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Assisted reproductive technology in Australia and New Zealand 2012

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Assisted reproductive technology in Australia and New Zealand 2012

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UNSW Australia

The National Perinatal Epidemiology and Statistics Unit (NPESU) aims to provide national information and statistics in reproductive and perinatal health.

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Contents

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Abbreviations

ANZARD	Australian and New Zealand Assisted Reproduction Database
ART	assisted reproductive technology
DET	double embryo transfer
DI	donor sperm insemination
FSA	Fertility Society of Australia
FSH	follicle stimulating hormone
GIFT	gamete intrafallopian transfer
ICSI	intracytoplasmic sperm injection
IVF	in vitro fertilisation
NPESU	National Perinatal Epidemiology and Statistics Unit
OHSS	ovarian hyperstimulation syndrome
OPU	oocyte pick-up
PGD	preimplantation genetic diagnosis
SET	single embryo transfer
SLK	statistical linkage key
UNSW	University of New South Wales
WHO	World Health Organization

Symbols

–	not applicable

Summary

Use of assisted reproductive technology treatment

There were 70,082 assisted reproductive technology (ART) treatment cycles performed in Australia and New Zealand in 2012 (64,905 and 5,177 respectively), representing an increase of 5.8% for Australia and a decrease of 0.2% for New Zealand on 2011. This represented 13.7 cycles per 1,000 women of reproductive age (15–44 years) in Australia, compared with 5.7 cycles per 1,000 women of reproductive age in New Zealand. Women used their own oocytes or embryos (autologous) in 95.2% of treatments, and 34.8% of all cycles used frozen/thawed embryos.

There were 36,171 women who undertook 66,710 autologous fresh and/or thaw cycles in Australia and New Zealand in 2012. On average, 1.8 cycles per woman were undertaken in 2012, with more cycles per woman in Australia (1.9 cycles per woman) than in New Zealand (1.5 cycles per woman). There was a marked increase in cycles where preimplantation genetic diagnosis was performed, from 2.0% of cycles in 2011 to 3.7% of cycles in 2012.

Women's age

The average age of women undergoing autologous cycles was 35.8. In contrast, the average age of women undergoing ART treatment using donor oocytes or embryos was approximately five years older at 40.5. Approximately one in four (25.3%) women who underwent an autologous cycle in 2012 was aged 40 or older. The average age of male partners was 38.2, with one-third (35.4%) aged 40 or older.

Treatment outcomes and number of babies

Of the 70,082 initiated cycles, 23.9% resulted in a clinical pregnancy, and 17.9% in a live delivery (the birth of at least one liveborn baby). The live delivery rate per initiated fresh cycle was 16.7% and per fresh embryo transfer cycle was 22.8%. The live delivery rate per initiated thaw cycle was 20.5% and per thaw embryo transfer cycle was 22.2%.

There was a higher live delivery rate in younger women. For women aged under 30, the live delivery rate was 26.0% for both autologous fresh and thaw cycles. For women aged over 44, the live delivery rate was 0.9% and 4.6% for autologous fresh and thaw cycles respectively.

There were 13,590 babies born (including 13,312 liveborn babies) following ART treatment in 2012. Of these, 12,304 (90.5%) were from Australian clinics and 1,286 (9.5%) from New Zealand clinics. Over three-quarters of the liveborn babies (76.4%) were full-term singletons of normal birthweight.

Cycle-specific success rates

Since 2009, ANZARD has included data items that make it possible to follow a woman's successive ART treatment cycles. A cohort of 16,565 women was followed from the start of their first autologous fresh cycle during 2009, through subsequent fresh and thaw cycles until December 2012 or until they achieved a live delivery. The cycle-specific live delivery rate for all women was 21.1% in their first cycle, and apart from an initial drop from cycle one to cycle two, the live delivery rate remained stable at around 14–17% for the next seven cycles. One-quarter of women did not proceed with a subsequent treatment cycle when they did not achieve a live birth.

Trends in ART procedures

In the last five years there has been a shift from day 2–3 embryo (cleavage stage) transfers to day 5–6 embryo (blastocyst) transfers and an increased use of intracytoplasmic sperm injection (ICSI). The proportion of blastocyst transfer cycles increased from 42.0% in 2008 to 59.8% in 2012, and the proportion of ART treatment cycles that used ICSI increased from 59.1% of cycles in 2008 to 64.7% in 2012.

The proportion of fresh cycles that reached embryo transfer has decreased from 76.6% to 72.0% of initiated cycles in the last five years. The proportion of ART cycles involving thaw embryos remained stable in the last five years at around 36% of initiated cycles. In the last five years the live delivery rate per initiated fresh cycle ranged from 16.4% to 18.1%, while the live delivery rate per initiated thaw cycle increased from 16.3% to 20.3%.

Multiple birth trends

A continuing trend in ART treatment in Australia and New Zealand has been the reduction in the rate of multiple deliveries, with a decrease from 8.4% in 2008 to 6.5% (6.6% for Australia and 5.2% for New Zealand) in 2012. This was achieved by clinicians and patients shifting to single embryo transfer, with the proportion increasing from 67.8% in 2008 to 76.3% in 2012. Importantly, this decrease in the multiple delivery rate was achieved while clinical pregnancy rates remained stable at around 23% per initiated cycle.

1 Introduction

It is estimated that around 9% of couples at any given time experience infertility, representing the source of much personal suffering to millions around the world (Boivin et al. 2007). The common medical definition of 'infertility' is the failure to achieve a clinical pregnancy after 12 or more months of regular unprotected sexual intercourse (Zegers-Hochschild et al. 2009). Infertility is increasingly being overcome through advancements in fertility treatment, in particular assisted reproductive technologies (ARTs). ARTs have evolved over the last three decades into a suite of mainstream medical interventions that have resulted in the birth of more than 5 million children worldwide (ICMART 2012). The most recent national estimates indicate that 3.8% of all women who gave birth in Australia in 2011 received some form of ART treatment (Li et al. 2013).

The purpose of this annual report is to inform clinicians, researchers, government and the community about ART treatment and the resulting pregnancy and birth outcomes; to provide ongoing monitoring of ART treatment practices, success rates and perinatal outcomes; and to provide information for national and international comparisons.

The Fertility Society of Australia (FSA), in collaboration with the University of New South Wales (UNSW), is committed to providing informative annual statistics on ART treatments and is pleased to present the 2012 annual report on the use of ART in Australia and New Zealand.

Treatments covered in this report

ART is a group of procedures that involve the in vitro (outside of body) handling of human oocytes (eggs) and sperm or embryos for the purposes of establishing a pregnancy (Zegers-Hochschild et al. 2009). A typical fresh in vitro fertilisation (IVF) cycle involves the following five steps:

1. controlled ovarian hyperstimulation during which an ovarian stimulation regimen, typically using follicle stimulating hormone (FSH), is administered to a woman over a number of days to induce the maturation of multiple oocytes
2. oocyte pick-up (OPU) where mature oocytes are aspirated from ovarian follicles
3. fertilisation of the collected oocytes by incubating them with sperm (from the woman's partner or donor) over a few hours in the laboratory
4. embryo maturation during which a fertilised oocyte is cultured for 2–3 days to form a cleavage stage embryo (6–8 cells) or 5–6 days to create a blastocyst (60–100 cells)
5. transfer of one or more fresh embryos into the uterus in order to achieve pregnancy.

Treatment may be discontinued at any stage during a treatment cycle due to a number of reasons including inadequate response of ovaries to medication, excessive ovarian stimulation, failure to obtain oocytes, failure of oocyte fertilisation, inadequate embryo growth or patient choice.

Over the last three decades, ART has evolved to encompass complex ovarian hyperstimulation protocols and numerous variations to the typical fresh IVF treatment cycle described above. Some of these variations include:

- intracytoplasmic sperm injection (ICSI), when a single sperm is injected directly into the oocyte
- assisted hatching, when the outer layer of the embryo, the zona pellucida, is either thinned or perforated in the laboratory to aid 'hatching' of the embryo

- gamete intrafallopian transfer (GIFT), when mature oocytes and sperm are placed directly into a woman's fallopian tubes so that fertilisation may take place in vivo (inside the body). While once popular, this procedure now accounts for only a very small percentage of ART cycles
- preimplantation genetic diagnosis (PGD), when one or more cells are removed from the embryo and analysed for chromosomal disorders or genetic diseases
- oocyte donation, when a woman donates her oocytes to others
- oocyte/emrbyo recipient, when a woman receives oocytes or embryos from another woman
- cryopreservation and storage of embryos that are not transferred in the initial fresh treatment cycle. Once thawed or warmed, the embryos can be transferred in subsequent treatment cycles. Cryopreservation techniques include both the traditional slow freezing method and a newer technique called 'vitrification'. Vitrification can be used to cryopreserve gametes and embryos, and uses an ultra-rapid temperature change with exposure to higher concentrations of cryoprotectants
- cryopreservation and storage of oocytes and embryos for fertility preservation
- surrogacy arrangements, where a woman, known as the 'gestational carrier', agrees to carry a child for another person or couple, known as the 'intended parent(s)', with the intention that the child will be raised by the intended parent(s).

Along with ART, a number of other fertility treatments are undertaken in Australia and New Zealand. Artificial insemination is one such treatment by which sperm are placed into the female genital tract (for example, intracervical or intrauterine), and can be used with controlled ovarian hyperstimulation or in natural cycles. Artificial insemination can be undertaken using a partner's sperm, or donated sperm, also known as 'donor sperm insemination' (DI).

Data used in this report

This report provides information on ART and DI treatments and the resulting pregnancy and birth outcomes. Also included is an analysis of trends in ART treatments and outcomes in the five years from 2008 to 2012.

As a joint initiative of the NPESU at UNSW and FSA, the Australian and New Zealand Assisted Reproduction Database (ANZARD) was upgraded in 2009 to accommodate new ART treatment types and to transform ANZARD from a cycle-based data collection to a woman-based data collection (ANZARD2.0). A more detailed description of ANZARD2.0 can be found in Appendices B and C. The expanded treatment information in the collection includes data fields for oocyte/embryo vitrification, and duration of oocytes and embryos in storage. The upgrade to a woman-based data collection was achieved by introducing a statistical linkage key (SLK) that links successive treatment cycles undertaken by one woman. The SLK is a combination of the first two letters of a woman's first name, the first two letters of her surname and her date of birth. The SLK enables the number of women undergoing treatment across time to be reported. The 2012 annual report presents cycle-specific success rates for women who started their first autologous fresh cycle during 2009. These women were followed from the start of their first autologous fresh cycle through subsequent fresh and thaw cycles until 31 December 2012, or until they achieved a live delivery (a delivery of at least one liveborn baby) up to and including 31 October 2012.

The 2012 data presented in this report were supplied by all 37 fertility centres (73 fertility clinics in Australia and seven fertility clinics in New Zealand), and compiled into ANZARD2.0.

Note: The 2008 ANZARD data have been updated to correct the errors relating to misclassification of cleavage and blastocyst transfers. In this report, the numbers and percentages of cleavage embryo and blastocyst transfer cycles for 2008 are different from previous annual reports.

Structure of this report

This report has nine chapters, including this introductory chapter (Chapter 1).

Chapter 2—'Overview of ART treatment in 2012', provides an outline of the numbers and outcomes of all ART treatments undertaken in Australia and New Zealand.

Chapter 3—'Autologous and donation/recipient cycles in 2012', presents data on the number of cycles, cycle types, and the outcomes of treatment in terms of discontinued treatment, clinical pregnancies and deliveries.

Chapter 4—'Pregnancy and birth outcomes following autologous and recipient embryo transfer cycles in 2012', presents data on the outcomes of clinical pregnancies and deliveries following autologous and recipient cycles including a description of perinatal outcomes.

Chapter 5—'Other cycle types, procedures and treatment complications in 2012', includes information on cycles, procedures and complications that do not fit into the chapters already described.

Chapter 6—'Donor sperm insemination cycles in 2012', presents data on DI cycles and their outcomes, including a description of pregnancy and perinatal outcomes.

Chapter 7—'Trends in ART treatment and outcomes: 2008–2012', presents trends in ART treatments during the last five years of data collection in Australia and New Zealand.

Chapter 8—'Women undertaking autologous treatment in 2012', presents information on the number of women undergoing ART treatment in 2012.

Chapter 9—'Cycle-specific rates for women who started their first autologous fresh ART treatment in 2009', presents information for a cohort of women who started their first autologous fresh ART treatment cycle during 2009, and these women were followed through subsequent fresh and thaw cycles until 31 December 2012 or until they achieved a live delivery.

Appendices—Appendix A lists the contributing fertility clinics. Appendix B provides an overview of the ANZARD2.0 data collection that was used to prepare this report. Appendix C provides a detailed list of the data items in the collection.

