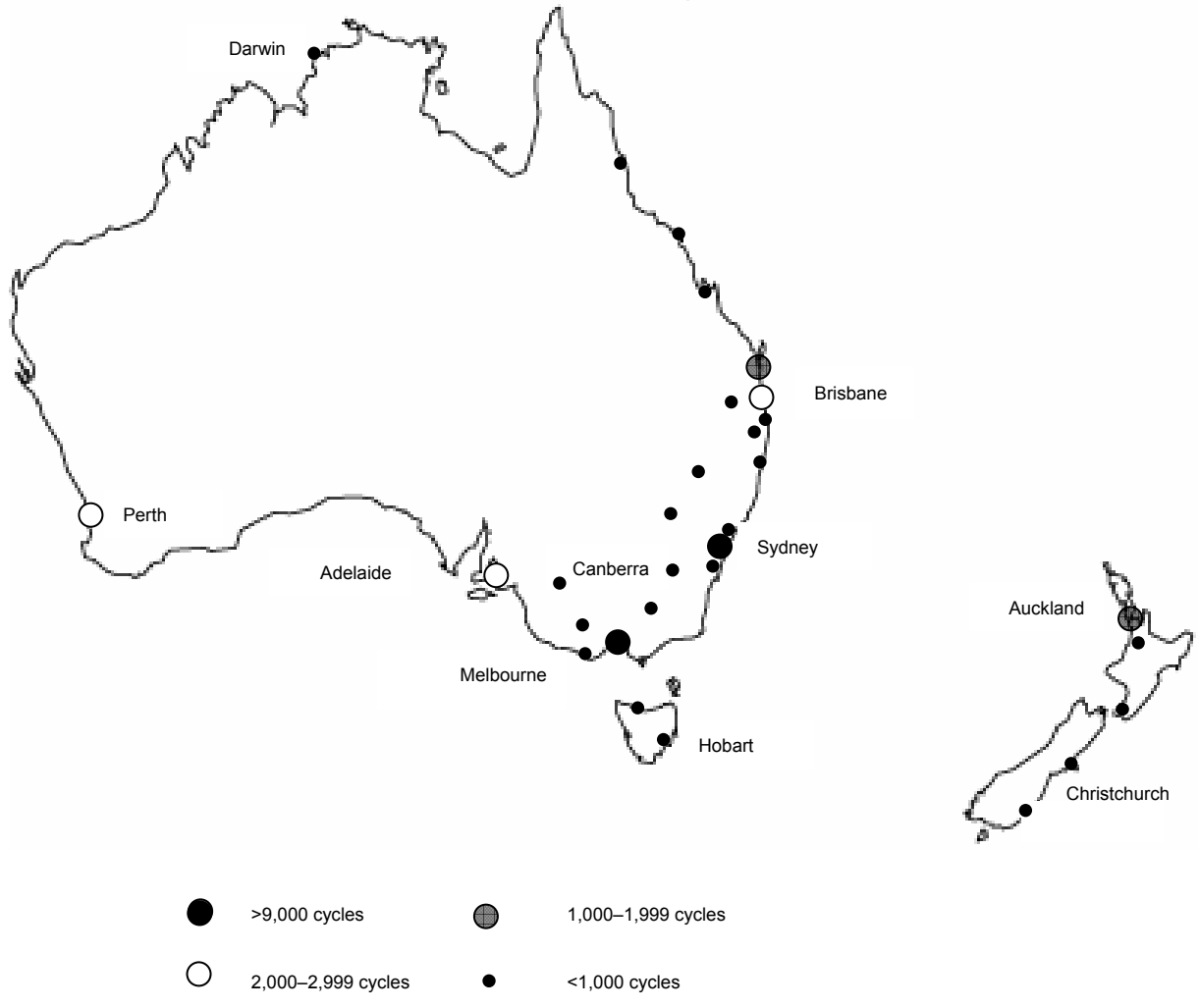


Figure 5: Distribution of treatment cycles by location, Australia and New Zealand, 2002

What types of ART treatments took place in Australia and New Zealand in 2002?

Figure 6 shows that the majority of ART treatment cycles in 2002 (54.5%, 19,883) used fresh, non donor eggs or embryos (Table R5). About a third (31.1%, 11,370) used frozen, non donor embryos (Table R7) and a small proportion (4.8%, 1,733) used donated oocytes or embryos that were either fresh or frozen (Table R5). The remaining 9.4% (3,419) of ART treatments involved artificial insemination using sperm donated from an anonymous or known donor (Table R5).

Of fresh, non donor cycles, almost half involved ICSI (9,627) and approximately a third used IVF (7,348) (Table R6). GIFT accounted for 1.0% (189) of all fresh, non donor cycles. The remaining 13.7% of fresh, non donor treatments include mixed IVF and ICSI cycles, cycles that did not successfully retrieve oocytes, and cycles that were cancelled prior to oocyte retrieval.

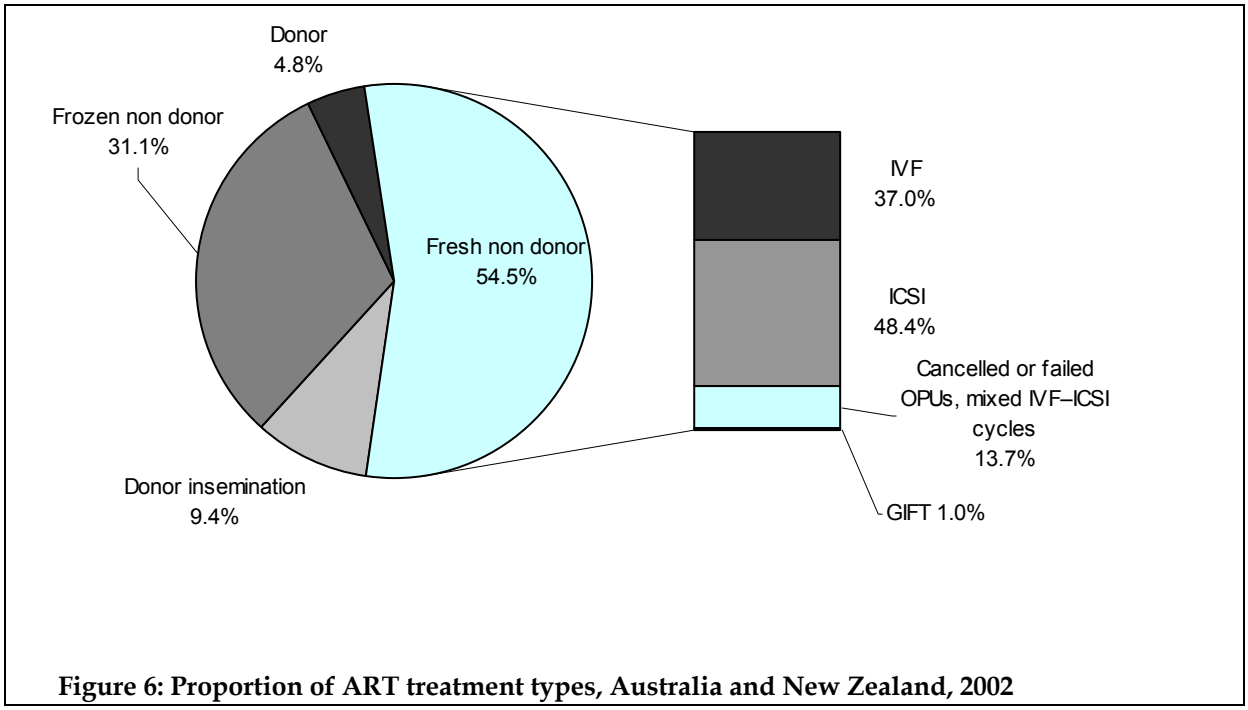


Figure 6: Proportion of ART treatment types, Australia and New Zealand, 2002

How many embryos were transferred in embryo transfer cycles in 2002?

Figure 7 shows that most ART treatment cycles (94.2%) in 2002 involved the transfer of one or two embryos (Table R3). As Figure 3 demonstrated previously, this is a considerable change from earlier years, such as 1993, in which 44.6% of cycles transferred only one or two embryos (Table R3). In 2002, women aged 38 years or older tended to have more embryos replaced than those aged less than 38 years (Table R8).

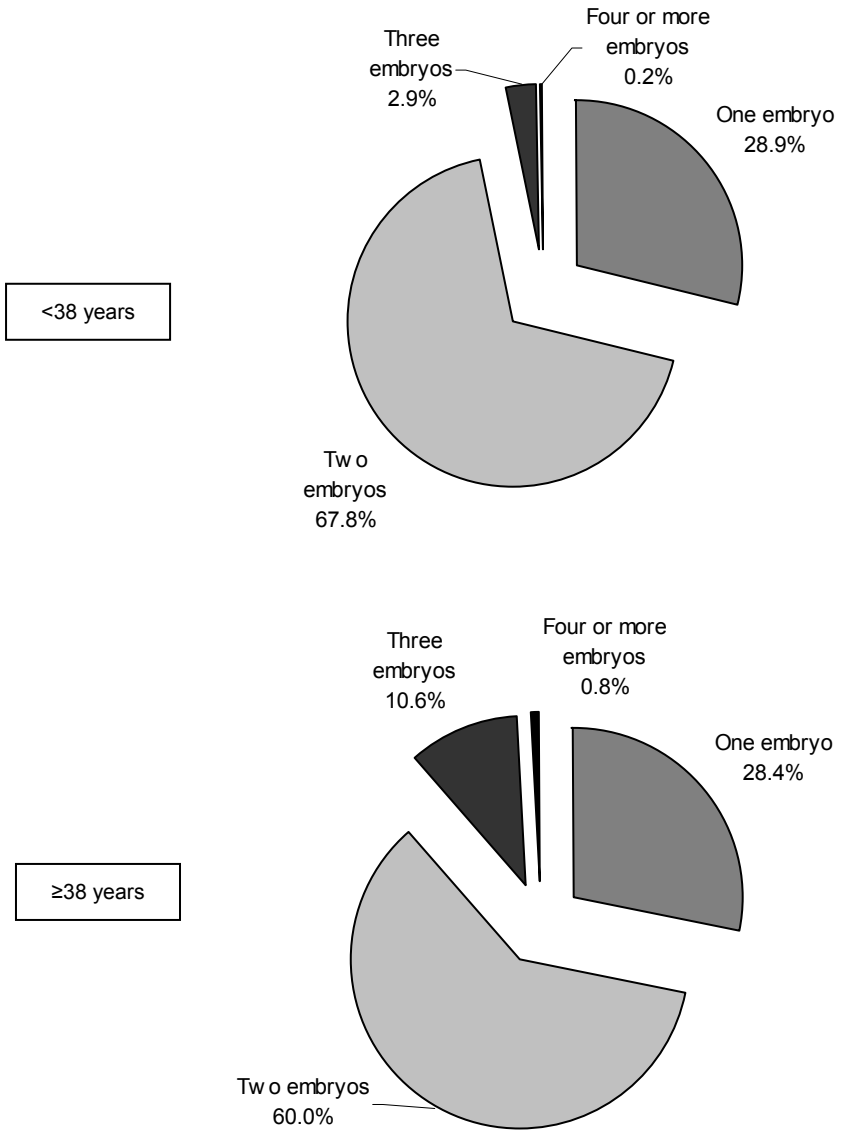


Figure 7: Proportion of fresh and frozen embryo transfer cycles transferring one, two, three, and four or more embryos, by age group, Australia and New Zealand, 2002

How many embryos were stored in 2002?

The NPSU collects information about the number of embryos removed from/added to storage in fertility centres each year. While these data are accurate for counts in a single year, their accuracy over time is less dependable since a small amount of error compounds with each annual calculation. Thus, information about total number of embryos in storage in Australia and New Zealand at the end of 2002 should be considered with caution.