2 Overview of ART treatment in 2012

There were 70,082 ART treatment cycles reported from Australian and New Zealand clinics in 2012 (Table 1). Of these, 92.6% (64,905) were from Australian clinics and 7.4% (5,177) were from New Zealand clinics. The number of ART treatment cycles in 2012 increased by 5.3% overall from the 66,347 cycles in 2011, with an 5.8% increase in Australia and 0.2% decrease in New Zealand. In 2012, the number of ART treatment cycles represented 13.7 cycles per 1,000 women of reproductive age (15–44 years) in Australia, compared with 5.7 cycles per 1,000 women of reproductive age in New Zealand (Australian Bureau of Statistics 2014; Statistics New Zealand 2012).

More than 95% of cycles in 2012 were autologous cycles (where a woman intended to use, or used her own oocytes or embryos). Of the 66,710 autologous cycles, 42,299 (63.4%) were fresh cycles and 24,411 (36.6%) were thaw cycles. Other treatment cycles accounted for small proportions: 2.7% were oocyte recipient cycles, 0.5% were embryo recipient cycles, 1.4% were oocyte donation cycles and 0.2% were surrogacy arrangement cycles (Table 1).

Of all ART treatments in 2012, 23.9% (16,717) resulted in a clinical pregnancy and 17.9% (12,521) in a live delivery (Table 1). Of these clinical pregnancies, 15,153 (90.6%) were from Australian clinics and 1,564 (9.4%) from New Zealand clinics. There were 13,590 babies born (including 13,312 liveborn babies) following ART treatment in 2012. Of these, 12,304 (90.5%) were from Australian clinics and 1,286 (9.5%) from New Zealand clinics. Of the liveborn babies, 76.4% (10,167) were singletons at term (gestational age of 37–41 weeks) with normal birthweight (≥ 2,500 grams). The multiple delivery rate was 6.5%.

Table 1: Number of initiated ART treatment cycles by treatment type, Australia and New Zealand, 2012

	Number of initiated ART cycles	Per cent of treatment types	Number of clinical pregnancies	Number of live deliveries	Number of liveborn babies	Number of liveborn singletons at term with normal birthweight
Autologous	66,710	95.2	16,077	12,075	12,822	9,835
Fresh	*42,299*	*60.4*	*9,388*	*7,072*	*7,523*	*5,722*
Thaw	*24,411*	*34.8*	*6,689*	*5,003*	*5,299*	*4,113*
Oocyte recipient	1,892	2.7	525	369	405	275
Embryo recipient	337	0.5	84	57	65	42
Oocyte donation	973	1.4	-	-	-	-
GIFT[(a)]	7	0.0	1	1	1	0
Surrogacy arrangement cycles	163	0.2	30	19	19	15
Commissioning cycles[(b)]	*42*	*0.1*	-	-	-	-
Gestational carrier cycles[(c)]	*121*	*0.2*	*30*	*19*	*19*	*15*
Total	**70,082**	**100.0**	**16,717**	**12,521**	**13,312**	**10,167**

(a) GIFT cycles were classified separately from autologous cycles.

(b) A variety of cycle types undertaken as part of surrogacy arrangements, e.g. cycles undertaken by intended parents or women donating their oocytes or embryos for use by the gestational carrier.

(c) A cycle undertaken by a woman who carries, or intends to carry, a pregnancy on behalf of the intended parents with an agreement that the child will be raised by the intended parent(s).

3 Autologous and donation/recipient cycles in 2012

This chapter presents data on initiated autologous cycles, oocyte donation cycles and oocyte/embryo recipient cycles. Surrogacy cycles and GIFT cycles are presented separately in Chapter 5.

An ‘autologous cycle’ is defined as an ART treatment cycle in which a woman intends to use, or uses her own oocytes.

A ‘donation cycle’ is defined as an ART treatment cycle in which a woman intends to donate, or donates her oocytes to others. A donation cycle may result in the donation of either oocytes or embryos to a recipient woman. The use of donor sperm does not influence the donor status of the cycle.

A ‘recipient cycle’ is defined as an ART treatment cycle in which a woman receives oocytes or embryos from another woman.

Autologous and donor/recipient cycles can involve the use of, or intended use of, either fresh or frozen/thawed embryos.

3.1 Overview of autologous and recipient cycles

Age of women and their partners

The average age of women undergoing autologous and oocyte/embryo recipient cycles was 36. For women undergoing oocyte/embryo recipient cycles, the mean age was 40.5, five years older than for autologous cycles (35.8). Of all autologous and oocyte/embryo recipient cycles, one in four (26.5%) was undertaken by women aged 40 or older (Table 2). The average age of male partners was 38.2, with one-third (35.4%) aged 40 or older. For 15.5% of oocyte/embryo cycles, the partner's age was not stated or no partner was involved (Table 3).

Table 2: Number of autologous and recipient cycles by women's age group and treatment type, Australia and New Zealand, 2012

Age group (years)[(a)]	Autologous				Oocyte /embryo recipient		All	
	Fresh		Thaw					
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
< 30	4,507	10.7	2,846	11.7	84	3.8	7,437	10.8
30–34	10,648	25.2	7,484	30.7	225	10.1	18,357	26.6
35–39	15,046	35.6	9,298	38.1	531	23.8	24,875	36.1
40–44	11,287	26.7	4,476	18.3	868	38.9	16,631	24.1
≥ 45	811	1.9	307	1.3	521	23.4	1,639	2.4
Total	**42,299**	**100.0**	**24,411**	**100.0**	**2,229**	**100.0**	**68,939**	**100.0**

(a) Age at start of a treatment cycle.

Note: Data are collected for each treatment cycle; therefore, some individuals may be counted more than once.

Table 3: Number of autologous and recipient cycles by women's partners' age group and treatment type, Australia and New Zealand, 2012

Age group (years)[(a)]	Autologous				Oocyte /embryo recipient		All	
	Fresh		Thaw					
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
< 30	2,676	6.3	1,496	6.1	41	1.8	4,213	6.1
30–34	8,731	20.6	5,609	23.0	232	10.4	14,572	21.1
35–39	12,452	29.4	7,640	31.3	518	23.2	20,610	29.9
40–44	9,197	21.7	5,256	21.5	558	25.0	15,011	21.8
≥ 45	6,017	14.2	2,853	11.7	534	24.0	9,404	13.6
Not stated	3,226	7.6	1,557	6.4	346	15.5	5,129	7.4
Total	**42,299**	**100.0**	**24,411**	**100.0**	**2,229**	**100.0**	**68,939**	**100.0**

(a) Age at start of a treatment cycle.

Note: Data are collected for each treatment cycle; therefore, some individuals may be counted more than once.

Parity

Parity is the number of previous pregnancies of 20 weeks or more gestation experienced by a woman. A woman who has had no previous pregnancies of 20 or more weeks gestation is called 'nulliparous'. A woman who has had at least one previous pregnancy of 20 weeks or more gestation is described as 'parous'.

Of the 68,939 initiated autologous and recipient cycles undertaken in 2012, 65.3% were undertaken by nulliparous women. Of autologous cycles (fresh and thaw), 65.1% were undertaken by nulliparous women, compared with 71.9% for oocyte/embryo recipient cycles (Table 4).

Table 4: Number of autologous and recipient cycles by parity and treatment type, Australia and New Zealand, 2012

	Autologous				Oocyte/embryo recipient		All	
	Fresh		Thaw					
Parity	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Nulliparous	29,322	69.3	14,076	57.7	1,603	71.9	45,001	65.3
Parous	8,602	20.3	7,538	30.9	444	19.9	16,584	24.1
Not stated	4,375	10.3	2,797	11.5	182	8.2	7,354	10.7
Total	**42,299**	**100.0**	**24,411**	**100.0**	**2,229**	**100.0**	**68,939**	**100.0**

Note: Data are collected for each treatment cycle; therefore, some individuals may be counted more than once.

Cause of infertility

Causes of infertility may be known to relate to either the woman or her male partner, or both, or may be unexplained. The reported causes of infertility are based on clinical diagnosis by the treating clinician. However, the diagnostic definitions may vary among fertility centres and should be interpreted with caution.

Of the 68,939 initiated autologous and recipient cycles, 22.4% reported male infertility factors as the only cause of infertility; 28.5% reported only female infertility factors; 13.8% reported combined male–female factors; 20.7% reported unexplained infertility; and 14.6% were not stated.

Intracytoplasmic sperm injection procedures

Of the 37,271 autologous fresh cycles where fertilisation was attempted, 68.2% used ICSI procedures and 31.8% used IVF procedures. Of fresh oocyte recipient cycles where fertilisation was attempted, 77.8% used ICSI procedures and 22.2% used IVF procedures (Table 5).

Table 5: Number of autologous and recipient cycles with fertilisation attempted by treatment type and procedure, Australia and New Zealand, 2012

	Autologous				Oocyte/embryo recipient			
	Fresh[(a)]		Thaw[(b)]		Fresh[(a)]		Thaw[(b)]	
Procedure	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
IVF	11,864	31.8	8,853	39.2	200	22.2	432	34.6
ICSI[(c)]	25,407	68.2	13,704	60.8	701	77.8	815	65.4
Not stated	-	-	1	0.0	-	-	-	-
Total	**37,271**	**100.0**	**22,558**	**100.0**	**901**	**100.0**	**1,247**	**100.0**

(a) Fresh cycles where fertilisation was attempted.

(b) Thaw cycles where embryos were transferred.

(c) Mixed IVF/ICSI cycles were classified as ICSI cycles.

Number of embryos transferred

Of the 55,620 fresh and thawed embryo transfer cycles, nearly three-quarters (76.3%) were single embryo transfer (SET) cycles and 23.0% were double embryo transfer (DET). In women aged under 35, 85.2% of embryo transfer cycles were SET cycles and 14.8% were DET cycles. In women aged 35 or older, two-thirds (70.7%) of cycles were SET cycles and 28.2% were DET cycles (Table 6).

Table 6: Number of fresh and thawed embryos transferred per cycle and women's age group, Australia and New Zealand, 2012

	Number of embryos transferred							
	One		Two		Three or more		All	
Age group (years)[(a)]	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
< 30	5,267	87.1	777	12.9	0	0.0	6,044	100.0
30–34	12,990	84.4	2,392	15.5	4	0.0	15,386	100.0
35–39	15,552	76.2	4,817	23.6	33	0.2	20,402	100.0
40–44	7,893	62.6	4,411	35.0	308	2.4	12,612	100.0
≥ 45	716	60.9	420	35.7	40	3.4	1,176	100.0
Total	**42,418**	**76.3**	**12,817**	**23.0**	**385**	**0.7**	**55,620**	**100.0**

(a) Age at start of a treatment cycle.

Stage of embryo development

Of the 55,620 embryo transfer cycles, 59.8% involved the transfer of day 5–6 embryos (blastocysts) with the remainder day 2–3 embryos (cleavage embryos). Of autologous cycles, blastocyst transfers made up 68.2% of thaw cycles compared with 53.8% of fresh cycles (Table 7).

Table 7: Number of embryo transfer cycles by treatment type and stage of embryo development, Australia and New Zealand, 2012

Type and procedure	Autologous				Oocyte/embryo recipient			
	Fresh		Thaw		Fresh		Thaw	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Cleavage embryo	14,348	46.2	7,169	31.8	302	39.8	523	41.9
Blastocyst	16,708	53.8	15,389	68.2	457	60.2	724	58.1
Total	**31,056**	**100.0**	**22,558**	**100.0**	**759**	**100.0**	**1,247**	**100.0**

Transfer of cryopreserved embryos

Embryos created in a fresh cycle can be cryopreserved by either slow freezing or ultra-rapid (vitrification) methods. Slow frozen and vitrified embryos can be thawed/warmed and then transferred in subsequent cycles.

Of the 23,805 frozen/thawed embryo transfer cycles, over half (55.8%) involved the transfer of vitrified embryos. Three-quarters (76.9%) of frozen/thawed blastocyst transfer cycles had vitrified blastocysts transferred. By comparison, 11.5% of frozen/thawed cleavage embryo transfer cycles used vitrified embryos (Table 8).

Table 8: Number of embryo transfer cycles by cryopreservation method and stage of embryo development, Australia and New Zealand, 2012

Type and procedure	Autologous				Oocyte/embryo recipient			
	Cleavage embryo		Blastocyst		Cleavage embryo		Blastocyst	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Slow frozen	6,333	88.3	3,516	22.8	473	90.4	203	28.0
Vitrification[(a)]	836	11.7	11,873	77.2	50	9.6	521	72.0
Total	**7,169**	**100.0**	**15,389**	**100.0**	**523**	**100.0**	**724**	**100.0**

(a) Ultra-rapid cryopreservation.

3.2 Autologous fresh cycles

In 2012, there were 42,299 initiated autologous fresh cycles, comprising 42,025 (99.4%) FSH-stimulated cycles and 274 (0.6%) unstimulated cycles. There were 104 cycles in which thawed oocytes were used.

Of the 42,299 initiated autologous fresh cycles, 92.6% (39,149) were in Australian clinics and 7.4% (3,150) were in New Zealand clinics.

Progression of autologous fresh cycles

Figure 1 shows the main stages of autologous fresh cycles and the resulting treatment outcomes.

Of the 42,299 initiated autologous fresh cycles in 2012, 91.6% had OPU performed; 73.4% had embryos transferred; 22.2% resulted in a clinical pregnancy; and 16.7% resulted in a live delivery (Figure 1). A live delivery is the delivery of one or more liveborn infants, with the birth of twins and triplets counted as one live delivery.

A treatment can be discontinued for a variety of reasons, including inadequate response of ovaries to medication, excessive ovarian stimulation, failure to obtain oocytes, failure of oocyte fertilisation, inadequate embryo growth or patient choice.

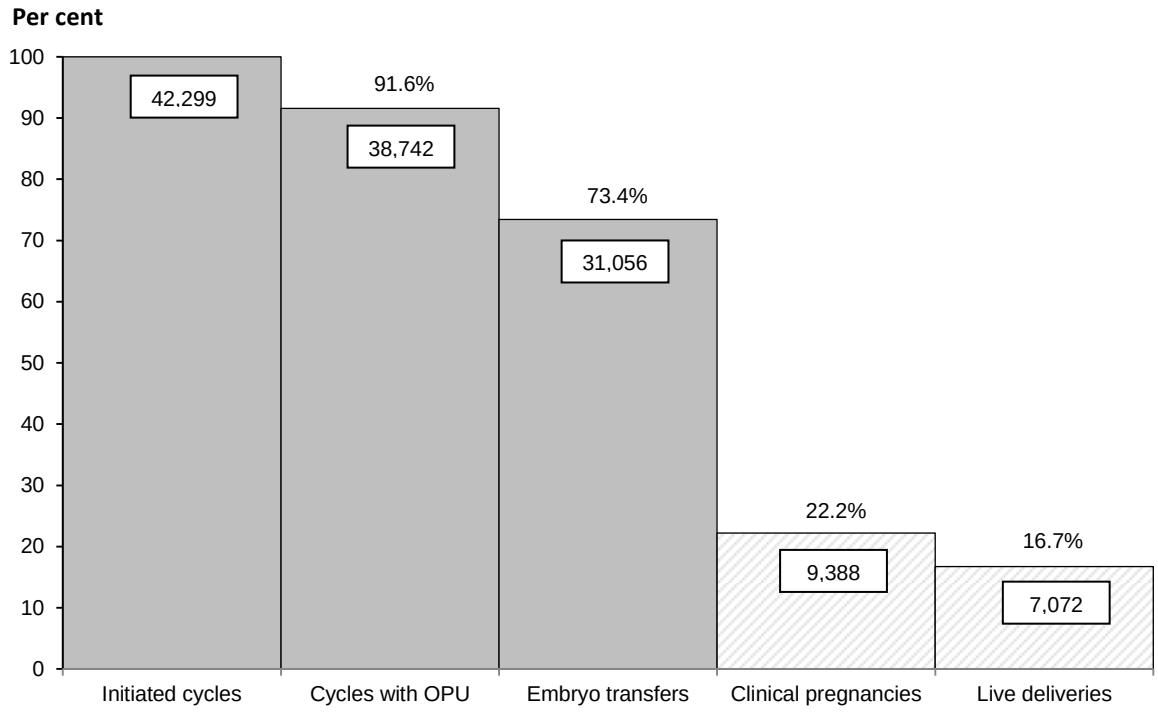

Figure 1: Progression of autologous fresh cycles, Australia and New Zealand, 2012

Clinical pregnancies and live deliveries by women's age

Maternal age is one of the key factors associated with the outcomes of autologous fresh cycles. The highest live delivery rate per embryo transfer cycle was in women aged under 30 (35.4%). The rate declined with advancing women's age, with a rate of 8.8% for women aged 40–44 and 1.6% for women aged 45 or older (Table 9).

Table 9: Outcomes of autologous fresh cycles by women's age group, Australia and New Zealand, 2012

	Age group (years)[(a)]					
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
Initiated cycles	4,507	10,648	15,046	11,287	811	42,299
Cycles with OPU	4,174	9,943	13,878	10,062	685	38,742
Embryo transfer cycles	3,321	8,182	11,331	7,778	444	31,056
Clinical pregnancies	1,413	3,222	3,479	1,251	23	9,388
Live deliveries	1,174	2,642	2,564	685	7	7,072
Live deliveries per initiated cycle (%)	*26.0*	*24.8*	*17.0*	*6.1*	*0.9*	*16.7*
Live deliveries per embryo transfer cycle (%)	*35.4*	*32.3*	*22.6*	*8.8*	*1.6*	*22.8*
Live deliveries per clinical pregnancy (%)	*83.1*	*82.0*	*73.7*	*54.8*	*30.4*	*75.3*

(a) Age at start of a treatment cycle.

Figure 2 shows age-specific live delivery rates per initiated autologous fresh cycle by two-year age groups. The highest live delivery rates were for women aged between their mid-20s to mid-30s. The live delivery rate declined steadily for women older than 32. For women aged 45 or older, only one live delivery resulted from every 100 initiated cycles compared with 25 live deliveries from every 100 initiated cycles in women aged between 25 and 34.

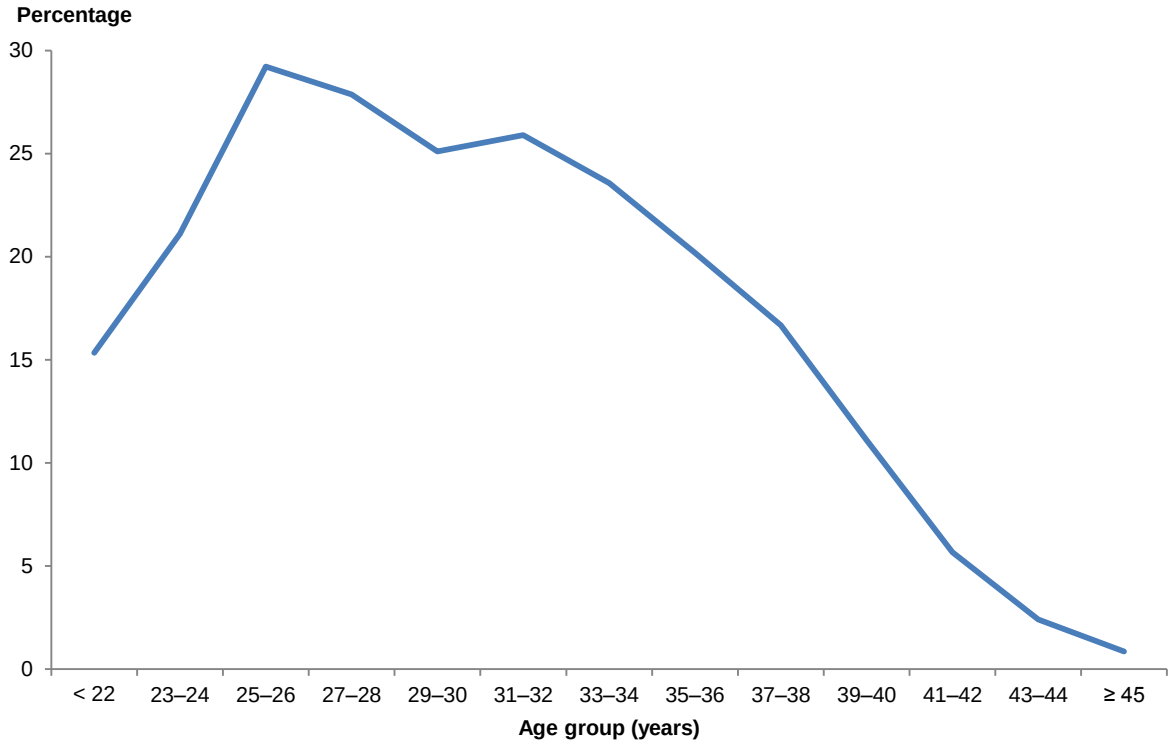

Figure 2: Live deliveries per initiated autologous fresh cycle by women's age at start of a treatment cycle, Australia and New Zealand, 2012

Clinical pregnancies and live deliveries by cause of infertility

Cycles reported with endometriosis as the only cause of infertility had the highest live birth rates (19.1), followed by cycles reported with male factor infertility as the only cause of infertility (18.9) (Table 10).

Table 10: Outcomes of autologous fresh cycles by cause of infertility, Australia and New Zealand, 2012

Cause of infertility	Initiated cycles (number)	Embryo transfer cycles per initiated cycle (per cent)	Clinical pregnancies per initiated cycle (per cent)	Live deliveries per initiated cycle (per cent)
Male factor only	9,549	77.7	24.3	18.9
Female factor	12,128	69.8	21.5	16.1
Tubal disease only	*1,622*	*77.6*	*24.5*	*17.8*
Endometriosis only	*1,934*	*76.2*	*25.3*	*19.1*
Other female factor only	*7,041*	*66.4*	*20.1*	*15.1*
Combined female factor	*1,531*	*69.0*	*19.9*	*15.1*
Combined male—female factors	6,134	73.6	24.1	18.0
Unexplained	8,753	75.1	21.8	16.2
Not stated	5,735	71.3	18.6	13.9
Total	**42,299**	**73.4**	**22.2**	**16.7**

Clinical pregnancies and live deliveries by number of embryos transferred

Overall, 71.5% of autologous fresh embryo transfer cycles were SET cycles, 27.4% were DET cycles and 1.0% had three or more embryos transferred. In women aged under 35, three or more embryos transferred accounted for less than 0.1% of embryo transfer cycles. This increased to 3.5% in women aged 40 or older.

Overall, the live delivery rate was 24.5% for SET cycles and 18.8% for DET cycles (Table 11). Of embryo transfer cycles in women aged under 35, the live delivery rate was higher for SET cycles than DET cycles (33.6% and 30.8% respectively). Of embryo transfer cycles in women aged 35 or older, the live delivery rate was slightly lower for SET cycles than DET cycles (22.4% and 23.2% respectively for women aged 35 to 39, and 8.3% and 8.6% respectively for women aged 40 or older).

Table 11: Outcomes of autologous fresh embryo transfer cycles by women's age and number of embryos transferred, Australia and New Zealand, 2012

	Age group (years)[a]							
	< 35		35–39		≥ 40		All	
Stage/outcome of treatment	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]
Embryo transfer cycles	9,754	1,747	8,027	3,278	4,439	3,495	22,220	8,520
Clinical pregnancies	3,963	672	2,436	1,031	650	575	7,049	2,278
Live deliveries	3,278	538	1,795	759	368	301	5,441	1,598
Clinical pregnancies per embryo transfer cycle (%)	*40.6*	*38.5*	*30.3*	*31.5*	*14.6*	*16.5*	*31.7*	*26.7*
Live deliveries per embryo transfer cycle (%)	*33.6*	*30.8*	*22.4*	*23.2*	*8.3*	*8.6*	*24.5*	*18.8*

(a) Age at start of a treatment cycle.

(b) SET: single embryo transfer.

(c) DET: double embryo transfer.

Clinical pregnancies and live deliveries by stage of embryo development

Overall, the rates of clinical pregnancy and live delivery were higher in blastocyst transfer cycles than in cleavage stage embryo transfer cycles regardless of a woman's age (Table 12). The live delivery rate for blastocyst transfer cycles was 11.1 percentage points higher than for cleavage stage embryo transfer cycles.

Table 12: Outcomes of autologous fresh embryo transfer cycles by women's age and stage of embryo development, Australia and New Zealand, 2012

Stage/outcome of treatment	Age group (years)[a]							
	< 35		35–39		≥ 40		All	
	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]
Embryo transfer cycles	4,418	7,085	5,239	6,092	4,691	3,531	14,348	16,708
Clinical pregnancies	1,440	3,195	1,298	2,181	577	697	3,315	6,073
Live deliveries	1,178	2,638	931	1,633	300	392	2,409	4,663
Clinical pregnancies per embryo transfer cycle (%)	*32.6*	*45.1*	*24.8*	*35.8*	*12.3*	*19.7*	*23.1*	*36.3*
Live deliveries per embryo transfer cycle (%)	*26.7*	*37.2*	*17.8*	*26.8*	*6.4*	*11.1*	*16.8*	*27.9*

(a) Age at start of a treatment cycle.

(b) CL: cleavage stage embryo.

(c) BL: blastocyst.

Live deliveries among fertility centres

The live delivery rate per initiated autologous fresh cycle varied among the 35 fertility centres that performed at least 90 autologous fresh treatment cycles in 2012. This variation is measured using quartiles that rank a centre's live delivery rate within the top and bottom 25% or the middle 50% of centres. There were eight or nine centres in each quartile.

The live delivery rate per initiated autologous fresh cycle ranged from 4.0% to 30.9% among fertility centres. The middle 50% of fertility centres (second and third quartiles) had live delivery rates between 13.3% and 19.6% (Table 13).