In 2002, there were 9,645 fresh cycles where excess embryos were frozen (Table R9). A total of 44,911 excess embryos were stored for the purposes of future treatment. Another 12,117 cycles involved the thawing of embryos for treatment purposes where 29,805 embryos were thawed. A further 4,192 embryos were removed from storage due to patient request, government regulation or donation to research. This contributed a net 10,914 embryos to the current pool of embryos available for treatment, leaving 92,541 embryos in storage at 31 December 2002 (Table R9).

What was the average age of couples undergoing ART treatment in 2002?

2002 was the first year in which national data were collected about the age of people undergoing ART treatment. Women ranged in age from 19–59 years, with an average age of 35.2 years (Table R10). Men tended to be older and ranged in age from 19–67 years, with an average age of 37.6 years (Table R11).

2.3 Success of ART in 2002

The success of different types of ART procedures can be compared by measuring the number of live deliveries per embryo transfer cycle. Table A presents the number of live deliveries per embryo transfer as a percentage for each ART treatment type (Table R12). In 2002, 23.5% of fresh non donor embryo transfer cycles resulted in the delivery of one or more live babies, compared to 14.8% of frozen non donor embryo transfer cycles.

However, calculating the number of successful embryo transfer cycles is only one means of measuring ART success. Because the processes behind fresh and frozen treatment are different it is often more accurate to use measures of success that are specific to fresh or frozen ART treatment. These are presented in the following sections 2.3.1–2.3.3.

Table A: Live delivery per embryo transfer cycle, by treatment type, Australia and New Zealand, 2002

Description		Live delivery per embryo transfer (%)
Non donor oocytes/embryos	Fresh	23.5
	Frozen	14.8
Donor oocytes/embryos	Fresh	28.0
	Frozen	14.5

2.3.1 Success of fresh, non donor ART treatment in 2002

How is fresh, non donor ART success measured?

Figure 8 presents the total number of fresh, non donor cycles started in 2002 and how many of these progressed to the stage of oocyte retrieval, embryo transfer, pregnancy and the delivery of at least one live baby. The treatment process can be discontinued at any stage for a variety of reasons, including inadequate oocyte production, failure of the oocyte and sperm to fertilise, inadequate embryo growth, development of treatment side effects, patient choice, or failure of the embryo to implant in the uterus.

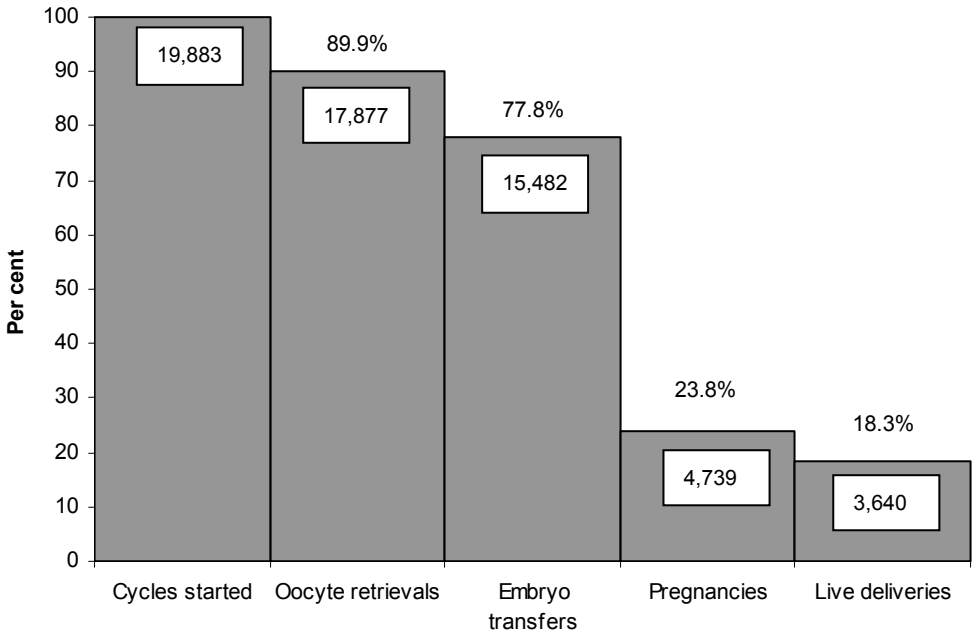


Figure 8: Progression of fresh, non donor ART treatment cycles, Australia and New Zealand, 2002

The success of fresh, non donor ART treatment is determined in a number of ways, depending on which values are considered the endpoint (numerator) and the starting point (denominator). Below, Table B presents the various success measures that can be derived from the steps depicted in Figure 8. For instance, in 2002, 18.3% of all fresh, non donor cycles started resulted in the delivery of one or more live babies.

Table B: Measures of success for fresh, non donor ART treatment, Australia and New Zealand, 2002

	Pregnancy	Live delivery
Cycle started	23.8% (4,739/19,883)	18.3% (3,640/19,883)
Oocyte retrieval	26.5% (4,739/17,877)	20.4% (3,640/17,877)
Embryo transfer	30.6% (4,739/15,482)	23.5% (3,640/1,5482)

What is the BESST endpoint for measuring fresh, non donor ART success?

Concerns about the high rate of multiple pregnancies associated with ART have prompted the introduction of the BESST (birth emphasising successful singleton at term) endpoint (Min et al. 2004). This measure takes as its starting point all fresh, non donor cycles initiated in which ovulation drugs are administered. It defines the successful endpoint as a single, live baby at full gestation of 37 weeks or more. Table C demonstrates that, for Australia and New Zealand in 2002, 12.9% of all fresh, non donor, stimulated cycles started resulted in a live, full-term, singleton baby.

Table C: Birth emphasising successful singleton at term (BESST) for fresh, non donor stimulated cycles, Australia and New Zealand, 2002

Stage of treatment	Number	Per cent of cycles started
Cycles started	19,472	
Pregnancies	4,697	24.1
Viable pregnancies	3,690	19.0
Live deliveries (all)	3,599	18.5
Live multiple deliveries	795	4.0
Preterm	496	2.4
Term	299	1.5
Live singleton deliveries	2,804	14.4
Preterm	296	1.5
Term	2,508	12.9

Did ART success vary by type of treatment in 2002?

Table D presents the number of live deliveries per cycle started as a percentage for IVF and ICSI treatment. In 2002, treatment by IVF and ICSI achieved similar success (Table R12). There were too few treatment cycles to report a success rate for GIFT.

Table D: Live delivery per cycle started by type of fresh, non donor ART treatment, Australia and New Zealand, 2002

Type of fresh, non donor ART treatment	Live delivery per cycle started (%)
IVF	21.2
ICSI	20.6
GIFT	n.p.

n.p. Not published due to small cell size.

Did ART success vary by cause of infertility?

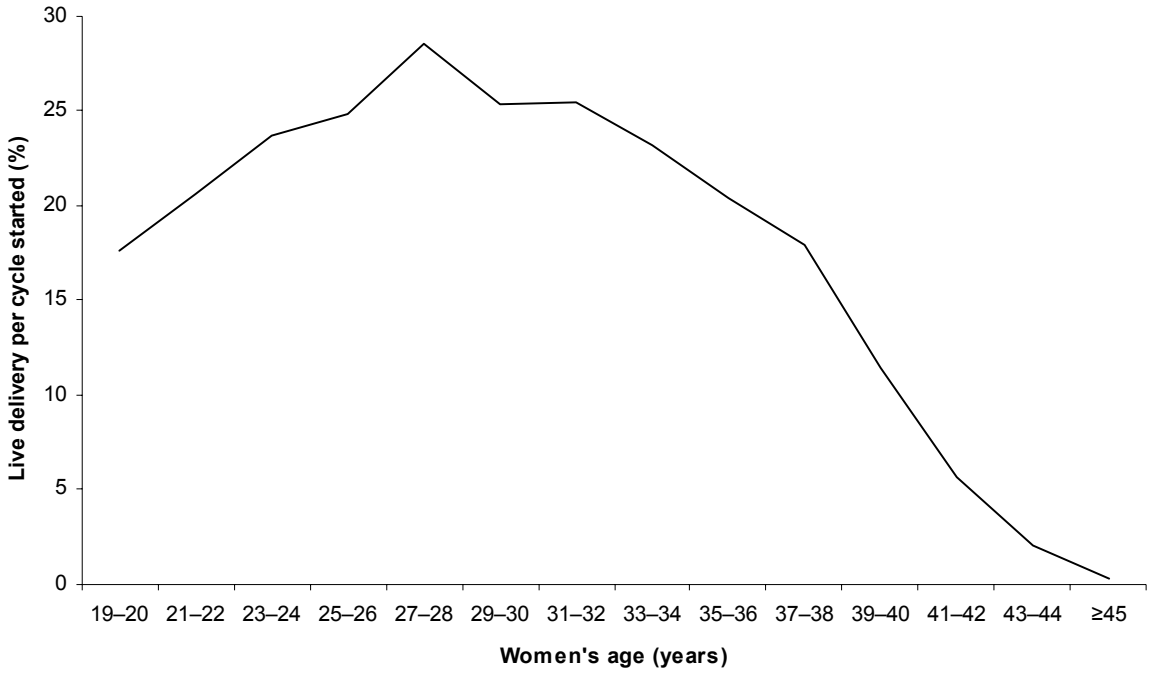
Table E presents the number of live deliveries per cycle started as a percentage for fresh, non donor cycles by different causes of infertility. In 2002, couples in which the infertility resided with the male partner achieved the greatest success. Those with female factors of infertility, such as tubal disease or endometriosis, had comparatively less success. The relative success of couples with male factor infertility is to be expected when considering that the female partner usually has normal reproductive physiology.

Table E: Live delivery per cycle started by cause of infertility for fresh, non donor ART treatment, Australia and New Zealand, 2002

Cause of infertility		Number of cycles started	Number of live deliveries	Live delivery per cycle started (%)
Male factor only		5,250	1,107	21.1
Female factor only	Tubal disease	1,986	332	16.7
	Endometriosis	1,189	221	18.6
Multiple causes		6,224	1,044	16.8
Unexplained		3,313	646	19.5
Other (including fibroids, ovulation disorders, premature ovarian failure)		1,921	290	15.1

Did ART success vary by women's age in 2002?

Figure 9 indicates how the success of fresh, non donor cycles varied among women of different ages in 2002 (Table R13). Women's age is one of the key factors associated with ART success when women use their own oocytes. The figure demonstrates how success is greatest when women are aged in their mid-20s to mid-30s but declines steadily from this age onwards. For women over the age of 40 years the chance of achieving a live delivery is, on average, less than 2% (Table R13).



*Note: V*alues for women aged ≥45 years were combined due to small numbers.

Figure 9: Live delivery per cycle started by women's age for fresh, non donor ART treatment, Australia and New Zealand, 2002

2.3.2 Success of frozen, non donor ART treatment in 2002

How is frozen, non donor ART success measured?

Figure 10 presents the total number of frozen, non donor treatment cycles started in 2002 and the number that progressed from the stage of attempted embryo thaw to embryo transfer, pregnancy and delivery of at least one live baby. In 2002, 13.7% of all attempted thaw cycles resulted in the delivery of at least one live baby (Table R12). This compares well with the success of fresh, non donor treatment in which 18.3% of cycles initiated resulted in the delivery of one or more live babies (Figure 8), particularly when considering that treatment with frozen embryos can be less invasive.