These data should be interpreted with caution because of the small number of women who underwent autologous fresh treatments in some centres coupled with potential variation in patient characteristics that may influence the live delivery rate of an individual centre. In addition, there are an increasing number of autologous fresh cycles where all embryos are frozen and subsequently transferred in thaw cycles. This practice reduces the risk of OHSS in some patients and can improve pregnancy rates in patients whose endometrium is not receptive during a fresh cycle. These 'freeze all' cycles reduce fresh autologous live delivery rates for some clinics because the number of initiated fresh cycles is included in the denominator.

Table 13: Live delivery rate of autologous fresh cycles by women's age group among fertility centres, Australia and New Zealand, 2012

	Live deliveries per initiated autologous fresh cycle (per cent)				
Age group (years)[(a)]	**Overall**	**First quartile**	**Second quartile**	**Third quartile**	**Fourth quartile**
< 35	25.2	29.1–38.6	24.3–29.0	19.9–24.2	5.4–19.8
35–39	17.0	18.6–30.2	15.8–18.5	14.6–15.7	2.5–14.5
≥ 40	5.7	8.1–20.7	5.6–8.0	4.3–5.5	0–4.2
All	**16.7**	**19.7–30.9**	**17.3–19.6**	**13.3–17.2**	**4.0–13.2**

(a) Age at start of a treatment cycle.

There was also variation in the outcomes of autologous fresh cycles by number of embryos transferred and stage of embryo development. Figure 3 shows the median live delivery rate and interquartile range among the 35 fertility centres that performed autologous fresh cleavage stage embryo or blastocyst transfers. For example, 50% of the clinics that performed single blastocyst transfers achieved a live delivery rate between 25.2% and 34.7%.

These data should be interpreted with caution because of the small number of patients who underwent autologous fresh cleavage embryo or blastocyst transfers in some centres coupled with potential variation in patient characteristics which may influence the live delivery rate of an individual centre. A woman's age, parity, cause of infertility and embryo quality may influence whether one or two embryos are transferred, and whether embryos are transferred at the cleavage or blastocyst stage.

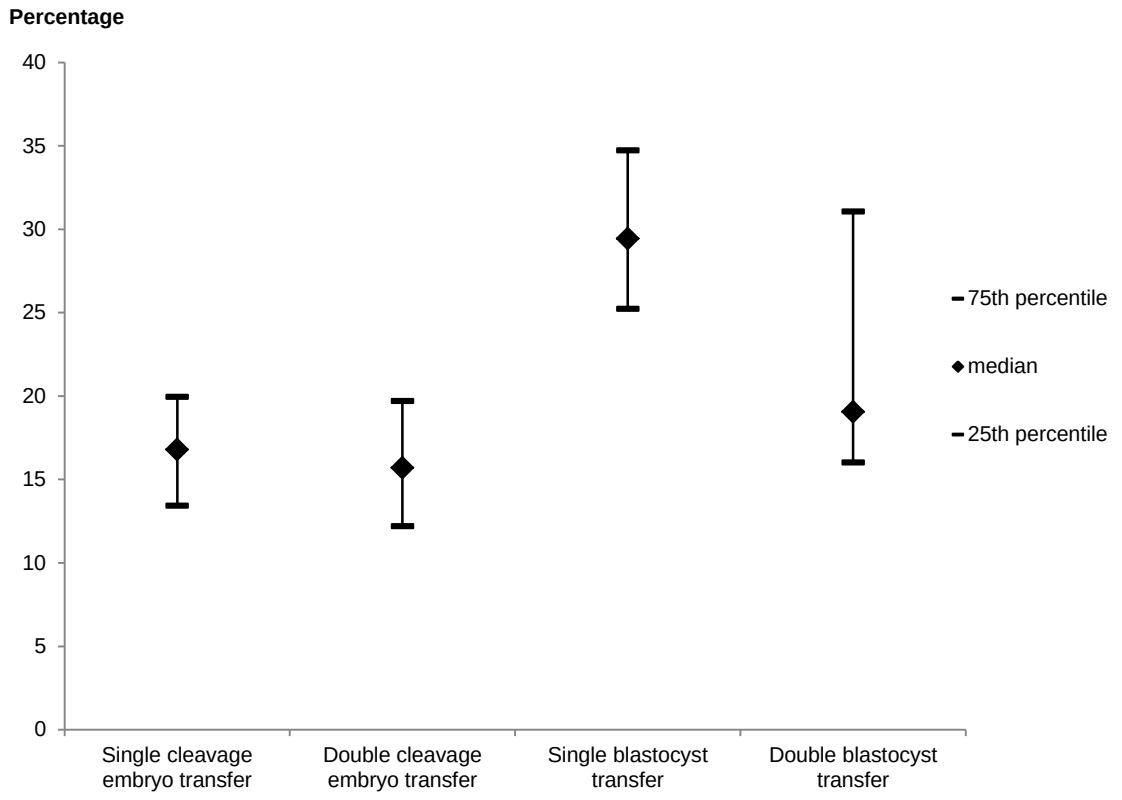

Figure 3: Live deliveries per autologous fresh embryo transfer cycle by number of embryos transferred and stage of embryo development among fertility centres, Australia and New Zealand, 2012

3.3 Autologous thaw cycles

There were 24,411 autologous thaw cycles reported in 2012 (Figure 4). Of these, 93.1% (22,726) were in Australian clinics and 6.9% (1,685) in New Zealand clinics.

Progression of autologous thaw cycles

Figure 4 shows the main stages of autologous thaw cycles and the resulting treatment outcomes.

Of the 24,411 initiated autologous thaw cycles, 92.4% had embryos transferred, 27.4% resulted in a clinical pregnancy and 20.5% resulted in a live delivery (Figure 4). Almost 1 in 12 initiated autologous thaw cycles did not progress to embryo transfer, principally due to non-viability following thawing of cryopreserved (frozen) embryo(s).

The rate of live deliveries per initiated cycle was higher for autologous thaw cycles than for autologous fresh cycles in 2012 (20.5% and 16.7% respectively) (Figures 1 and 4).

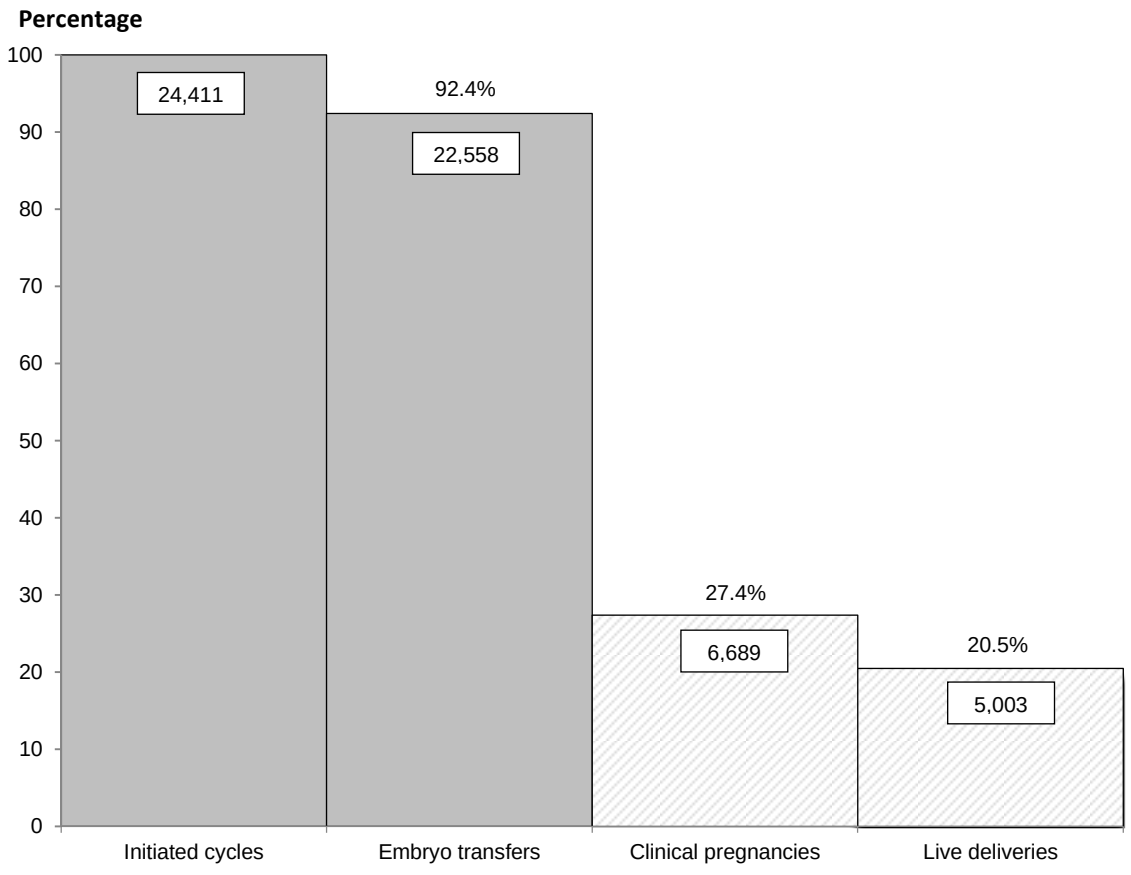

Figure 4: Progression of autologous thaw cycles, Australia and New Zealand, 2012

Clinical pregnancies and live deliveries from autologous thaw cycles by women's age

Similar to autologous fresh embryo transfer cycles, the live delivery rate per thawed embryo transfer cycle declined with advancing women's age (Table 14). It is important to note that embryos thawed during a thaw cycle were created in an earlier initiated fresh cycle; therefore, a woman's age at the start of a thaw cycle is older than her age at the start of the initiated fresh cycle.

Table 14: Outcomes of autologous thaw cycles by women's age group, Australia and New Zealand, 2012

	Age group (years)[(a)]					
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
Initiated cycles	2,846	7,484	9,298	4,476	307	24,411
Embryo transfer cycles	2,650	7,006	8,596	4,046	260	22,558
Clinical pregnancies	932	2,373	2,523	832	29	6,689
Live deliveries	741	1,847	1,859	542	14	5,003
Live deliveries per initiated cycle (%)	*26.0*	*24.7*	*20.0*	*12.1*	*4.6*	*20.5*
Live deliveries per embryo transfer cycle (%)	*28.0*	*26.4*	*21.6*	*13.4*	*5.4*	*22.2*
Live deliveries per clinical pregnancy (%)	*79.5*	*77.8*	*73.7*	*65.1*	*48.3*	*74.8*

(a) Age at start of the thaw treatment cycle.

Figure 5 shows age-specific live delivery rates per initiated autologous thaw cycle by two-year age groups. The highest live delivery rates were for women in their mid-20s to mid-30s. The live delivery rate declined steadily for women aged 35 and older. For women aged 45 or older, 4.6% of initiated autologous thaw cycles resulted in a live delivery, which is higher than the live delivery rate per initiated autologous fresh cycle in this age group (0.9%) (Figures 2 and 5).

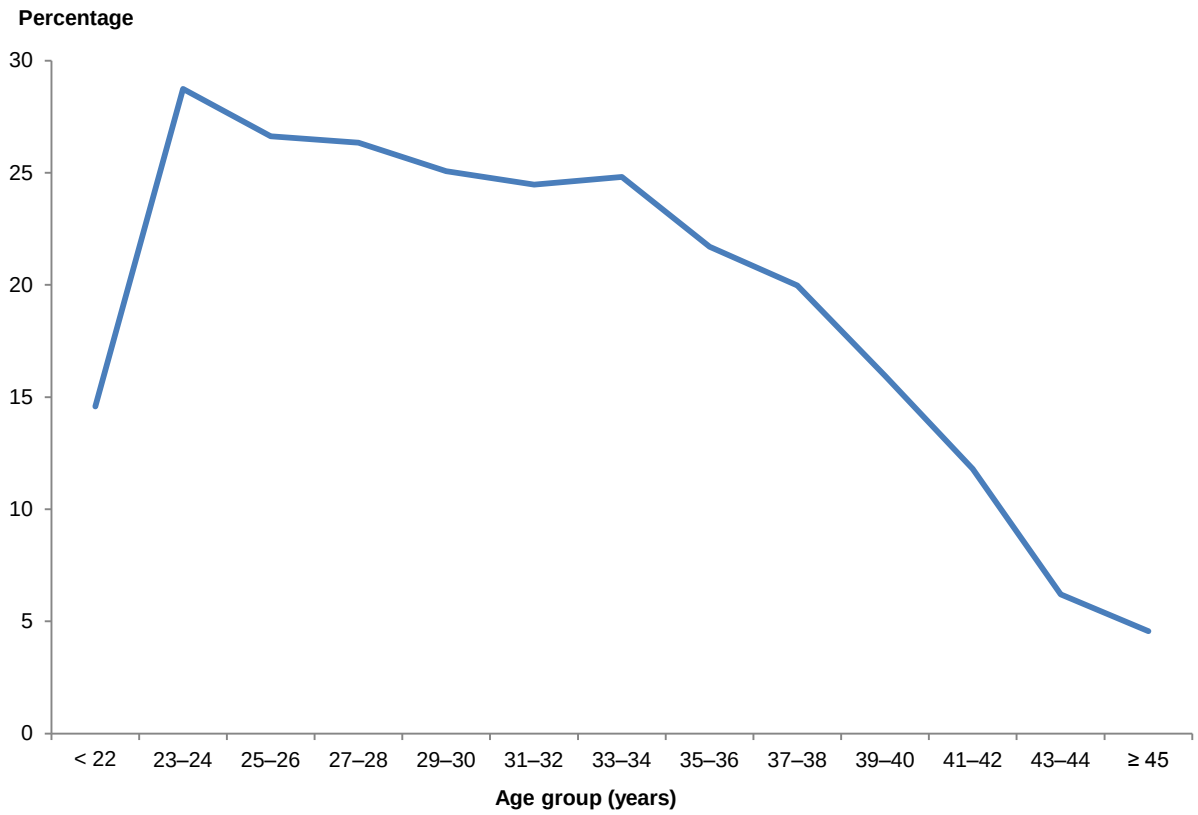

Figure 5: Live deliveries per initiated autologous thaw cycle by women's age at start of thaw treatment cycle, Australia and New Zealand, 2012

Clinical pregnancies and live deliveries by cause of infertility

Cycles reported with male factor as the only cause of infertility had a higher rate of live delivery per initiated thaw cycle (22.4%) than those with female factor-only infertility (21.0%) (Table 15).