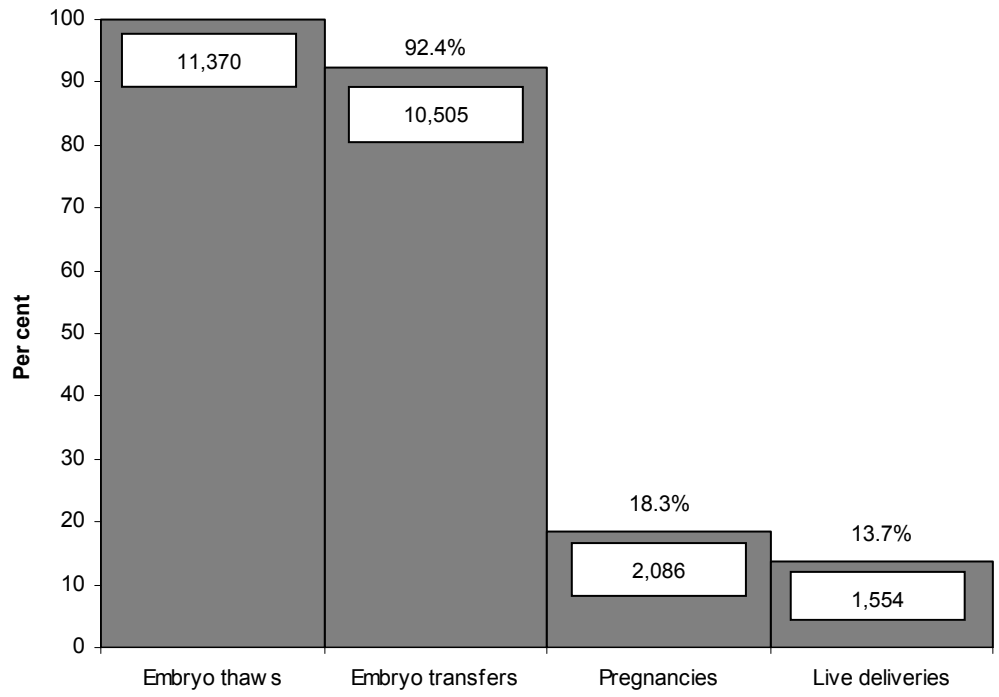


Figure 10: Progression of frozen, non donor ART treatment cycles, Australia and New Zealand, 2002

2.3.3 Success of donor insemination treatment in 2002

Treatment by artificial insemination involves different procedures from other ART treatments. With artificial insemination, oocytes are not retrieved from the body. Instead, sperm is placed in the uterus and fertilisation occurs inside the body. Accordingly, the success of artificial insemination is measured differently from other ART procedures, usually as the number of live deliveries per cycle started. In 2002, there were 3,419 insemination treatments using sperm donated from an anonymous or known donor. Of these, 9.9% (340) resulted in the delivery of one or more live babies (Table R12).

2.4 Variation in success rates among fertility centres

How did fresh, non donor ART success vary among fertility centres in Australia and New Zealand in 2002?

The variation in success among fertility centres is best measured using quartiles which rank individual centre success rates and report the success of the top and bottom 25% of centres.

For fresh, non donor ART treatment in 2002, the top 25% of fertility centres (first quartile) achieved live delivery in at least 21.8% of treatment attempts (first quartile range 21.8–27.3%). The bottom 25% of fertility centres (fourth quartile) achieved live delivery in less than 14.8% of treatment attempts. The remaining 50% of fertility centres achieved success rates (live delivery per cycle started) between 14.9 and 21.7% (Table R14).

The variation in fertility centre success persists across age groups. Table F presents the rankings for fresh, non donor ART treatment by women's age group. For women aged 40 years or older, the top 25% of fertility clinics achieved live delivery in at least 7.8% of treatment attempts (first quartile range 7.8–18.8%).

Table F: Quartiles for fertility centres for fresh, non donor ART treatment, by women's age group, Australia and New Zealand, 2002

	Live delivery per cycle started (%)				
Women's age group (years)	Average for all fertility centres	First quartile	Second quartile	Third quartile	Fourth quartile
<35 years	24.9	30.1–40.7	23.0–30.0	18.5–22.9	<18.4
35–39 years	17.9	20.6–33.3	15.5–20.5	13.6–15.4	<13.5
≥40 years	5.7	7.8–18.8	4.7–7.7	3.4–4.6	<3.3

Note: One fertility centre missing from this calculation.

How did frozen, non donor ART success vary among fertility centres in Australia and New Zealand in 2002?

For frozen, non donor ART treatment in 2002, the top 25% of fertility centres (first quartile) achieved live delivery in at least 17.2% of treatment attempts (first quartile range 17.2–23.3%) (Table R15). The bottom 25% of fertility centres (fourth quartile) achieved live delivery in less than 11.3% of treatment attempts (Table R15). The remaining 50% of fertility centres achieved success rates (live delivery per cycle started) between 11.4 and 17.1% (Table R15). Table G presents the rankings for frozen, non donor ART treatment by women's age group.

Table G: Quartiles for fertility centres for frozen, non donor ART treatment, by women's age group, Australia and New Zealand, 2002

	Live delivery per attempted thaw cycle (%)				
Women's age group (years)	Average for all fertility centres	First quartile	Second quartile	Third quartile	Fourth quartile
<35 years	16.0	20.1–36.0	16.2–20.0	13.8–16.1	<13.7
35–39 years	13.0	16.0–25.0	13.2–15.9	9.1–13.1	<9.0
≥40 years	7.1	11.1–33.3	9.1–11.0	3.7–9.0	<3.6

Note: One fertility centre missing from this calculation.

2.5 Complications of ART treatment in 2002

ANZARD includes morbidity information that is specifically related to ART treatment but only where hospital admission is required. Treatment morbidity data are self-reported by patients and validated later with hospital records by fertility centre staff. It is possible that there is under-reporting of this information.

In 2002, there were 246 cases in which women were admitted to hospital with complications of ART treatment, representing 0.7% of all treatment cycles. Of these, most (78%, 192) were hospitalised for symptoms of ovarian hyperstimulation syndrome (OHSS) (Table R16). OHSS is a complication of ovulation induction therapy and includes symptoms of abdominal pain and fluid retention. Other treatment–related complications in 2002 included abdominal pain, bleeding, and infection.

3 Outcomes of pregnancies and births from assisted reproductive technology in 2002

3.1 Ten-year trends (1993–2002)

How many pregnancies and live babies have resulted from ART treatment since 1993?

Figure 11 demonstrates the steady increase in the number of pregnancies and live babies resulting from ART treatment since 1993. In 2002, 6,816 live babies were born in Australia and New Zealand following ART, which is 2.5 times more than the 2,506 born in 1993 (Table R1).

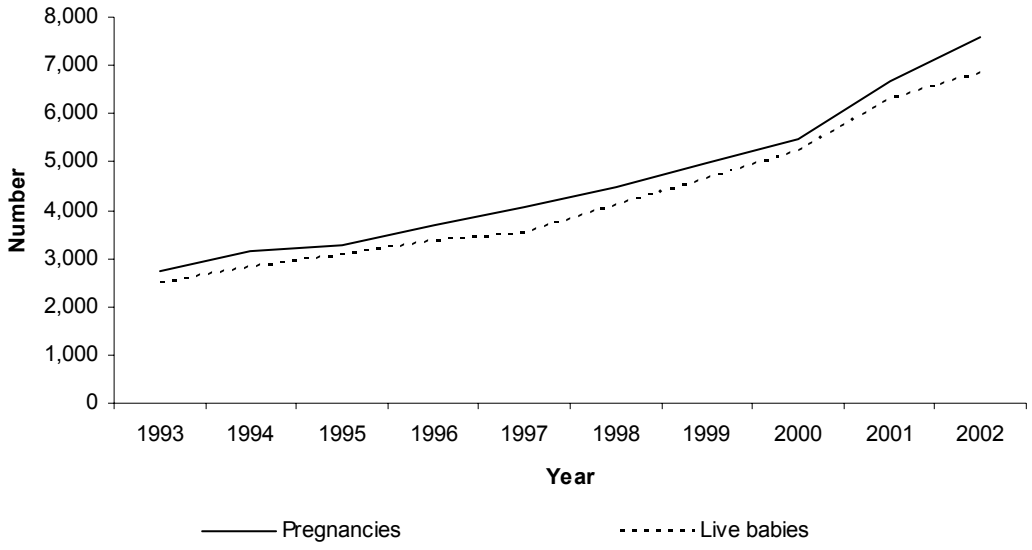


Figure 11: Total number of pregnancies and live babies, Australia and New Zealand, 1993–2002

Has the proportion of multiple births changed since 1993?

Figure 12 demonstrates the decline in the proportion of triplets or higher order deliveries since 1993. In 1993, 2.0% of deliveries were of triplets or higher order multiples. However, in the 2002 conception cohort, only 0.6% of deliveries were of triplets and there were no quadruplet or higher order deliveries. Since 1993 the proportion of twin deliveries has remained relatively steady between 17.1 and 21.1% (Table R17).

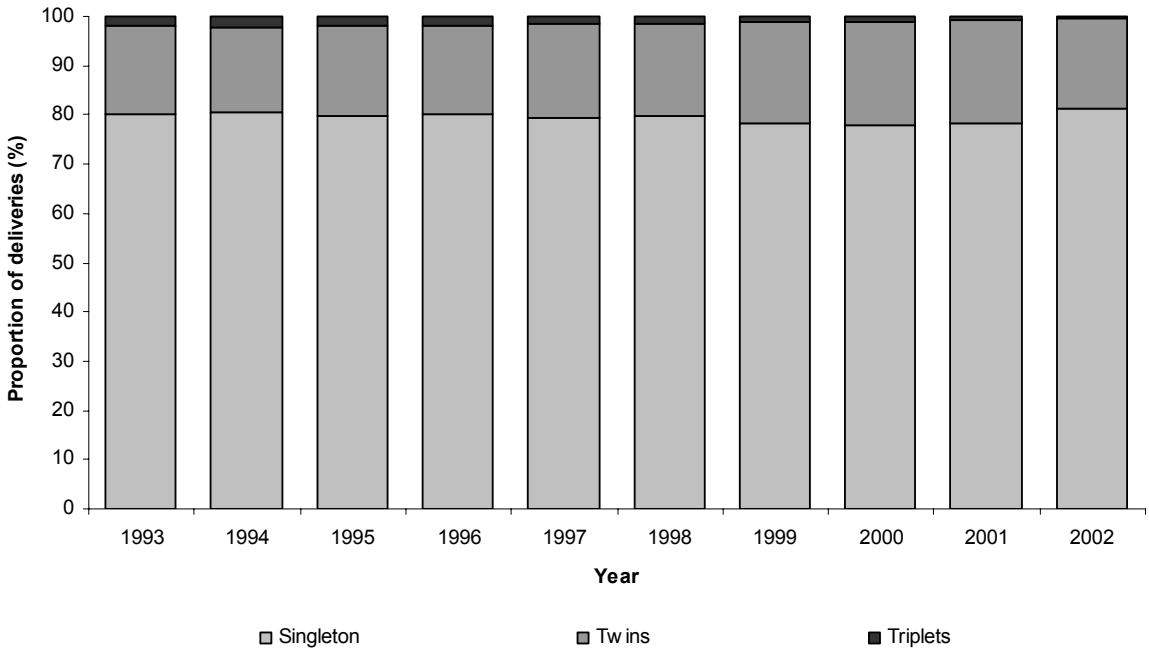


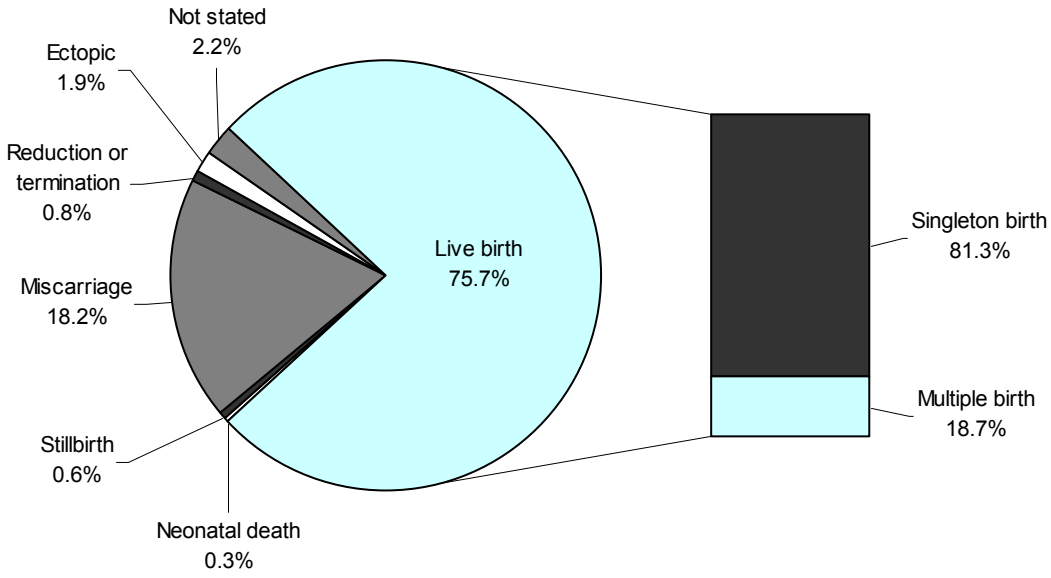
Figure 12: Proportion of singleton, twin and higher order deliveries, all babies ≥ 20 weeks gestation, Australia and New Zealand, 1993–2002

3.2 Pregnancies achieved from ART treatment in 2002

In 2002, a total of 7,577 pregnancies were reported in Australia and New Zealand. Of these, 88% (6,675) were reported from fertility centres in Australia and 12% (902) from centres in New Zealand.

What was the outcome of ART pregnancies in Australia and New Zealand?

Figure 13 presents the outcome of pregnancies conceived using ART in 2002. The majority of pregnancies (75.7%) resulted in the delivery of one or more live babies. Of these, 81.3% were live singleton deliveries and 18.7% involved the delivery of two or more live babies. Approximately 22% of pregnancies resulted in other outcomes, including stillbirth, neonatal death, miscarriage or ectopic pregnancy. The outcome for 2.2% of pregnancies was not stated (Table R18).



Note: Pregnancies conceived in 2002. Births occurred in 2002 or 2003.

Figure 13: Outcome of ART pregnancies conceived in 2002, Australia and New Zealand

What was the risk of multiple pregnancy in 2002?

Of all deliveries in the 2002 conception cohort, live and stillborn, 18.9% (1,103) involved the delivery of twins or triplets (Table R17). There were 1,070 deliveries of twins (18.3% of all deliveries) and 33 deliveries of triplets (0.6% of all deliveries). These proportions are considerably higher than those reported in the Australian population where, in 2001, 1.7% of deliveries were multiple (AIHW: Laws & Sullivan 2004).

What was the risk of multiple pregnancy in relation to the number of embryos transferred?

Table H correlates the number of embryos transferred in a treatment cycle to the number of babies resulting from that transfer. The majority of pregnancies in 2002 resulted from treatment cycles transferring two embryos. Most twins came from two-embryo transfers, although a small proportion arose from single-embryo transfers meaning they were spontaneously occurring monozygotic twins. Likewise, most triplets arose from two-embryo transfers, also suggesting the occurrence of monozygotic twinning.

Table H: Plurality of pregnancies of ≥20 weeks gestation, by number of embryos transferred, Australia and New Zealand, 2002

Plurality of pregnancies ≥ 20 weeks	Number of embryos transferred					
	1	2	3	4 or more	Not applicable	Total deliveries
Singleton	1,098 (23.1%)	3,122 (65.8%)	176 (3.7%)	13 (0.3%)	339 (7.1%)	4,748
Twin	27 (2.5%)	958 (89.5%)	49 (4.6%)	5 (0.5%)	31 (2.9%)	1,070
Triplet	n.p.	21 (63.6%)	9 (27.3%)	n.p.	n.p.	33

n.p. Not published due to small cell size.

Note: Not applicable includes treatments in which no embryos were transferred, such as donor insemination and GIFT.

Did pregnancy outcome vary with maternal age?

The average age of women giving birth to ART babies in the 2002 conception cohort was 34.4 years, 5.2 years older than the average age (29.2) of Australian mothers in 2001 (AIHW: Laws & Sullivan 2004). This is also slightly older than the average age of mothers (33.6) in the 2000 ART cohort, the last group of published ART births (AIHW: Dean & Sullivan 2003). The average age of fathers in the 2002 cohort was 37.3 years.

On average, in 2002, 75.7% of all pregnancies resulted in the delivery of one or more live babies (Table R19). Figure 14 shows the rate of live delivery per pregnancy for the 2002 cohort. It demonstrates how the capacity of women to maintain a pregnancy through to live delivery changes with advancing age. For women aged 25–29 years, 81.3% of all pregnancies resulted in a live delivery (Table R19). However, this steadily declined with advancing age and, for women aged 40–44 years, only 58.9% of all pregnancies resulted in a live delivery (Table R19).

Note: Values for women aged <25 years or ≥45 years are excluded from this figure due to small numbers.

Figure 14: Live delivery per pregnancy by maternal age, Australia and New Zealand, 2002

What pregnancy complications were experienced in ART pregnancies in 2002?

ANZARD includes pregnancy morbidity information that is self-reported by patients and, if relevant, validated with hospital records by fertility centre staff. It is possible that there is inexact reporting of this information.

Of all pregnancies in 2002, 13.2% (998) reported a complication. Pregnancy-induced hypertension was reported in 1.9% (144) of all pregnancies, gestational diabetes in 1.8% (135), placenta praevia in 1.1% (83) and antepartum hemorrhage in 1.0% (72). Other complications, such as premature rupture of membranes (67), intrauterine growth retardation (42) and pre-eclampsia (46), occurred in less than 1.0% of pregnancies.

How many deliveries were by Caesarean section in 2002?

There were 2,807 Caesarean deliveries of babies of at least 20 weeks gestation in the 2002 cohort (Table R20). This represents almost half (48.0%) of all deliveries after ART and is approximately twice that reported in the population for 2001 in which 25.4% of deliveries were by Caesarean section (AIHW: Laws & Sullivan 2004). The high proportion of Caesarean deliveries in ART pregnancies compared to that in the Australian population persisted across age groups. While 46.0% of ART mothers aged younger than 38 years delivered by Caesarean section (Table R21), only 24.5% of mothers in this age group in the Australian population did so. Likewise, 55.7% of ART mothers aged 38 years or older delivered by Caesarean section (Table R21), compared to only 37.5% of same aged mothers in the Australian population.

The high proportion of Caesarean sections among ART deliveries is possibly related to the high number of multiple pregnancies resulting from ART. While 42.4% of singletons were delivered by Caesarean section, 71.1% of twins and 93.9% of triplets were delivered in this way (Table R20).

3.3 Babies conceived in 2002

There were a total of 6,987 live and stillborn babies of at least 20 weeks gestation delivered in the 2002 conception cohort. Of these, 68.0% (4,748) were singletons, 30.6% (2,140) were twins, and 1.4% (99) were triplets (Table R22, Table R23). There were 6,816 live born babies, representing 97.3% of all ART babies. Of these, 87.3% (5,953) were conceived at fertility centres in Australia and 12.7% (863) in New Zealand.

What was the risk of preterm birth for ART babies in 2002?

The average gestational age for all babies of at least 20 weeks gestation in the 2002 conception cohort was 37.2 weeks (Table R22). This means that the average ART baby in the 2002 cohort was born at full-term gestation (≥37 weeks).

Figure 15 shows the distribution of gestational age for all babies in the 2002 cohort. Most (72.7%, 5,083) reached full-term gestation of at least 37 weeks (Table R22). This is a higher proportion than the 67.4% of ART babies that were born at full term in the 2000 cohort (AIHW: Dean & Sullivan 2003). Nevertheless, 21.1% (1,476) of babies in 2002 were born at 32–36 weeks and a further 6.1% at 20–31 weeks (Table R22).

The proportion of preterm babies is possibly related to the high incidence of multiple births resulting from ART pregnancies. While the average gestational age for singletons was 38.4 weeks, for twins this was reduced to 35.0 weeks and for triplets 30.5 weeks (Table R22). Similarly, while only 11.1% of singletons were born preterm this increased to 59.8% of twins and 100% of triplets (Table R22).

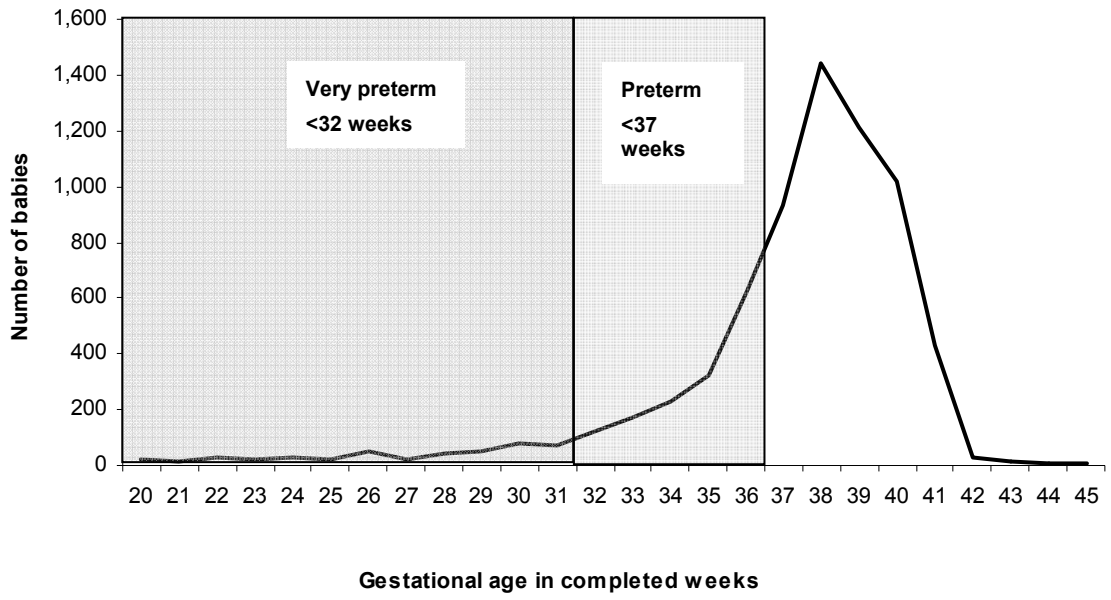


Figure 15: Distribution of gestational age for all babies of ≥ 20 weeks gestation, Australia and New Zealand, 2002

What was the risk for low birthweight for ART babies in 2002?

The average birthweight for all babies of at least 20 weeks gestation in the 2002 conception cohort was 2,985 grams. Live born babies had an average birthweight of 3,011 grams. The average birthweight for ART babies was less than the average of 3,362 grams for the Australian population in 2001 (AIHW: Laws & Sullivan 2004). Of all ART babies, 21.7% were classified as having low birthweight (<2,500g) (Table R23), which has decreased from the 26.4% of ART babies reported to be low birthweight in 2000 (AIHW: Dean & Sullivan 2003).

Again, this outcome is likely to be related to the high number of twins resulting from ART pregnancies. Figure 16 shows the difference in the average birthweight and distribution of singletons compared to twins for the 2002 conception cohort. Singletons had an average birthweight of 3,279 grams compared to twins whose average birthweight was 2,397 grams (average indicated by vertical lines). Similarly, 8.2% of singletons were classified as low or very low birthweight compared to 48.4% of twins (Table R23).