Table 15: Outcomes of autologous thaw cycles by cause of infertility, Australia and New Zealand, 2012

Cause of infertility	Initiated cycles (number)	Embryo transfer cycles per initiated cycle (per cent)	Clinical pregnancies per initiated cycle (per cent)	Live deliveries per initiated cycle (per cent)
Male factor only	5,649	93.4	29.4	22.4
Female factor	6,528	92.6	28.3	21.0
Tubal disease only	*1,055*	*92.3*	*28.0*	*20.9*
Endometriosis only	*1,128*	*92.5*	*27.7*	*20.4*
Other female factor only	*3,494*	*92.1*	*28.9*	*21.4*
Combined female factor	*851*	*95.4*	*27.1*	*19.7*
Combined male–female factors	3,004	93.1	28.8	21.1
Unexplained	5,209	90.8	27.1	20.2
Not stated	4,021	92.2	22.4	17.0
Total	**24,411**	**92.4**	**27.4**	**20.5**

Clinical pregnancies and live deliveries by number of embryos transferred

Overall, of the 22,558 embryo transfer cycles, 82.9% were SET cycles, 16.8% were DET cycles and 0.3% transferred three or more embryos. In women aged under 40, three or more frozen/thawed embryos were transferred in less than 0.1% of embryo transfer cycles, compared with 1.2% in women aged 40 or older.

The live delivery rate was higher for DET than for SET for women in each age group. However, there was no difference between the overall live delivery rates for SET and DET in autologous thaw cycles (22.2%) (Table 16).

Table 16: Outcomes of autologous thaw embryo transfer cycles by women's age and number of embryos transferred, Australia and New Zealand, 2012

Stage/outcome of treatment	Age group (years)[a]							
	< 35		35–39		≥ 40		All	
	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]
Embryo transfer cycles	8,297	1,357	7,159	1,431	3,255	998	18,711	3,786
Clinical pregnancies	2,807	497	2,074	447	644	205	5,525	1,149
Live deliveries	2,198	389	1,540	318	417	135	4,155	842
Clinical pregnancies per embryo transfer cycle (%)	*33.8*	*36.6*	*29.0*	*31.2*	*19.8*	*20.5*	*29.5*	*30.3*
Live deliveries per embryo transfer cycle (%)	*26.5*	*28.7*	*21.5*	*22.2*	*12.8*	*13.5*	*22.2*	*22.2*

(a) Age at start of a treatment cycle.

(b) SET: single embryo transfer.

(c) DET: double embryo transfer.

Clinical pregnancies and live deliveries by stage of embryo development

The rates of clinical pregnancy and live delivery were higher for blastocyst transfer cycles than for cleavage stage embryo transfer cycles, regardless of a woman's age. The rate of live delivery for blastocyst transfer cycles was 9.3 percentage points higher than for cleavage stage embryo transfer cycles (Table 17).

Table 17: Outcomes of autologous thaw embryo transfer cycles by women's age and stage of embryo development, Australia and New Zealand, 2012

Stage/outcome of treatment	Age group (years)[a]							
	< 35		35–39		≥ 40		All	
	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]
Embryo transfer cycles	2,716	6,940	2,691	5,905	1,762	2,544	7,169	15,389
Clinical pregnancies	707	2,598	575	1,948	224	637	1,506	5,183
Live deliveries	554	2,034	431	1,428	148	408	1,133	3,870
Clinical pregnancies per embryo transfer cycle (%)	*26.0*	*37.4*	*21.4*	*33.0*	*12.7*	*25.0*	*21.0*	*33.7*
Live deliveries per embryo transfer cycle (%)	*20.4*	*29.3*	*16.0*	*24.2*	*8.4*	*16.0*	*15.8*	*25.1*

(a) Age at start of a treatment cycle.

(b) CL: cleavage stage embryo.

(c) BL: blastocyst.

Clinical pregnancies and live deliveries by embryo freezing methods

Over three-quarters (77.2%) of autologous thaw cycles where a blastocyst was transferred used vitrified embryos, compared with 11.7% of cycles where a cleavage embryo was transferred. The rates of clinical pregnancy and live delivery were higher for the transfer of vitrified blastocysts than slow frozen blastocysts. In contrast, the rates of clinical pregnancy and live delivery were higher for slow frozen cleavage stage embryos than vitrified cleavage stage embryos (Table 18).

Table 18: Outcomes of autologous thaw embryo transfer cycles by stage of embryo development and embryo freezing methods, Australia and New Zealand, 2012

	Stage of embryo development					
	Cleavage embryo		Blastocyst		All	
Stage/outcome of treatment	Slow freezing	Vitrification[(a)]	Slow freezing	Vitrification[(a)]	Slow freezing	Vitrification[(a)]
Embryo transfer cycles	6,333	836	3,516	11,873	9,849	12,709
Clinical pregnancies	1,338	168	1,064	4,119	2,402	4,287
Live deliveries	1,020	113	777	3,093	1,797	3,206
Clinical pregnancies per embryo transfer cycle (%)	*21.1*	*20.1*	*30.3*	*34.7*	*24.4*	*33.7*
Live deliveries per embryo transfer cycle (%)	*16.1*	*13.5*	*22.1*	*26.1*	*18.2*	*25.2*

(a) Ultra-rapid cryopreservation.

Live deliveries from autologous thaw cycles among fertility centres

The live delivery rate per initiated autologous thaw cycle ranged from 4.7% to 32.0% among the 35 fertility centres that performed at least 50 autologous thaw cycles in 2012. The middle 50% of fertility centres (second and third quartiles) achieved rates between 14.9% and 23.6% (Table 19).

These data should be interpreted with caution because of the small number of patients who underwent autologous thaw cycles in some centres and potential variation in patient characteristics which may influence the live delivery rate of an individual centre.

Table 19: Live delivery rate of autologous thaw cycles by women's age group among fertility centres, Australia and New Zealand, 2012

	Live deliveries per initiated autologous thaw cycle (per cent)				
Age group (years)[(a)]	**Overall**	**First quartile**	**Second quartile**	**Third quartile**	**Fourth quartile**
< 35	25.1	28.4–42.5	23.4–28.3	20.3–23.3	5.2–20.2
35–39	20.0	22.3–31.6	17.9–22.2	14.1–17.8	2.8–14.0
≥ 40	11.6	14.6–21.8	10.8–14.5	7.1–10.7	0.0–-7.0
All	**20.5**	**23.7–32.0**	**19.0–23.6**	**14.9–18.9**	**4.7–14.5**

(a) Age at start of the thaw treatment cycle.

There was also variation among the 35 fertility centres in the outcomes of autologous thaw cycles by number and type of embryos transferred. Figure 6 shows the median live delivery rate for autologous thaw embryo transfer cycles and the interquartile range by number of embryos transferred and stage of embryo development among the fertility centres. For example, 50% of the clinics who performed single frozen/thawed blastocyst transfers achieved a live delivery rate of between 15.1% and 28.4%.

These data should be interpreted with caution because of the small number of patients who underwent autologous thaw cleavage stage embryo or blastocyst transfers in some centres, and potential variation in patient characteristics which may influence the live delivery rate of an individual centre.

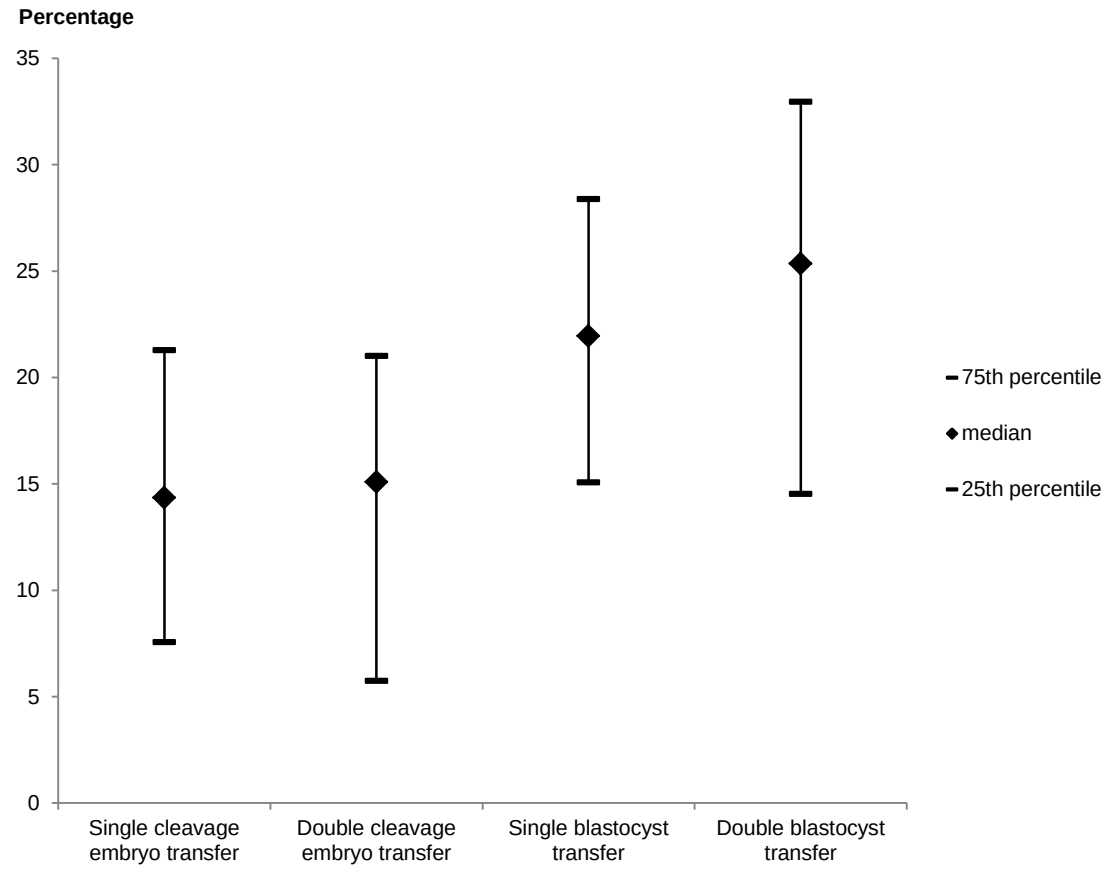

Figure 6: Live delivery rate of autologous thaw embryo transfer cycles by number of embryos transferred and stage of embryo development among fertility centres, Australia and New Zealand, 2012

3.4 Donation and recipient cycles

A donation cycle is defined as an ART treatment cycle in which a woman intends to donate, or donates her oocytes to another woman. A donation cycle may result in either oocytes or embryos being donated to a recipient woman. A recipient cycle is defined as an ART treatment cycle in which a woman receives oocytes or embryos. The use of donor sperm does not alter the donor status of the cycle.

In 2012, donation and recipient cycles accounted for 4.6% (3,202) of all treatment cycles in Australia and New Zealand. There were 973 initiated cycles where the intention was to donate oocytes, consisting of 862 (88.6%) cycles in Australia and 111 (11.4%) in New Zealand. There were 2,229 oocyte/embryo recipient cycles (Table 1), including 2,022 cycles in Australia and 207 cycles in New Zealand.