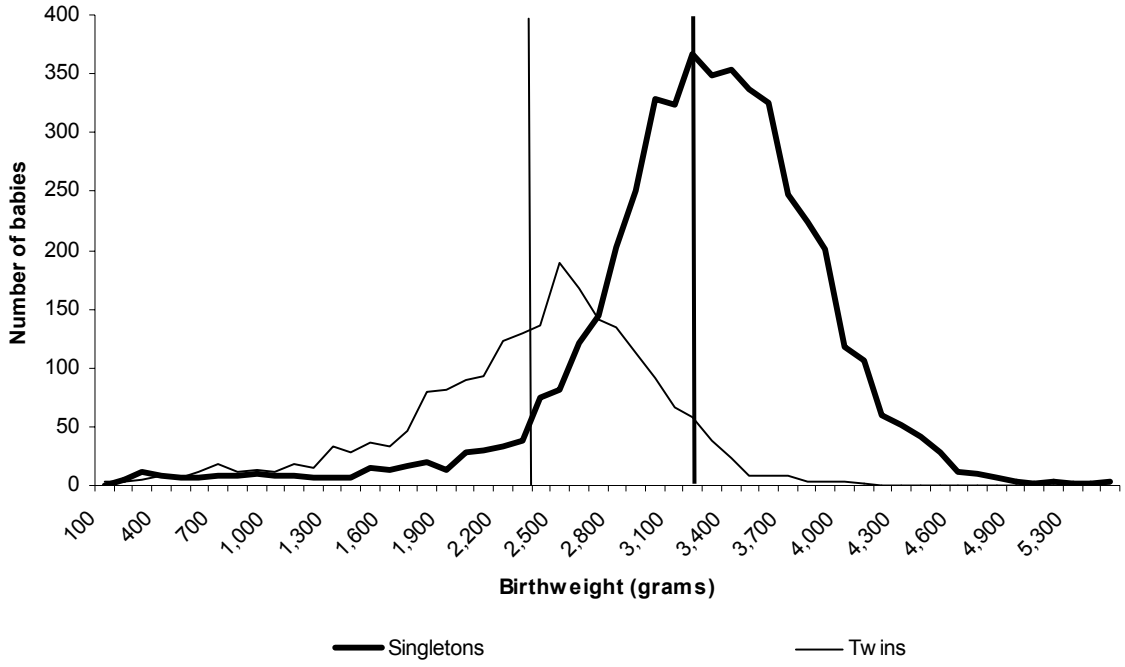


Figure 16: Distribution of birthweight for all babies of ≥20 weeks gestation by plurality, Australia and New Zealand, 2002

What was the sex distribution for ART babies in 2002?

In the 2002 cohort, there were 104.6 male babies for every 100 female babies (Table R24). This is similar to that reported in the 2000 ART cohort in which there were 105.0 males per 100 females (AIHW: Dean & Sullivan 2003). Fresh ICSI treatment had a lower ratio of 100.2 males to 100 females and fresh IVF treatment had a higher ratio of 116.1 males to 100 females (Table R24).

What was the risk for perinatal mortality among ART babies conceived in 2002?

Perinatal mortality refers to foetal deaths (stillbirths) of at least 20 weeks gestation or 400 grams and the deaths of neonatal babies occurring within 28 days of birth. In the 2002 conception cohort there were 121 reported perinatal deaths, giving a perinatal death rate of 17.3 deaths per 1,000 ART births in Australia and New Zealand (Table R25). This was higher than the 10.0 deaths per 1,000 births reported in the Australian population in 2001 (AIHW: Laws & Sullivan 2004) but is lower than the rate of 20.7 reported for ART babies in 2000 cohort.

Perinatal mortality correlates with plurality of ART pregnancies. Singletons had the lowest rate: 10.9 deaths per 1,000 births. Twins had a higher rate: 29.3 deaths per 1,000 births, and triplets reported the highest rate: 60.6 deaths per 1,000 births (Table R25).

Glossary

This glossary is authored by the International Committee for the Monitoring of Assisted Reproductive Technologies (ICMART) and is endorsed by the World Health Organization.

Aspiration cycle: initiated ART cycle in which one or more follicles are punctured and aspirated irrespective of whether or not oocytes are retrieved.

Assisted hatching: an *in vitro* procedure in which the zona pellucida of an embryo (usually at 8-cell stage or a blastocyst) is perforated by chemical, mechanical or laser-assisted methods to assist separation of the blastocyst from the zona pellucida.

Assisted reproductive technology (ART): all treatments or procedures that include the *in vitro* handling of human oocytes and sperm or embryos for the purpose of establishing a pregnancy. This includes, but is not limited to, *in vitro* fertilization and trans-cervical embryo transfer, gamete intrafallopian transfer, zygote intrafallopian transfer, tubal embryo transfer, gamete and embryo cryopreservation, oocyte and embryo donation and gestational surrogacy. ART does not include assisted insemination (artificial insemination) using sperm from either a woman's partner or sperm donor.

Birth defect: Structural, functional or developmental abnormalities present at birth or later in life, due to genetic or nongenetic factors acting before birth.

Blastocyst: an embryo with a fluid-filled blastocele cavity (usually developing by five or six days after fertilization).

Cancelled cycle: an ART cycle in which ovarian stimulation or monitoring has been carried out with the intent of undergoing ART but which did not proceed to follicular aspiration, or in the case of a thawed embryo, to transfer.

Clinical abortion: an abortion of a clinical pregnancy which takes place between the diagnosis of pregnancy and 20 completed weeks' gestational age.

Clinical pregnancy: evidence of pregnancy by clinical or ultrasound parameters (ultrasound visualization of a gestational sac). It includes ectopic pregnancy. Multiple gestational sacs in one patient are counted as one clinical pregnancy.

Clinical pregnancy rate: number of clinical pregnancies expressed per 100 initiated cycles, aspiration cycles or embryo transfer cycles. When clinical pregnancy rates are given, the denominator (initiated, aspirated or embryo transfer cycles) must be specified.

Controlled ovarian hyperstimulation (COH): medical treatment to induce the development of multiple ovarian follicles to obtain multiple oocytes at follicular aspiration.

Cryopreservation: freezing and storage of gametes, zygotes or embryos.

Delivery rate: number of deliveries expressed per 100 initiated cycles, aspiration cycles or embryo transfer cycles. When delivery rates are given, the denominator (initiated, aspirated or embryo transfer cycles) must be specified. It includes deliveries that resulted in a live birth and/or stillbirth. The delivery of a singleton, twin or other multiple pregnancy is registered as one delivery.

Early neonatal death: death occurring within the first seven days after delivery.

Ectopic pregnancy: a pregnancy in which implantation takes place outside the uterine cavity.

Embryo: product of conception from the time of fertilization to the end of the embryonic stage eight weeks after fertilization (the term 'pre-embryo' or dividing conceptus has been replaced by embryo).

Embryo donation: the transfer of an embryo resulting from gametes that did not originate from the recipient and/or her partner.

Embryo transfer (ET): procedure in which embryo(s) are placed in the uterus or fallopian tube.

Embryo transfer cycle: ART cycle in which one or more embryos are transferred into the uterus or fallopian tube.

Fertilization: the penetration of the ovum by the spermatozoon and fusion of genetic materials resulting in the development of a zygote.

Foetus: the product of conception starting from completion of embryonic development (at eight completed weeks after fertilization) until birth or abortion.

Full-term birth: a birth that takes place at 37 or more completed weeks of gestational age. This includes both live births and stillbirths.

Gamete intrafallopian transfer (GIFT): ART procedure in which both gametes (oocytes and sperm) are transferred to the fallopian tubes.

Gestational age: age of an embryo or foetus calculated by adding 14 days (2 weeks) to the number of completed weeks since fertilization.

Gestational carrier: a woman in whom a pregnancy resulted from fertilization with third-party sperm and oocytes. She carries the pregnancy with the intention or agreement that the offspring will be parented by one or both of the persons that produced the gametes.

Gestational sac: a fluid-filled structure containing an embryo that develops early in pregnancy usually within the uterus.

Hatching: it is the process that precedes implantation by which an embryo at the blastocyst stage separates from the zona pellucida.

Host uterus: see gestational carrier.

Implantation: the attachment and subsequent penetration by the zona-free blastocyst (usually in the endometrium) which starts five to seven days following fertilization.

In vitro fertilization (IVF): an ART procedure which involves extracorporeal fertilization.

Infertility: failure to conceive after at least one year of unprotected coitus.

Initiated cycles: ART treatment cycles in which the woman receives ovarian stimulation, or monitoring in the case of spontaneous cycles, irrespective of whether or not follicular aspiration is attempted.

Intracytoplasmatic (intracytoplasmic) sperm injection (ICSI): IVF procedure in which a single spermatozoon is injected through the zona pellucida into the oocyte.

Live birth: a birth in which a foetus is delivered with signs of life after complete expulsion or extraction from its mother, beyond 20 completed weeks of gestational age. (Live births are counted as birth events, e.g. a twin or triplet live birth is counted as one birth event.)

Live-birth delivery rate: number of live-birth deliveries expressed per 100 initiated cycles, aspiration cycles or embryo transfer cycles. When delivery rates are given, the denominator (initiated, aspirated or embryo transfer cycles) must be specified. It includes deliveries that

resulted in at least one live birth. The delivery of a singleton, twin or other multiple birth is registered as one delivery.

Malformation rate: includes all structural, functional, genetic and chromosomal abnormalities identified in aborted tissue or diagnosed before or subsequent to birth.

Medically assisted conception: conception brought about by noncoital conjunction of the gametes. Includes ART procedures and intrauterine, intracervical and intravaginal insemination with semen of husband/partner or donor.

Micromanipulation (also referred to as **assisted fertilization):** the use of special micromanipulative technology that allows operative procedures to be performed on the oocyte, sperm or embryo**.**

Microscopic epididymal sperm aspiration (MESA): procedure in which spermatozoa are obtained from the epididymis, by either aspiration or surgical excision.

Missed abortion: a clinical abortion where the products of conception are not expelled spontaneously from the uterus.

Neonatal death: death within 28 days of birth.

Newborns or infants born: the number of live births plus stillbirths.

Oocyte donation: an ART procedure performed with third-party oocytes.

Preclinical abortion: an abortion that takes place before clinical or ultrasound evidence of pregnancy.

Preclinical pregnancy (biochemical pregnancy): evidence of conception based only on biochemical data in the serum or urine before ultrasound evidence of a gestational sac.

Preimplantation genetic diagnosis (PGD): screening of cells from preimplantation embryos for the detection of genetic and/or chromosomal disorders before embryo transfer.

Preterm birth: a birth which takes place after at least 20, but less than 37, completed weeks of gestation. This includes both live births and stillbirths. Births are counted as birth events (e.g. a twin or triplet live birth is counted as one birth event).

Recipient: in an ART cycle refers to the woman who receives an oocyte or an embryo from another woman.

Spontaneous abortion: spontaneous loss of a clinical pregnancy before 20 completed weeks of gestation or, if gestational age is unknown, a weight of 500 g or less.

Stillbirth: a birth in which the foetus does not exhibit any signs of life when completely removed or expelled from the birth canal at or above 20 completed weeks of gestation. Stillbirths are counted as birth events (e.g. a twin or triplet stillbirth is counted as one birth event).

Surrogate mother: see **Gestational carrier**.

Testicular sperm aspiration (TESA): procedure in which spermatozoa are obtained directly from the testicle, by either aspiration or surgical excision of testicular tissue.

Zygote: is the diploid cell, resulting from the fertilization of an oocyte by a spermatozoon, which subsequently develops into an embryo.

Zygote intrafallopian transfer (ZIFT): procedure in which the zygote, in its pronuclear stage of development, is transferred into the fallopian tube.

Subject index to table data

Use this index to locate specific information about ART in Australia and New Zealand.

Tables with a prefix 'R' are found in the following pages of this report. Tables with a prefix 'W' are found only on the NPSU's website at <http://www.npsu.unsw.edu.au>.