Oocyte donation cycles

Of the 973 cycles in Australia and New Zealand where the intention was to donate oocytes to a recipient, 38 (3.9%) cycles were cancelled before OPU, and a further 13 did not result in oocytes being donated.

The average age of women donating oocytes was 32.9 years, with 41.3% of cycles in women aged 35 or older (Table 20).

Table 20: Number of oocyte donation cycles by donor's age group, Australia and New Zealand, 2012

Donor age group (years)[(a)]	Initiated cycles (number)	Cycles with OPU performed (number)	Cycles with OPU performed (per cent)	Cycles with oocytes donated (number)	Cycles with oocytes donated (per cent)
< 30	240	230	95.8	226	94.2
30–34	331	322	97.3	318	96.1
35–39	336	323	96.1	320	95.2
≥ 40	66	60	90.9	59	89.4
Total	**973**	**935**	**96.1**	**923**	**94.9**

(a) Donor's age at start of a treatment cycle.

Oocyte/embryo recipient cycles

There were 2,229 oocyte/embryo recipient cycles in 2012. Of these, 84.9% (1,892) were oocyte recipient cycles and 15.1% (337) were embryo recipient cycles (Table 1). The average age of women undertaking an oocyte/embryo recipient cycle was 40.5 years.

Progression of oocyte/embryo recipient cycles

Figure 7 shows the main stages of oocyte/embryo recipient cycles and the treatment outcomes. Of the 2,229 initiated oocyte/embryo recipient cycles undertaken in 2012, 27.3% resulted in a clinical pregnancy and 19.1% in a live delivery.

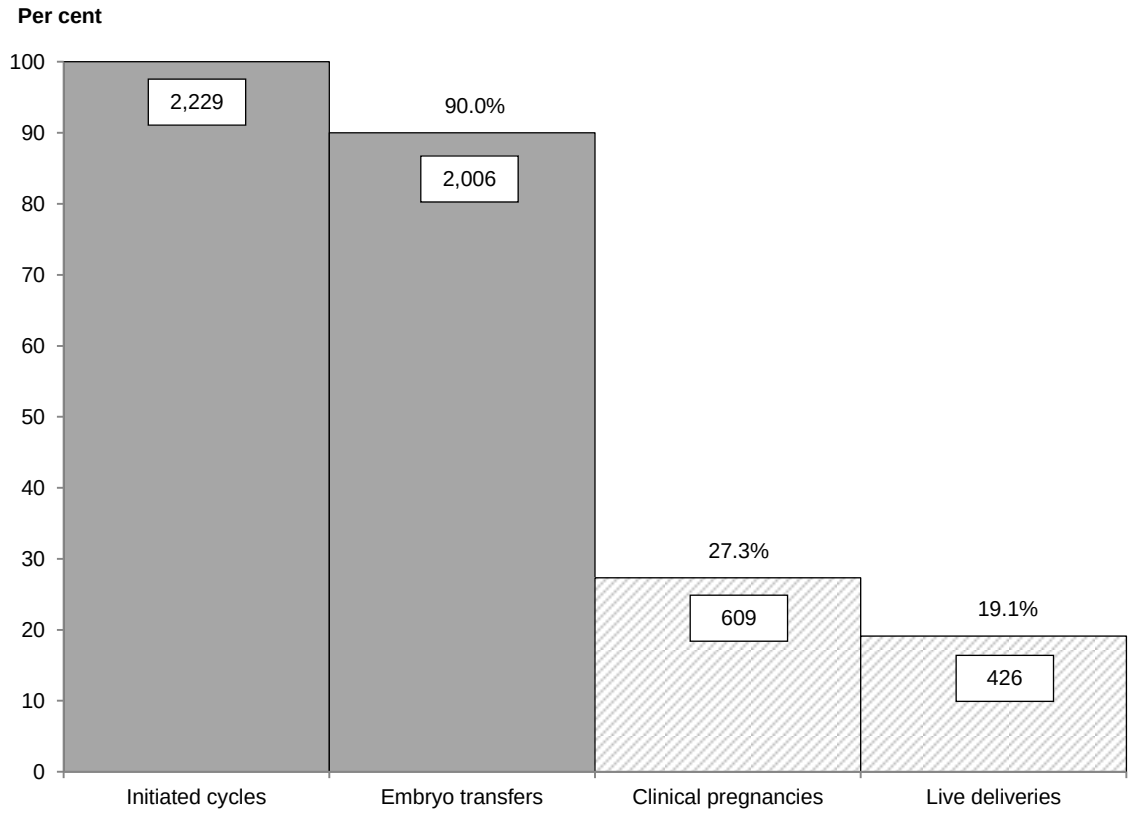

Figure 7: Progression of fresh and thaw oocyte/embryo recipient cycles, Australia and New Zealand, 2012

Clinical pregnancies and live deliveries from oocyte/embryo recipient cycles by type of recipient cycle

Of the 1,892 oocyte recipient cycles, 47.9% were fresh cycles and 52.1% were thaw cycles. The live delivery rate per initiated cycle was 21.9% for fresh oocyte recipient cycles, higher than for thawed oocyte recipient cycles (17.3%).

All 337 embryo recipient cycles were thaw cycles. The overall live delivery rate was 16.9% for embryo recipient cycles (Table 21).

Table 21: Outcomes of oocyte/embryo recipient cycles by treatment type, Australia and New Zealand, 2012

	Oocyte recipient			
Stage/outcome of treatment	**Fresh**	**Thaw**	**Embryo recipient**	**All**
Initiated cycles	906	986	337	2,229
Embryo transfer cycles	759	931	316	2,006
Clinical pregnancies	276	249	84	609
Live deliveries	198	171	57	426
Live deliveries per initiated cycle (%)	*21.9*	*17.3*	*16.9*	*19.1*
Live deliveries per embryo transfer cycle (%)	*26.1*	*18.4*	*18.0*	*21.2*
Live deliveries per clinical pregnancy (%)	*71.7*	*68.7*	*67.9*	*70.0*

Clinical pregnancies and live deliveries from oocyte/embryo recipient cycles by recipient's age

The clinical pregnancy and live delivery rates of recipient cycles varied by recipient's age group. The overall live delivery rate per initiated cycle was 19.1%, varying between 16.3% and 22.2% by recipient's age (Table 22). However, the live delivery rate of oocyte/embryo recipient cycles in recipients aged ≥ 45 (16.3%) was markedly higher than the rate for autologous fresh cycles (0.9%) and the rate for autologous thaw cycles (4.6%) in women aged ≥ 45 (Tables 9 and 14).

Table 22: Outcomes of oocyte/embryo recipient cycles by recipient's age group, Australia and New Zealand, 2012

	Recipient age group (years)[(a)]					
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
Initiated cycles	84	225	531	868	521	2,229
Embryo transfer cycles	73	198	475	788	472	2,006
Clinical pregnancies	19	70	148	249	123	609
Live deliveries	14	50	104	173	85	426
Live deliveries per initiated cycle (%)	*16.7*	*22.2*	*19.6*	*19.9*	*16.3*	*19.1*
Live deliveries per embryo transfer cycle (%)	*19.2*	*25.3*	*21.9*	*22.0*	*18.0*	*21.2*
Live deliveries per clinical pregnancy (%)	*73.7*	*71.4*	*70.3*	*69.5*	*69.1*	*70.0*

(a) Recipient age at start of a treatment cycle.

Clinical pregnancies and live deliveries from oocyte/embryo recipient cycles by donor's age

Advancing donor's age was associated with a decrease in the live delivery rate (Table 23). The live delivery rate per initiated cycle in which the donor's age was under 40 was 19.4% compared to 9.1% for cycles in which the donor's age was ≥ 40 (Table 23).

Table 23: Outcomes of oocyte/embryo recipient cycles by donor's age group, Australia and New Zealand, 2012

	Donor age group (years)[a]				
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**≥ 40**	**All[b]**
Initiated cycles	500	694	685	132	2,229
Embryo transfer cycles	445	635	598	110	2,006
Clinical pregnancies	140	214	165	23	609
Live deliveries	108	155	101	12	426
Live deliveries per initiated cycle (%)	*21.6*	*22.3*	*14.7*	*9.1*	*19.1*
Live deliveries per embryo transfer cycle (%)	*24.3*	*24.4*	*16.9*	*10.9*	*21.2*
Live deliveries per clinical pregnancy (%)	*77.1*	*72.4*	*61.2*	*52.2*	*70.0*

(a) Donor age at start of a treatment cycle.

(b) Includes cycles where donor's age was not stated.

Clinical pregnancies and live deliveries from oocyte/embryo recipient cycles by number of embryos transferred

Of the 2,006 oocyte/embryo recipient cycles where embryos were transferred, 74.1% were SET, 25.5% were DET and eight cycles (0.4%) transferred three or more embryos.

The live delivery rate per oocyte/embryo recipient cycle where embryos were transferred was higher for DET cycles than SET cycles regardless of a recipient's age. Overall, the difference in the live delivery rate between SET cycles and DET cycles was 3.3 percentage points (20.4% and 23.7% respectively) (Table 24).

Table 24: Outcomes of oocyte/embryo recipient cycles by recipient's age and number of embryos transferred, Australia and New Zealand, 2012

	Recipient age group (years)[a]							
	< 35		35–39		≥ 40		All	
Stage/outcome of treatment	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]
Embryo transfer cycles	206	65	366	108	915	338	1,487	511
Clinical pregnancies	62	27	110	38	256	114	428	179
Live deliveries	46	18	74	30	183	73	303	121
Clinical pregnancies per embryo transfer cycle (%)	*30.1*	*41.5*	*30.1*	*35.2*	*28.0*	*33.7*	*28.8*	*35.0*
Live deliveries per embryo transfer cycle (%)	*22.3*	*27.7*	*20.2*	*27.8*	*20.0*	*21.6*	*20.4*	*23.7*

(a) Recipient age at start of a treatment cycle.

(b) SET: single embryo transfer.

(c) DET: double embryo transfer.

Clinical pregnancies and live deliveries from oocyte/embryo recipient cycles by stage of embryo development

The live delivery rate per oocyte/embryo recipient cycle with embryos transferred was higher for blastocyst transfer cycles than cleavage embryo transfer cycles regardless of a recipient's age. Overall, the difference in live delivery rates for cleavage stage embryo and blastocyst transfer cycles was 10.1 percentage points (15.3% and 25.4% respectively) (Table 25).

Table 25: Outcomes of oocyte/embryo recipient cycles by recipient's age and stage of embryo development, Australia and New Zealand, 2012

	Recipient age group (years)[a]							
	< 35		35–39		≥ 40		All	
Stage/outcome of treatment	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]
Embryo transfer cycles	117	154	186	289	522	738	825	1,181
Clinical pregnancies	31	58	47	101	116	256	194	415
Live deliveries	22	42	31	73	73	185	126	300
Clinical pregnancies per embryo transfer cycle (%)	*26.5*	*37.7*	*25.3*	*34.9*	*22.2*	*34.7*	*23.5*	*35.1*
Live deliveries per embryo transfer cycle (%)	*18.8*	*27.3*	*16.7*	*25.3*	*14.0*	*25.1*	*15.3*	*25.4*

(a) Recipient age at start of a treatment cycle.

(b) CL: cleavage stage embryo.

(c) BL: blastocyst.

Clinical pregnancies and live deliveries from oocyte/embryo recipient cycles by stage of embryo development and embryo freezing methods

Almost three-quarters (72.0%) of oocyte/embryo recipient thaw cycles where a blastocyst was transferred used vitrified embryos, compared with 9.6% of cycles where a cleavage stage embryo was transferred. The rates of clinical pregnancy and live delivery were higher for the transfer of vitrified blastocysts than slow frozen blastocysts. In contrast, the rates of clinical pregnancy and live delivery were higher for slow frozen cleavage stage embryos than vitrified cleavage stage embryos (Table 26).

Table 26: Outcomes of oocyte/embryo recipient thaw cycles by stage of embryo development and embryo freezing methods, Australia and New Zealand, 2012

	Stage of embryo development					
	Cleavage embryo		Blastocyst		All	
Stage/outcome of treatment	Slow freezing	Vitrification	Slow freezing	Vitrification	Slow freezing	Vitrification
Embryo transfer cycles	473	50	203	521	676	571
Clinical pregnancies	101	9	54	169	155	178
Live deliveries	64	5	35	124	99	129
Clinical pregnancies per embryo transfer cycle (%)	*21.4*	*18.0*	*26.6*	*32.4*	*22.9*	*31.2*
Live deliveries per embryo transfer cycle (%)	*13.5*	*10.0*	*17.2*	*23.8*	*14.6*	*22.6*

4 Pregnancy and birth outcomes following autologous and recipient embryo transfer cycles in 2012

4.1 Clinical pregnancies

Clinical pregnancies overview

Of the 55,620 autologous and recipient embryo transfer cycles undertaken in Australian and New Zealand fertility centres, 16,686 resulted in a clinical pregnancy. Of these, 15,127 (90.7%) were reported from fertility centres in Australia and 1,559 (9.3%) from New Zealand centres. Clinical pregnancies that resulted from other cycles are described in Chapter 5.

Of the 16,686 clinical pregnancies, over three-quarters (76.3%) resulted in a delivery and 22.1% resulted in early pregnancy loss (less than 20 weeks gestation and less than 400 grams birthweight). The outcomes of 267 (1.6%) clinical pregnancies were not known because women could not be followed up or contacted by fertility centres.

Over three-quarters (77.9%) of clinical pregnancies followed SET, while one-fifth followed DET (21.6%). Just 0.5% of clinical pregnancies followed the transfer of three or more embryos.

Fetal hearts by number of embryos transferred

Of the 16,686 clinical pregnancies, 80.0% had one fetal heart (single fetus) detected, 5.9% had multiple fetal hearts (multiple fetuses) detected and 10.7% had no fetal heart detected at the time of ultrasound (Table 27). Multiple fetuses are closely related to the number of embryos transferred in ART treatment. Two fetal hearts were detected in 19.3% of clinical pregnancies following DET cycles and in 2.0% of clinical pregnancies following SET cycles (Table 27).

Table 27: Clinical pregnancies by number of fetal hearts and number of embryos transferred, Australia and New Zealand, 2012

Number of fetal hearts	One embryo		Two embryos		Three or more embryos		Total	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
0[(a)]	1,330	10.2	442	12.3	8	10.3	1,780	10.7
1	10,998	84.6	2,297	63.7	54	69.2	13,349	80.0
2	256	2.0	695	19.3	5	6.4	956	5.7
3 or 4	12	0.1	21	0.6	1	1.3	34	0.2
Not stated	406	3.1	151	4.2	10	12.8	567	3.4
Total	**13,002**	**100.0**	**3,606**	**100.0**	**78**	**100.0**	**16,686**	**100.0**

(a) No fetal heart detected at the time of ultrasound.

Early pregnancy loss

There were 3,694 early pregnancy losses (less than 20 weeks gestation and less than 400 grams birthweight) following embryo transfers, representing 22.1% of clinical pregnancies (Table 28).

Pregnancies following SET resulted in a lower rate of early pregnancy loss (20.8%) and higher delivery rate (77.4%) than pregnancies following DET and three or more embryos (Table 28).

Table 28: Early pregnancy loss by pregnancy outcome and number of embryos transferred, Australia and New Zealand, 2012

Pregnancy outcome	Number of embryos transferred							
	One		Two		Three or more		All	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Early pregnancy loss	2,700	20.8	957	26.5	37	47.4	3,694	22.1
Miscarriage	*2,467*	*19.0*	*878*	*24.3*	*34*	*43.6*	*3,379*	*20.3*
Reduction or termination	*86*	*0.7*	*18*	*0.5*	*1*	*1.3*	*105*	*0.6*
Ectopic or heterotopic pregnancy	*147*	*1.1*	*61*	*1.7*	*2*	*2.6*	*210*	*1.3*
Delivery	10,067	77.4	2,617	72.6	41	52.6	12,725	76.3
Not stated	235	1.8	32	0.9	0	0.0	267	1.6
Total	**13,002**	**100.0**	**3,606**	**100.0**	**78**	**100.0**	**16,686**	**100.0**

4.2 Deliveries

There were 12,725 women who gave birth to at least one baby of 20 weeks or more gestation or at least 400 grams birthweight following embryo transfer cycles. Of these, 98.2% (12,501) gave birth to at least one liveborn baby (live delivery). The proportion of term live deliveries among all deliveries was higher for autologous cycles than for oocyte/embryo recipient cycles (Table 29).

Table 29: Deliveries by delivery outcome and treatment type, Australia and New Zealand, 2012

Pregnancy outcome	Autologous				Oocyte /embryo recipient		All	
	Fresh		Thaw					
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Live delivery	7,072	98.7	5,003	97.6	426	98.8	12,501	98.2
< 37 weeks	*914*	*12.8*	*603*	*11.8*	*91*	*21.1*	*1,608*	*12.6*
≥ 37 weeks	*6,158*	*85.9*	*4,400*	*85.8*	*335*	*77.7*	*10,893*	*85.6*
Fetal death (stillbirth)[(a)]	71	1.0	48	0.9	2	0.5	121	1.0
Not stated	24	0.3	76	1.5	3	0.7	103	0.8
Total	**7,167**	**100.0**	**5,127**	**100.0**	**431**	**100.0**	**12,725**	**100.0**

(a) Fetal death (stillbirth) is reported by patients to fertility centre staff. These data are not official vital statistics.

Deliveries by number of embryos transferred

Of the 12,725 deliveries, 6.5% had multiple deliveries (Table 30), a lower proportion than in 2011 (6.9%) (Macaldowie et al. 2013). By comparison, the proportion of multiple deliveries in Australia from all conceptions in 2011 was 1.5% (Li et al. 2013).

Twin deliveries accounted for 6.3% of deliveries following embryo transfer cycles in 2012. Of twin deliveries, three-quarters were from DET (583/807) and one-quarter were from SET cycles (221/807). Of the 2,617 deliveries following DET cycles, 22.3% were twins, markedly higher than the proportion following SET cycles (2.2%) (Table 30).

Table 30: Deliveries by gestation and number of embryos transferred, Australia and New Zealand, 2012

Gestation	One embryo		Two embryos		Three or more embryos		Total	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Singleton	9,839	97.7	2,022	77.3	38	92.7	11,899	93.5
Multiple	*228*	*2.3*	*595*	*22.7*	*3*	*7.3*	*826*	*6.5*
Twin	221	2.2	583	22.3	3	7.3	807	6.3
Higher order multiple	7	0.1	12	0.5	0	0.0	19	0.1
Total	**10,067**	**100.0**	**2,617**	**100.0**	**41**	**100.0**	**12,725**	**100.0**

Deliveries by maternal age

The average age of women at the time of delivery was 34.9. This is five years older than the average age (30.0) of women who gave birth in Australia in 2011 (Li et al. 2013).

Women aged 40 or older had a higher proportion (7.1%) of multiple deliveries compared with women aged under 35 (5.9%) and women aged 35–39 (7.0%). Of deliveries following DET, the proportion of multiple deliveries was higher for women aged under 35 (28.7%) compared with women aged 35–39 (21.6%) and women aged 40 or older (17.4%) (Table 31).

Table 31: Deliveries by gestation and maternal age group, Australia and New Zealand, 2012

	Age group (years)[a]								
	< 35			35–39			≥ 40		
Gestation	One embryo	Two embryos	All	One embryo	Two embryos	All[b]	One embryo	Two embryos	All[b]
					Number				
Singleton	4,887	581	5,468	3,653	880	4,536	1,299	561	1,895
Multiple	*107*	*234*	*341*	*97*	*243*	*340*	*24*	*118*	*145*
Twin	104	230	334	94	238	332	23	115	141
Higher order multiple	3	4	7	3	5	8	1	3	4
Total	**4,994**	**815**	**5,809**	**3,750**	**1,123**	**4,876**	**1,323**	**679**	**2,040**
					Per cent				
Singleton	97.9	71.3	94.1	97.4	78.4	93.0	98.2	82.6	92.9
Multiple	*2.1*	*28.7*	*5.9*	*2.6*	*21.6*	*7.0*	*1.8*	*17.4*	*7.1*
Twin	2.1	28.2	5.7	2.5	21.2	6.8	1.7	16.9	6.9
Higher order multiple	0.1	0.5	0.1	0.1	0.4	0.2	0.1	0.4	0.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Age at time of delivery.

(b) Included three or more embryos.

Caesarean section

Almost half (49.0%) of deliveries following embryo transfer cycles were by caesarean section (Table 32). This is a markedly higher rate than for all deliveries in Australia in 2011 (32.3%) (Li et al. 2013). The higher rate of caesarean section following ART treatment may be related to the fact that women were five years older on average and that there were more multiple births following ART treatment.

The caesarean section rate increased with advancing women's age at delivery: 39.4% of women aged less than 30 had a caesarean section compared with 77.8% of women aged 45 or older (Table 32).

The caesarean section rate varied by plurality, with 46.8% for singleton deliveries, 80.7% for twin deliveries and 84.2% for triplet deliveries.

Table 32: Deliveries by method of delivery and maternal age group, Australia and New Zealand, 2012

	Age group (years)[(a)]					
Method of delivery	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**Total**
			Number			
Caesarean section	597	1,839	2,544	1,140	119	6,239
Other	903	2,430	2,309	738	33	6,413
Not stated	16	24	23	9	1	73
Total	**1,516**	**4,293**	**4,876**	**1,887**	**153**	**12,725**
			Per cent			
Caesarean section	39.4	42.8	52.2	60.4	77.8	49.0
Other	59.6	56.6	47.4	39.1	21.6	50.4
Not stated	1.1	0.6	0.5	0.5	0.7	0.6
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Age at time of delivery.

4.3 Perinatal outcomes of babies

The babies described in this section were those born at 20 weeks or more gestational age or at least 400 grams birthweight following autologous and recipient embryo transfer cycles. The outcomes of babies born from other cycles are described in Chapter 5.

There were 13,570 babies born to women who had autologous and recipient embryo transfer cycles, 90.5% (12,286) were reported from fertility centres in Australia and 9.5% (1,284) from fertility centres in New Zealand. Of the 13,570 babies, 87.7% were singletons, 11.9% were twins and 0.4% were triplets. There were 13,292 liveborn babies (98.0%). The birth status was not reported for 0.9% of babies.

Sex distribution in liveborn babies

There were 6,690 (50.3%) liveborn male babies, 6,292 (47.4%) liveborn female babies and 310 (2.3%) liveborn babies where sex was not stated. For the 12,982 liveborn babies where the baby's sex was stated, the sex ratio was 106.3 male babies for every 100 female babies, similar to the ratio for all Australian liveborn babies born in 2011 (105.7) (Li et al. 2013).

Liveborn babies following cleavage embryo transfers had a sex ratio of 93.4 male babies for every 100 female babies. In comparison, liveborn babies following blastocyst transfers had a sex ratio of 112.3 male babies for every 100 female babies. In comparison, in 2011, liveborn babies following cleavage embryo transfers had a sex ratio of 96.8 male babies for every 100 female babies, and liveborn babies following blastocyst transfers had a sex ratio of 114.6 male babies for every 100 female babies (Macaldowie et al. 2013).

Gestational age of babies

The average gestational age of babies born following autologous and recipient embryo transfer cycles was 37.9 weeks (Table 33). This is lower than the average gestational age of 38.7 weeks for all babies born in Australia in 2011 (Li et al. 2013).

Nearly one in six babies (17.0%) were preterm (less than 37 weeks gestation), which was markedly higher than the proportion of preterm babies (8.3%) born in Australia in 2011 (Li et al. 2013). The average gestational age of ART singletons was 38.4 weeks, marginally less than the average gestational age of 38.8 weeks for all singletons born in Australia in 2011 (Li et al. 2013). The average gestational age for ART twins was 34.9 weeks (Table 33), marginally less than the average gestational age of 35.0 weeks for all twins born in Australia in 2011 (Li et al. 2013).

Table 33: Babies by gestational age and plurality, Australia and New Zealand, 2012

Gestational age (weeks)	Singletons		Twins		Higher order multiples		Total	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Mean	38.4		34.9		29.8		37.9	
≤ 27	149	1.3	70	4.3	12	21.1	231	1.7
28–31	109	0.9	94	5.8	24	42.1	227	1.7
32–36	897	7.5	934	57.9	21	36.8	1,852	13.6
≥ 37	10,744	90.3	516	32.0	0	0.0	11,260	83.0
Total	**11,899**	**100.0**	**1,614**	**100.0**	**57**	**100.0**	**13,570**	**100.0**
≤ 36	*1,155*	*9.7*	*1,098*	*68.0*	*57*	*100.0*	*2,310*	*17.0*

Figure 8 shows the distribution of gestational age for singletons and twins born to women who had autologous and recipient embryo transfer cycles in 2012. Singletons following SET cycles had a lower proportion of preterm birth (9.2%) than singletons following DET cycles (11.9%). The overall proportions of preterm singletons (9.7%) and twins (67.9%) born to women who had embryo transfer cycles in 2012 were higher than the overall proportions of preterm singletons and twins born in Australia in 2011 (6.8% and 57.4% respectively) (Li et al. 2013).