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Table data

Table R1: Number of treatment cycles started, pregnancies and live deliveries, 1993–2002

Stage of treatment	Year									
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Treatment cycles started	16,999	18,876	20,181	21,739	23,512	25,235	26,592	27,067	28,797	36,483 (30,119)
Cycles with oocyte retrieval	12,050	13,247	13,556	14,337	15,071	15,728	16,461	16,982	18,092	18,506
Cycles with embryo transfer	15,359	16,966	18,337	20,052	21,330	22,829	24,534	24,915	26,556	27,154
Pregnancies	2,738	3,139	3,282	3,706	4,071	4,481	4,988	5,467	6,660	7,577
Live deliveries	2,064	2,318	2,515	2,765	2,932	3,395	3,796	4,253	5,154	5,737
Live born babies	2,506	2,801	3,071	3,355	3,530	4,099	4,658	5,208	6,285	6,816
Pregnancies per ET (%)	*17.8*	*18.5*	*17.9*	*18.5*	*19.1*	*19.6*	*20.3*	*21.9*	*25.1*	*27.9*
Live deliveries per ET (%)	*13.4*	*13.7*	*13.7*	*13.8*	*13.7*	*14.9*	*15.5*	*17.1*	*19.4*	*21.1*

Note: In 2002 the definition of 'treatment cycle' was broadened to include cancelled ART cycles, unsuccessful OPUs and embryo thaws, and donor insemination. For 2002 data, this table includes the total for each definition: the number in brackets reflects the treatment cycles defined as for previous years, the number above this reflects the treatment cycles defined as per the new definition.

Table R2: Number of transfer cycles, by treatment type, 1993–2002

Treatment type		Year									
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Fresh	ICSI	937	2,436	3,778	4,738	5,364	6,038	7,098	7,854	8,499	8,716
	IVF	5,405	5,524	5,295	5,520	5,471	5,685	6,010	6,155	6,871	6,490
	GIFT	3,637	3,012	2,387	2,250	1,858	1,415	1,239	800	341	189
Frozen		4,607	5,238	6,198	6,801	7,723	8,720	9,130	9,117	9,664	10,505
Donor oocytes/embryos		342	391	427	601	718	787	1,001	968	1,041	1,052

Table R3: Proportion of fresh and frozen embryo transfer cycles transferring one, two, three and four or more embryos, 1993–2002

Number of transfer cycles transferring	Year									
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
					Fresh					
One embryo	n.a.	n.a.	n.a.	n.a.	12.6	12.0	12.9	14.4	16.7	24.7
Two embryos	n.a.	n.a.	n.a.	n.a.	51.2	50.5	59.9	63.6	67.9	68.5
Three embryos	n.a.	n.a.	n.a.	n.a.	32.9	33.8	24.7	20.2	13.9	6.4
Four or more embryos	n.a.	n.a.	n.a.	n.a.	3.3	3.7	2.5	1.8	1.5	0.5
Total cycles	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
					Frozen					
One embryo	n.a.	n.a.	n.a.	n.a.	21.3	16.9	12.9	23.1	26.2	34.7
Two embryos	n.a.	n.a.	n.a.	n.a.	59.3	60.0	59.9	66.0	65.3	61.1
Three embryos	n.a.	n.a.	n.a.	n.a.	18.5	22.1	24.7	10.4	8.1	3.9
Four or more embryos	n.a.	n.a.	n.a.	n.a.	0.9	1.0	2.5	0.5	0.4	0.3
Total cycles	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
					All					
One embryo	11.1	13.1	11.8	12.5	15.7	13.8	12.9	17.7	20.3	28.8
Two embryos	33.5	38.1	43.2	49.5	54.1	53.9	59.9	64.5	66.9	65.4
Three embryos	51.9	45.4	42.0	34.5	27.7	29.6	24.7	16.5	11.7	5.4
Four or more embryos	3.4	3.3	3.0	3.5	2.4	2.7	2.4	1.3	1.1	0.4
Total cycles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

n.a. Data about whether embryos were fresh or frozen were not available prior to 1997.

Table R4: Number of embryo transfer cycles and pregnancies, by fresh and frozen embryo type, 1993–2002

Type of ART treatment	Year									
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
					Fresh cycles					
Embryo transfer cycles	6,773	8,325	9,325	10,400	11,031	11,907	13,164	14,036	15,510	15,906
Pregnancies	1,105	1,455	1,688	2,000	2,306	2,610	3,079	3,432	4,602	4,858
Pregnancy per embryo transfer (%)	*16.3*	*17.5*	*18.1*	*19.2*	*20.9*	*21.9*	*23.4*	*24.5*	*29.7*	*30.5*
					Frozen cycles					
Embryo transfer cycles	4,607	5,238	6,198	6,801	7,723	8,720	9,130	9,117	9,664	11,160
Pregnancies	622	811	899	973	1,172	1,348	1,442	1,618	1,812	2,225
Pregnancy per embryo transfer (%)	*13.5*	*15.5*	*14.5*	*14.3*	*15.2*	*15.5*	*15.8*	*17.7*	*18.8*	*19.9*

Table R5: Types of ART procedures, number of cycles started, 2002

Type of ART procedure	Number	Per cent
Fresh non donor	19,883	54.5
Frozen non donor	11,370	31.1
Fresh donor	1,084	3.0
Frozen donor	649	1.8
Donor insemination	3,419	9.4
Not stated	78	0.2
Total cycles	**36,483**	**100.0**

Table R6: Types of fresh ART procedures, number of cycles started, 2002

	Nondonor oocytes/embryos		Donor oocytes/embryos	
Type of fresh ART procedure	**Number**	**Per cent**	**Number**	**Per cent**
IVF	7,348	37.0	219	20.2
ICSI	9,627	48.4	274	25.3
GIFT	189	1.0	—	0.0
Other	2,719*	13.7	583#	53.8
Not stated	—	0.0	8	0.7
Total	**19,883**	**100.0**	**1,084**	**100.0**

Note: *Includes cycles cancelled prior to OPU, cycles that fail to retrieve oocytes, mixed IVF–ICSI cycles; # includes oocyte donations.

Table R7: Types of frozen ART procedures, number of cycles started, 2002

	Non donor oocytes/embryos		Donor oocytes/embryos	
Type of frozen ART procedure	**Number**	**Per cent**	**Number**	**Per cent**
IVF	5,031	44.2	406	62.5
ICSI	5,935	52.2	240	37.0
Not stated	404	3.6	3	0.5
Total cycles	**11,370**	**100.0**	**649**	**100.0**

Table R8: Proportion of fresh and frozen embryo transfer cycles transferring one, two, three, and four or more embryos, by age group, 2002

Number of embryos	Women's age (years)									
	≤24	25–29	30–34	35–39	40–44	≥45	Not stated	All ages	*<38*	*≥38*
					Number					
1	116	907	2,674	2,619	1,314	166	1	7,797	*5,336*	*2,464*
2	212	2,176	6,225	6,214	2,624	258	5	17,714	*12,520*	*5,204*
3	7	54	219	526	579	64	0	1,449	*527*	*923*
≥4	n.p.	n.p.	12	37	48	9	0	111	*38*	*73*
Not stated	n.p.	n.p.	16	24	7	1	25	83	*44*	*14*
Total cycles	**338**	**3,149**	**9,146**	**9,420**	**4,572**	**498**	**31**	**27,154**	***18,465***	***8,678***
					Per cent					
1	34.3	28.8	29.2	27.8	28.7	33.3	3.2	28.7	*28.9*	*28.4*
2	62.7	69.1	68.1	66.0	57.4	51.8	16.1	65.2	*67.8*	*60.0*
3	2.1	1.7	2.4	5.6	12.7	12.9	0.0	5.3	*2.9*	*10.6*
≥4	—	—	0.1	0.4	1.0	1.8	0.0	0.4	*0.2*	*0.8*
Not stated	—	—	0.2	0.3	0.2	0.2	80.6	0.3	*0.2*	*0.2*
Total cycles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	***100.0***	***100.0***

n.p. Not published due to small cell size.

Table R9: Freezing, thawing and storage of embryos, 1994–2002

Status of embryos	Year								
	1994	1995	1996	1997	1998	1999	2000	2001	2002
					Embryo freezing				
No. cycles having embryos frozen	4,404	4,912	6,213	6,391	7,462	8,669	8,819	9,545	9,645
No. embryos frozen	19,563	22,499	26,550	32,327	37,057	39,682	41,413	46,835	44,911
					Embryo thawing				
No. cycles having embryos thawed	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	12,117
No. embryos thawed	14,375	17,313	19,027	22,611	25,521	28,286	29,371	31,194	29,805
No. embryos transferred after thawing	10,581	12,515	13,430	15,959	18,085	18,907	18,362	18,777	19,011
					Removal for other reasons*				
No. embryos removed for other purposes	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	4,192
					Treatment embryos in storage				
Treatment embryos in storage on 31 December	22,280	30,475	41,662	46,322	56,136	65,518	71,176	81,627	92,541

*Including embryos discarded at patient or government request, or embryos donated for research purposes.

n.a. Data not available prior to 2002.

Table R10: Women's age at time of treatment, by treatment type, 2002

Maternal age group	Non donor oocytes/embryos				Donor oocytes/ embryos	DI	Not stated	All
	Fresh all	Fresh ICSI	Fresh IVF	Frozen				
				Number				
≤24	266	154	75	135	n.p.	60	n.p.	468
25–29	2,213	1,182	751	1,382	74	475	9	4,153
30–34	6,131	3,048	2,373	4,223	199	922	25	11,500
35–39	6,935	3,316	2,585	4,014	316	1,228	31	12,524
40–44	3,971	1,780	1,457	1,512	382	652	9	6,526
≥45	344	139	101	95	262	68	0	765
Not stated	23	8	6	9	n.p.	14	n.p.	547
Total cycles	**19,883**	**9,627**	**7,348**	**11,370**	**1,733**	**3,419**	**78**	**36,483**
Mean age	35.3	35.0	35.3	34.5	39.4	35.1	—	35.2
				Per cent				
≤24	1.3	1.6	1.0	1.2	—	1.8	—	1.3
25–29	11.1	12.3	10.2	12.2	4.3	13.9	—	11.4
30–34	30.8	31.7	32.3	37.1	11.5	27.0	—	31.5
35–39	34.9	34.4	35.2	35.3	18.2	35.9	—	34.3
40–44	20.0	18.5	19.8	13.3	22.0	19.1	—	17.9
≥45	1.7	1.4	1.4	0.8	15.1	2.0	—	2.1
Not stated	0.1	0.1	0.1	0.1	—	0.4	—	1.5
Total cycles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	—	**100.0**

Note: Data are collected on a per treatment cycle basis and not on a per patient basis. Therefore, some individuals may be counted several times.

n.p. Not published due to small cell size.

Table R11: Men's age at time of treatment, by treatment type, 2002

Paternal age group	Non donor oocytes/embryos				Donor oocytes/ embryos	DI	Not stated	All
	Fresh all	Fresh ICSI	Fresh IVF	Frozen				
				Number				
≤24	72	36	26	38	n.p.	28	n.p.	139
25–29	1,229	595	459	680	50	184	8	2,151
30–34	4,677	2,141	1,899	2,868	157	426	11	8,139
35–39	5,517	2,553	2,202	3,405	322	507	17	9,768
40–44	3,851	1,889	1,321	1,986	272	351	22	6,482
≥45	2,374	1,383	593	1,188	219	328	4	4,113
Not stated/single female	2,163	1,030	848	1,205	n.p.	1,595	n.p.	5,691
Total cycles	**19,883**	**9,627**	**7,348**	**11,370**	**1,733**	**3,419**	**78**	**36,483**
Mean age	37.7	38.1	36.9	37.3	39.8	38.0	—	37.6
				Per cent				
≤24	0.4	0.4	0.4	0.3	—	0.8	—	0.4
25–29	6.2	6.2	6.2	6.0	2.9	5.4	—	5.9
30–34	23.5	22.2	25.8	25.2	9.1	12.5	—	22.3
35–39	27.7	26.5	30.0	29.9	18.6	14.8	—	26.8
40–44	19.4	19.6	18.0	17.5	15.7	10.3	—	17.8
≥45	11.9	14.4	8.1	10.4	12.6	9.6	—	11.3
Not stated/single female	10.9	10.7	11.5	10.6	—	46.7	—	15.6
Total cycles	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	—	**100.0**

Note: Data are collected on a per treatment cycle basis and not on a per patient basis. Therefore, some individuals may be counted several times.

n.p. Not published due to small cell size.

Table R12: Success of ART treatment, by treatment type, 2002

Stage of treatment	Non donor oocytes/embryos				Donor oocytes/embryos				
	Fresh all	Fresh ICSI	Fresh IVF	Froz	Fresh all	Fresh ICSI	Fresh IVF	Froz	DI
Cycles started	19,883	n.a.	n.a.	11,370	n.a.	n.a.	n.a.	649	3,419
Oocyte retrievals	17,877	9,625	7,347	n.a.	531	n.a.	n.a.	n.a.	n.a.
Embryo transfers	15,482	8,716	6,490	10,505	425	230	173	627	n.a.
Pregnancies	4,739	2,575	2,028	2,086	160	81	69	134	435
Live deliveries	3,640	1,986	1,557	1,554	119	64	48	91	340
Live delivery per cycle started (%)	*18.3*	*n.a.*	*n.a*	*13.7*	*n.a.*	*n.a.*	*n.a.*	*14.0*	*9.9*
Live delivery per OPU (%)	*20.4*	*20.6*	*21.2*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
Live delivery per embryo transfer (%)	*23.5*	*22.8*	*24.0*	*14.8*	*28.0*	*27.8*	*27.7*	*14.5*	*n.a.*

Table R13: Outcome by stage of treatment for fresh non donor ART treatment, by women's age group, 2002

	Women's age (years)							
Stage of treatment	**≤24**	**25–29**	**30–34**	**35–39**	**40–44**	**≥45**	**Not stated**	**All**
Cycles started	266	2,213	6,131	6,935	3,971	344	23	19,883
Oocyte retrievals	239	2,054	5,660	6,192	3,443	272	17	17,877
Embryo transfers	204	1,781	5,014	5,432	2,849	186	16	15,482
Pregnancies	74	689	1,880	1,656	432	4	4	4,739
Live deliveries	60	574	1,514	1,243	244	n.p.	n.p.	3,640
Pregnancy per cycles started (%)	*27.8*	*31.1*	*30.7*	*23.9*	*10.9*	*1.2*	—	*23.8*
Live deliveries per cycle started (%)	*22.6*	*25.9*	*24.7*	*17.9*	*6.1*	*n.p.*	—	*18.3*
Live delivery per OPU (%)	*25.1*	*27.9*	*26.7*	*20.1*	*7.1*	*n.p.*	—	*20.4*
Live delivery per ET (%)	*29.4*	*32.2*	*30.2*	*22.9*	*8.6*	*n.p.*	—	*23.5*
Live delivery per pregnancy (%)	*81.1*	*83.3*	*80.5*	*75.1*	*56.5*	*n.p.*	—	*76.8*

n.p. Not published due to small cell size.

Table R14: Success for fresh non donor ART treatment, by grouped fertility centres, 2002

Fertility centre ranking	**First quartile**	**Second quartile**	**Third quartile**	**Fourth quartile**	**All**
Includes centres that achieved a live delivery per cycle started (%) of:	21.8–27.3	17.3–21.7	14.9–17.2	<14.8	
Number of fertility centres in this range	7	7	6	7	27
Combined number of:					Total
Cycles started	5,412	4,493	7,470	2,508	19,883
Oocyte retrievals	5,134	4,102	6,529	2,112	17,877
Embryo transfers	4,532	3,617	5,679	1,654	15,482
Pregnancies	1,697	1,115	1,502	425	4,739
Live deliveries	1,307	855	1,157	321	3,640
Pregnancy per cycles started (%)	*31.4*	*24.8*	*20.1*	*16.9*	*23.8*
Live deliveries per cycle started (%)	*24.2*	*19.0*	*15.4*	*12.8*	*18.3*
Live delivery per OPU (%)	*25.5*	*20.8*	*17.7*	*15.2*	*20.4*
Live delivery per ET (%)	*28.8*	*23.6*	*20.4*	*19.4*	*23.5*
Mean age of female patients (years)	35.2	35.3	35.4	35.1	35.3

Notes

1. The first quartile represents the seven fertility centres with the highest success rates. The fourth quartile represents the seven fertility centres with the lowest success rates.
2. One fertility centre missing from all calculations.

Table R15: Success for frozen non donor ART treatment, by grouped fertility centres, 2002

Fertility centre ranking	First quartile	Second quartile	Third quartile	Fourth quartile	All
Includes centres that achieved a live delivery per cycle started (%) of:	17.2–23.3	14.5–17.1	11.4–14.4	<11.3	
Number of fertility centres in this range	7	6	6	7	26
Combined number of:					Total
Cycles started	613	3,822	3,685	3,249	11,370[(a)]
Embryo transfers	605	3,601	3,395	2,903	10,505
Pregnancies	179	866	623	418	2,086
Live deliveries	120	625	482	327	1,554
Pregnancy per cycles started (%)	*29.2*	*22.7*	*16.9*	*12.9*	*18.3*
Live deliveries per cycle started (%)	*19.6*	*16.4*	*13.1*	*10.1*	*13.7*
Live delivery per ET (%)	*19.8*	*17.4*	*14.2*	*11.3*	*14.8*
Mean age of female patients (years)	34.0	34.8	34.5	34.2	34.5

(a) Includes one cycle with clinic identifier not stated.

Notes

1. The first quartile represents the seven fertility centres with the highest success rates. The fourth quartile represents the seven fertility centres with the lowest success rates.
2. One fertility centre missing from all calculations.

Table R16: Cases of ovarian hyperstimulation syndrome (OHSS), by number of oocytes collected, 2002

	Number of oocytes collected							
	≤4	5–6	7–8	9–10	11–12	13–14	15+	All
OPUs with OHSS	6	9	19	20	27	17	94	192
All OPUs	4,006	2,576	2,519	2,269	1,842	1,367	3,607	18,186
% with OHSS	0.15	0.35	0.75	0.88	1.47	1.24	2.61	1.06

Table R17: Incidence of singleton, twin and higher order pregnancies, 1993–2002

Year	Singleton delivery		Twin delivery		Triplet delivery		Total deliveries
	Number	Per cent	Number	Per cent	Number	Per cent	
1993	1,666	80.0	375	18.0	41	2.0	**2,082**
1994	1,903	80.6	403	17.1	56	2.4	**2,362**
1995	2,043	79.9	465	18.2	49	1.9	**2,557**
1996	2,250	80.1	508	18.1	52	1.9	**2,810**
1997	2,480	79.4	591	18.9	51	1.6	**3,122**
1998	2,748	79.9	645	18.8	47	1.4	**3,440**
1999	3,014	78.2	789	20.5	50	1.3	**3,853**
2000	3,335	78.0	901	21.1	42	1.0	**4,278**
2001	4,087	78.3	1,097	21.0	35	0.7	**5,219**
2002	4,748	81.1	1,070	18.3	33	0.6	**5,851**

Table R18: Outcome of ART pregnancies, by treatment type, 2002

Pregnancy outcome	Non donor oocytes/embryos				Donor oocytes /embryo	DI	Not stated	All
	Fresh all	Fresh ICSI	Fresh IVF	Frozen				
				Number				
Live birth singleton	2,836	1,555	1,204	1,344	166	315	15	4,676
Live birth multiple	798	426	350	209	43	24	3	1,077
Miscarriage	841	453	361	407	63	64	4	1,379
Stillbirth	33	19	14	10	n.p.	n.p.	0	49
Neonatal death	18	6	11	5	0	0	0	23
Reduction or termination	44	26	17	10	n.p.	n.p.	0	58
Ectopic or heterotopic pregnancy	84	43	36	43	9	8	1	145
Not stated	85	47	36	58	8	19	0	170
Total pregnancies	**4,739**	**2,575**	**2,028**	**2,086**	**294**	**435**	**23**	**7,577**
				Per cent				
Live birth singleton	59.8	60.4	59.4	64.4	56.5	72.4	65.2	61.7
Live birth multiple	16.8	16.5	17.3	10.0	14.6	5.5	13.0	14.2
Miscarriage	17.7	17.6	17.8	19.5	21.4	14.7	17.4	18.2
Stillbirth	0.7	0.7	0.7	0.5	—	—	0.0	0.6
Neonatal death	0.4	0.2	0.5	0.2	0.0	0.0	0.0	0.3
Reduction or termination	0.9	1.0	0.8	0.5	—	—	0.0	0.8
Ectopic or heterotopic pregnancy	1.8	1.7	1.8	2.1	3.1	1.8	4.3	1.9
Not stated	1.8	1.8	1.8	2.8	2.7	4.4	0.0	2.2
Total pregnancies	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

n.p. Not published due to small cell size.

Table R19: Total number of pregnancies and live deliveries, by maternal age, 2002

	Women's age (years)								
	<20	20–24	25–29	30–34	35–39	40–44	≥45	Not stated	Total
Pregnancies	4	104	1,070	2,958	2,614	738	81	8	7,577
Per cent of total	0.1	1.4	14.1	39.0	34.5	9.7	1.1	0.1	100.0
Live deliveries	4	79	870	2,348	1,937	435	58	6	5,737
Per cent of total	0.1	1.4	15.2	40.9	33.8	7.6	1.0	0.1	100.0
Live delivery per pregnancy (%)	*100.0*	*76.0*	*81.3*	*79.4*	*74.1*	*58.9*	*71.6*	—	*75.7*

Table R20: Method of delivery for all pregnancies ≥20 weeks gestation, by plurality, 2002

	Method of delivery						
	Caesarean section		Other		Not stated		Total deliveries
Plurality	Number	Per cent	Number	Per cent	Number	Per cent	
Singleton	2,015	42.4	2,701	56.9	32	0.7	4,748
Twin	761	71.1	n.p.	—	n.p.	—	1,070
Triplet	31	93.9	n.p.	—	n.p.	—	33
Total deliveries	**2,807**	48.0	**3,005**	51.4	**39**	0.7	**5,851**

n.p. not published due to small cell size.

Table R21: Method of delivery for all pregnancies ≥20 weeks gestation, by maternal age, 2002

	Maternal age (years)										
Method of delivery	<20	20–24	25–29	30–34	35–39	40–44	≥45	Not stated	Total	*<38*	*≥38*
					Number						
Caesarean	0	32	364	1,096	998	272	41	4	2,807	*2,153*	*650*
Other	4	50	521	1,278	963	169	17	3	3,005	*2,495*	*507*
Not stated	0	1	6	18	11	3	0	0	39	*30*	*9*
Total deliveries	**4**	**83**	**891**	**2,392**	**1,972**	**444**	**58**	**7**	**5,851**	***4,678***	***1,166***
					Per cent						
Caesarean	0.0	38.6	40.9	45.8	50.6	61.3	70.7	57.1	48.0	*46.0*	*55.7*
Other	100.0	60.2	58.5	53.4	48.8	38.1	29.3	42.9	51.4	*53.3*	*43.5*
Not stated	0.0	1.2	0.7	0.8	0.6	0.7	0.0	0.0	0.7	*0.6*	*0.8*
Total deliveries	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	***100.0***	***100.0***

Table R22: Gestational age for all babies of ≥20 weeks, by plurality, 2002

Gestational age (weeks)	Singletons		Twins		Triplets		Total babies	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
20–27	62	1.3	108	5.0	15	15.2	185	2.6
28–31	60	1.3	150	7.0	33	33.3	243	3.5
32–36	403	8.5	1,022	47.8	51	51.5	1,476	21.1
20–36	*525*	*11.1*	*1,280*	*59.8*	*99*	*100.0*	*1,904*	*27.3*
≥37	4,223	88.9	860	40.2	0	0.0	5,083	72.7
Total babies	**4,748**	**100.0**	**2,140**	**100.0**	**99**	**100.0**	**6,987**	**100.0**
Mean gestational age	38.4		35.0		30.5		37.2	

Table R23: Birthweight for all babies of ≥20 weeks gestation, by plurality, 2002

Birthweight (g)	Singleton		Twin		Triplet		Total babies	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
<1,000	68	1.4	82	3.8	23	23.2	173	2.5
1,000–1,499	37	0.8	107	5.0	26	26.3	170	2.4
1,500–1,999	79	1.7	278	13.0	31	31.3	388	5.6
2,000–2,499	203	4.3	570	26.6	12	12.1	784	11.2
<2,500	*387*	*8.2*	*1,036*	*48.4*	*92*	*92.9*	*1,515*	*21.7*
2,500–2,999	796	16.8	745	35.8	3	3.0	1,554	22.1
3,000–3,499	1,722	36.3	n.p.	—	n.p.	—	2,000	28.6
3,500–3,999	1,330	28.0	30	1.4	0	0.0	1,360	19.5
≥4,000	444	9.4	4	0.2	0	0.0	448	6.4
Not stated	69	1.5	n.p.	—	n.p.	—	120	1.7
Total babies	**4,748**	**100.0**	**2,140**	**100.0**	**99**	**100.0**	**6,987**	**100.0**
Mean birthweight	3,279		2,397		1,477		2,985	

n.p. Not published due to small cell size.

Table R24: Sex of all babies of ≥ 20 weeks gestation, by treatment type, 2002

	Non donor oocytes/embryos				Donor oocytes/ embryos	DI	Not stated	All
	Fresh all	Fresh IVF	Fresh ICSI	Frozen				
				Number				
Male	2,331	1,044	1,229	861	144	194	13	3,543
Female	2,190	899	1,226	914	109	164	9	3,386
Not stated	32	18	14	21	2	3	0	58
Total babies	4,553	1,961	2,469	1,796	255	361	22	6,987
				Per cent				
Male	51.2	53.2	49.8	47.9	56.5	53.7	—	50.7
Female	48.1	45.8	49.7	50.9	42.7	45.4	—	48.5
Ratio	*106.4*	*116.1*	*100.2*	*94.2*	*132.1*	*118.3*	—	*104.6*

Table R25: Perinatal mortality of all babies of ≥ 20 weeks gestation or 400 grams, by plurality, 2002

Birth outcome	Singleton	Twin	Triplet	Total births
Live births	4,679	2,071	92	6,842
Still births	34	n.p.	n.p.	81
Neonatal deaths	18	n.p.	n.p.	40
Not stated	36	n.p.	n.p.	51
Total births	**4,767**	**2,148**	**99**	**7,014**
Perinatal deaths	52	63	6	121
Stillbirths per 1,000 births	7.1	20.9	20.2	11.5
Neonatal deaths per 1,000 births	3.8	8.4	40.4	5.7
Perinatal deaths per 1,000 births	10.9	29.3	60.6	17.3

n.p. Not published due to small cell size.

ANZARD data items

Item name	Description	Codes
unit	Unit identifier	
site	Site of main treatment	For centres with multiple sites, this identifies location of most significant part of the treatment.
pat_id	Unit ID/Medical Record Number	Unique ID for patient.
mdob	Woman's date of birth	Day/month/year.
pdob	Husband/male partner DOB	Day/month/year.
don_age	Egg/embryo donor's age	Completed years at time of donation.
n_13200	Previous Medicare item 13200s	The number of billed Australian Medicare item 13200. New Zealand units leave this field blank.
ci_tube	Cause of Infertility: tubal disease	Yes—in the opinion of the treating clinician or clinic there is significant tubal disease present.
		No—other.
ci_endo	Cause of Infertility: endometriosis	Yes—in the opinion of the treating clinician or clinic there is significant endometriosis contributing to this couple's subfertility.
		No—other.
ci_male	Cause of infertility: male factor	Yes—in the opinion of the treating clinician or clinic there is a significant male factor problem.
		No—other.
ci_oth	Cause of infertility: other factors	Yes—in the opinion of the treating clinician or clinic there is subfertility due to any other factors apart from female age, tubal disease, male factor or endometriosis. Possible examples could include fibroids, ovulation disorders or premature ovarian failure. If there is no clinical subfertility (e.g. egg donor, preimplantation genetic diagnosis or other non-fertility reason for ART).
		No—other.
ci_unex	Cause of infertility: idiopathic	Yes—in the opinion of the treating clinician or clinic there is clinical subfertility without any apparent explanation.
		No—other, including case of PGD for genetic disease.
n_prless	Previous pregnancies <20 weeks	Number of known pregnancies less than 20 weeks in the female partner regardless of whether by ART or by a different partner.
n_prmore	Previous pregnancies >=20 weeks	Number of known pregnancies reaching 20 weeks or more in the female partner regardless of whether by ART or by a different partner.
cycle_id	Cycle ID	Unique cycle identifier.
cyc_date	Cycle date	The date of LMP for unstimulated cycles or, where FSH is used, the first day of FSH administration. For cycles where the only process is movement or disposal of embryos, this is the date of embryo movement. This date defines the year in which a cycle is reported to NPSU.
surr	Surrogacy	Yes—the procedure is part of a surrogate arrangement.
		No—the procedure is not part of a surrogate arrangement.
ov_stim	Injectable FSH stimulation given	Yes—FSH administered. Does not include clomiphene or hCG alone unless FSH was also given.
		No—other.
di_insem	DI date	Date of first donor insemination.
opu_date	OPU date	Date of oocyte retrieval.

Item name	Description	Codes
n_eggs	Number of eggs retrieved	Number of eggs retrieved at OPU. Include any immature oocytes that are identified.
n_donate	Number of eggs donated	Number of eggs donated to someone else.
n_recvd	Number of eggs received	Number of eggs received from someone else.
n_gift	Number of eggs GIFT	Number of eggs replaced in a GIFT procedure.
n_insem	Number of eggs IVF	Number of eggs treated with IVF.
n_icsi	Number of eggs ICSI	Number of eggs treated with ICSI.
sp_site	Site of sperm used	Site of sperm extraction: ejaculated, epididymal (whether by open biopsy or by PESA), testicular or other.
sp_persn	Person from which sperm derives	Husband/partner, known donor, or anonymous donor.
n_fert	Number of eggs fertilised normally	The number of eggs fertilised normally in the opinion of the treating embryologist.
pgd	Preimplantation genetic diagnosis	Yes —preimplantation genetic diagnosis in any form (including aneuploidy screening or sex selection) has been performed on any of the embryos (transferred or not).
		No—pgd not performed.
ass_hatc	Assisted hatching	Yes—where assisted hatching in any form has been performed on any of the embryos (transferred or not).
		No—assisted hatching not performed.
emrecimp	Number of embryos received from someone else or imported into the unit	To minimise the number of required fields in the data collection, this field serves two purposes: 1. Records the number of embryos that are to be received from donation (recipient cycle); or 2. Records the number of embryos to be imported into the current unit from another unit.
n_clthaw	Number of cleavage embryos thawed	Number of zygotes or cleavage stage embryos (up to 4 days) thawed with intention of performing an embryo transfer if they survive.
n_blthaw	Number of blastocysts thawed	Number of blastocysts (i.e. greater than 4 days culture from fertilisation) thawed with intention of performing an embryo transfer if they survive.
et_date	ET date	Embryo transfer date.
n_emb_et	Number of early embryos transferred	Number of zygote or cleavage stage embryos (i.e. up to 4 days since fertilisation) transferred.
n_bl_et	Number of blastocysts transferred	Number of blastocyst embryos (i.e. >4 days since fertilisation) transferred.
emb_icsi	Any embryos ICSI?	Yes— any embryos transferred were fertilised by ICSI.
		No— no transferred embryos were fertilised by ICSI.
n_clfroz	Number of zygotes/cleavage stage embryos frozen	Number of zygote or cleavage stage embryos (i.e. up to 4 days since fertilisation) frozen.
n_blfroz	Number of blastocysts frozen	Number of blastocyst embryos (i.e. >4 days since fertilisation) frozen.
emdonexp	Number of embryos donated to someone else or exported from the unit of treatment	To minimise the number of required fields in the data collection, this field serves two purposes: 1. Records the number of embryos that are to be donated to someone else (donor cycle); or 2. Records the number of embryos to be exported from the current unit to another unit.
emb_disp	Number of potentially usable frozen embryos discarded	Potentially usable embryos disposed of in accordance with patient or government request.
pr_clin	Clinical pregnancy	A pregnancy that fulfils one of the following criteria: 1. known to be ongoing at 20 weeks; 2. evidence by ultrasound of an intrauterine sac (with or without a foetal heart); 3. examination of products of conception reveal chorionic villi; or 4. a definite ectopic pregnancy that has been diagnosed laparoscopically or by ultrasound.
pr_end_dt	Date pregnancy ended	Date on which delivery, miscarriage or termination takes place.
n_fh	Number of foetal hearts	Number of foetal hearts seen on first ultrasound (intrauterine only).

Item name	Description	Codes
pr_ectop	Ectopic pregnancy	Yes— pregnancy is an ectopic pregnancy, or a combined ectopic and uterine (heterotopic) pregnancy.
		No— pregnancy not ectopic or heterotopic.
pr_top	Elective termination of pregnancy	Yes— pregnancy is terminated.
		No— pregnancy not terminated.
pr_reduc	Selective reduction performed	Yes— selective reduction was performed due to foetal abnormality.
		No— selective reduction not performed.
abn_less	Foetal abnormality in a pregnancy ending <20 weeks or in a foetus removed by selective reduction	Details of elective terminations of pregnancy and foetal reductions due to foetal abnormality.
mat_comp	Maternal complications of pregnancy	Describes morbidity related to pregnancy.
n_deliv	Number of babies delivered after 20 weeks	Include all live born and stillborn babies.
CS	Caesarean delivery	Yes— delivery by planned or emergency Caesarean section.
		No— other.
bab1_out	Baby 1 outcome	Live born, stillborn or neonatal death.
bab1_sex	Baby 1 sex	Male or female.
bab1_wt	Baby 1 birthweight	Weight in grams.
bab1_abn	Baby 1 abnormality	Describes any known congenital malformation.
bab1_nnd	Baby 1 date of neonatal death	Date of neonatal death.
bab2_out	Baby 2 outcome	Live born, stillborn or neonatal death.
bab2_sex	Baby 2 sex	Male or female.
bab2_wt	Baby 2 weight	Weight in grams.
bab2_abn	Baby 2 abnormality	Describes any known congenital malformation.
bab2_nnd	Baby 2 date of neonatal death	Date of neonatal death.
bab3_out	Baby 3 outcome	Live born, stillborn or neonatal death.
bab3_sex	Baby 3 sex	Male or female.
bab3_wt	Baby 3 weight	Weight in grams.
bab3_abn	Baby 3 abnormality	Describes any known congenital malformation.
bab3_nnd	Baby 3 date of neonatal death	Date of neonatal death.
bab4_out	Baby 4 outcome	Live born, stillborn or neonatal death.
bab4_sex	Baby 4 sex	Male or female.
bab4_wt	Baby 4 weight	Weight in grams.
bab4_abn	Baby 4 abnormality	Describes any known congenital malformation.
bab4_nnd	Baby 4 date of neonatal death	Date of neonatal death.
morb_adm	Admitted with ART morbidity	Yes— woman is admitted to hospital with any condition (excluding any pregnancy-related issues, such as ectopic pregnancy) that could be in any way related to fertility treatment.
mrb_ohss	OHSS	Yes— admission to hospital is due to symptoms of OHSS.
morb_inf	Morbidity detail	Describes symptoms of treatment-related morbidity.

References

AIHW: Dean J & Sullivan E 2003. Assisted conception in Australia and New Zealand 2000 and 2001. AIHW Cat. No. PER 22. Sydney: Australian Institute of Health and Welfare National Perinatal Statistics Unit (Assisted Conception Series no. 7).

AIHW: Laws P & Sullivan E 2004. Australia's mothers and babies 2001. AIHW Cat. No. PER 25. Canberra: AIHW National Perinatal Statistics Unit (Perinatal Statistics Series no. 13).

Min JK, Breheny SA, MacLachlan V, Healy DL 2004. What is the most relevant standard of success in assisted reproduction? The singleton, term gestation, live birth rate per cycle initiated: the BESST endpoint for assisted reproduction. Human Reproduction 19(1):3–7.