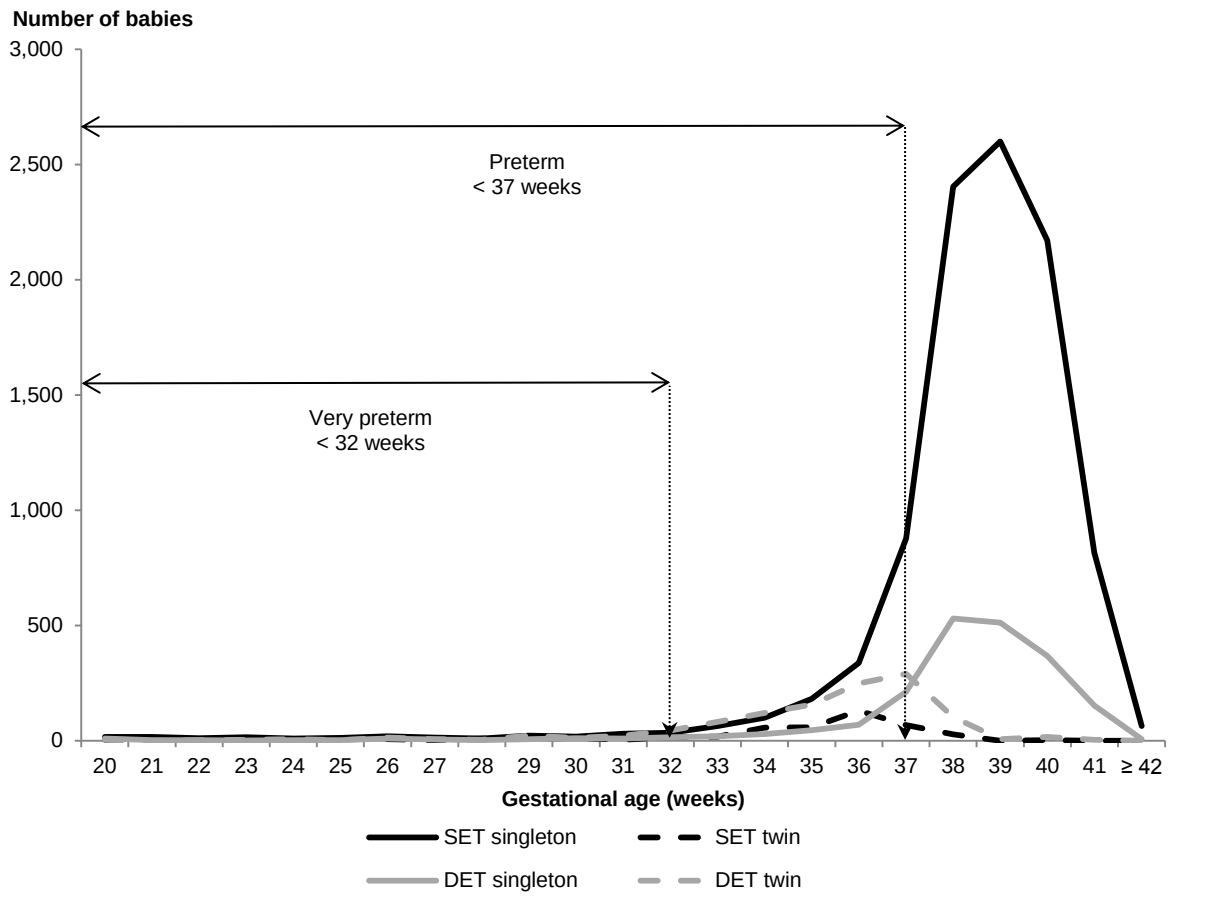

Figure 8: Number of babies born following embryo transfer cycles by gestational age, Australia and New Zealand, 2012

Birthweight of liveborn babies

The average birthweight for liveborn babies to women who had autologous and recipient embryo transfer cycles was 3,210 grams. Almost 13% of these babies were low birthweight (less than 2,500 grams) (Table 34).

The average birthweight was 3,331 grams and 2,344 grams for liveborn ART singletons and twins respectively. These were lower than the mean birthweight of all liveborn singletons (3,398 grams) and twins (2,379 grams) in Australia in 2011 (Li et al. 2013). Low birthweight was reported for 6.3% of liveborn singletons following SET, and 7.7% of liveborn singletons following DET.

Table 34: Liveborn babies by birthweight group and plurality, Australia and New Zealand, 2012

	Singletons				
Birthweight (grams)	**SET[(a)]**	**DET[(b)]**	**Twins**	**Higher order multiples**	**Total[(c)]**
			Number		
< 1,000	54	15	39	9	118
1,000–1,499	53	21	91	19	184
1,500–1,999	110	27	198	17	353
2,000–2,499	397	89	547	1	1,037
2,500–2,999	1,470	314	469	0	2,259
3,000–3,499	3,579	736	147	0	4,474
3,500–3,999	2,797	543	17	0	3,371
≥ 4,000	1,065	188	3	0	1,257
Not stated	156	45	37	1	239
Total	**9,681**	**1,978**	**1,548**	**47**	**13,292**
< 2,500	*614*	*152*	*875*	*46*	*1,692*
			Per cent		
< 1,000	0.6	0.8	2.5	19.1	0.9
1,000–1,499	0.5	1.1	5.9	40.4	1.4
1,500–1,999	1.1	1.4	12.8	36.2	2.7
2,000–2,499	4.1	4.5	35.3	2.1	7.8
2,500–2,999	15.2	15.9	30.3	0.0	17.0
3,000–3,499	37.0	37.2	9.5	0.0	33.7
3,500–3,999	28.9	27.5	1.1	0.0	25.4
≥ 4,000	11.0	9.5	0.2	0.0	9.5
Not stated	1.6	2.3	2.4	2.1	1.8
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
< 2,500	*6.3*	*7.7*	*56.5*	*97.9*	*12.7*

(a) SET: single embryo transfer.

(b) DET: double embryo transfer.

(c) Included singletons following transfer of three or more embryos.

Perinatal mortality

Perinatal mortality is a summary measure of fetal deaths (stillbirths) and neonatal deaths (defined as the death of liveborn infants within 28 days of birth).

There were 170 reported perinatal deaths, including 153 fetal deaths and 17 neonatal deaths. The perinatal mortality rate in 2012 was 12.5 deaths per 1,000 births (Table 35), which was higher than the rate of 9.9 per 1,000 births for all births in Australia in 2011 (Li et al. 2013). Singletons had a lower perinatal mortality rate (9.8 deaths per 1,000 births) compared with multiples (31.7 deaths per 1,000 births) (Table 35).

These data should be interpreted with caution because of the small numbers and potential variability in case reporting, which is compounded by the self-reported nature of ART birth outcome data. In 2012, information relating to pregnancy outcomes was not stated for 1.6% of clinical pregnancies.

Table 35: Perinatal mortality of babies by type of death and plurality, Australia and New Zealand, 2012

Birth outcome	Singletons	Multiples	Total
		Number	
Fetal death (stillbirth)	103	50	153
Neonatal death	14	3	17
Perinatal death[(a)]	117	53	170
All births	**11,899**	**1,671**	**13,570**
All live births	**11,697**	**1,595**	**13,292**
		Rate[(b)]	
Fetal deaths per 1,000 births	*8.7*	*29.9*	*11.3*
Neonatal deaths per 1,000 live births	*1.2*	*1.9*	*1.3*
Perinatal deaths per 1,000 births	*9.8*	*31.7*	*12.5*

(a) Perinatal deaths are reported by patients to fertility centre staff. These data are not official vital statistics.

(b) Fetal and perinatal mortality rates were calculated using all births (live births and fetal deaths) as the denominator. The neonatal mortality rate was calculated using live births as the denominator.

Note: The birth status was not reported for 125 babies.

5 Other cycle types, procedures and treatment complications in 2012

5.1 Gestational surrogacy cycles

Gestational surrogacy is an arrangement where a woman, known as the 'gestational carrier', agrees to carry a child for another person or couple, known as the 'intended parent(s)', with the intention that the child will be raised by the intended parent(s). The oocytes and/or sperm used to create the embryo(s) in the surrogacy cycle can be either from the intended parents or from a donor(s).

There were 163 gestational surrogacy cycles in 2012, including 121 gestational carrier cycles and 42 commissioning cycles. Commissioning cycles include a variety of cycle types involved in the provision of oocytes or embryos by either the intended parents or donors. Among the 121 gestational carrier cycles, 30 (24.8%) resulted in a clinical pregnancy and 19 (15.7%) resulted in a live delivery. All 19 babies born to gestational carriers were liveborn singletons.

5.2 GIFT cycles

Gamete intrafallopian transfer (GIFT) is an ART treatment where mature oocytes and sperm are placed directly into a woman's fallopian tubes. The use of GIFT has been declining in Australia and New Zealand in recent years. In 2012, there were seven GIFT cycles that resulted in one clinical pregnancy and one liveborn baby.

5.3 Assisted hatching

Assisted hatching is an ART procedure where the outer layer of the embryo, the zona pellucida, is either thinned or perforated in the laboratory to aid 'hatching' of the embryo.

There were 2,215 assisted hatching cycles reported in 2012. Of these, 1,782 (80.5%) had embryos transferred, resulting in 551 (24.9%) clinical pregnancies and 408 (18.4%) live deliveries. There were 412 births following assisted hatching cycles, including 375 singletons, 70 twins and six triplets. One-third (765) of preimplantation genetic diagnosis cycles (2,294) were associated with assisted hatching.

5.4 Preimplantation genetic diagnosis

Preimplantation genetic diagnosis (PGD) is a procedure in which one or more cells are removed from the embryo and analysed for chromosomal disorders or genetic diseases. The number of cycles where PGD was performed in 2012 increased by 94.1% from 1,182 in 2011 (Macaldowie et al. 2013) to 2,294 in 2012, representing 3.7% of cycles in which embryos were created or thawed (Table 36). Almost two-thirds (63.9%) of PGD cycles were fresh cycles (Table 36). The indication for PGD is not recorded in ANZARD.

The majority (63.5%) of the 2,294 cycles where PGD was performed were in woman aged 35 or older.

Of the 2,294 PGD cycles, 62.0% (1,423) had embryos transferred and resulted in 494 (21.5%) clinical pregnancies and 361 (15.7%) live deliveries.

Table 36: Number of cycles with PGD by type of embryo, Australia and New Zealand, 2012

	Stage of treatment		
Type of embryo	Number of cycles with embryo fertilised/thawed	Number of cycles with PGD	PGD per cycle with embryo fertilised/thawed (per cent)
Fresh	36,240	1,467	4.0
Thaw	25,178	827	3.3
Total	**61,418**	**2,294**	**3.7**

5.5 Ovarian hyperstimulation syndrome

Ovarian hyperstimulation syndrome (OHSS) is a complication of controlled ovarian hyperstimulation where excessive follicles are produced with high levels of oestrogen secretion.

Cases of OHSS that require hospitalisation are reported by patients and clinicians, and validated against hospital records by fertility centre staff. There were 266 OHSS cases reported in 2012 that were admitted to hospital. It is possible this information is under-reported as there is no nationally agreed definition for OHSS.

A higher number of oocytes retrieved at OPU is associated with OHSS (Table 37).

Table 37: Number of cycles with OPU performed and OHSS by number of oocytes collected, Australia and New Zealand, 2012

	Number of oocytes collected						
	None	1–4	5–9	10–14	15–19	≥ 20	All
Cycles with OHSS	0	2	28	59	67	110	266
Cycles with OPU	739	9,459	14,082	8,763	4,048	2,471	39,562
OHSS per OPU cycle (%)	*0.0*	*0.0*	*0.2*	*0.7*	*1.7*	*4.5*	*0.7*

6 Donor sperm insemination cycles in 2012

Donor sperm insemination (DI) covers a range of techniques of placing sperm into the female genital tract using donated sperm from a man who is not the woman's partner. The information presented in this section only describes DI cycles undertaken in fertility centres in Australia and New Zealand, and does not include DI undertaken outside of this setting.

Number and outcomes of DI cycles

In 2012, there were 2,283 DI cycles reported, which included 33.0% (754) undertaken with controlled ovarian hyperstimulation and 67.0% (1,529) undertaken in unstimulated cycles. Of all DI cycles, 15.0% resulted in a clinical pregnancy and 12.2% resulted in a live delivery (Table 38).

The average age of women who had a DI cycle was 35.1. The clinical pregnancy rate and live delivery rate was highest in women aged under 35 and decreased with advancing women's age. Of the DI cycles in women aged under 35, 16.4% resulted in a live delivery, compared with 4.5% of DI cycles in women aged 40 or older (Table 38).

Table 38: Outcomes of DI cycles by women's age group, Australia and New Zealand, 2012

	Age group (years)[(a)]				
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**≥ 40**	**Total**
DI cycles	359	610	896	418	2,283
Clinical pregnancies	64	119	137	23	343
Live deliveries	57	102	101	19	279
Clinical pregnancies per DI cycle (%)	*17.8*	*19.5*	*15.3*	*5.5*	*15.0*
Live deliveries per DI cycle (%)	*15.9*	*16.7*	*11.3*	*4.5*	*12.2*
Live deliveries per clinical pregnancy (%)	*89.1*	*85.7*	*73.7*	*82.6*	*81.3*

(a) Age at start of a treatment cycle.

Clinical pregnancies following DI cycles

Of the 343 clinical pregnancies following DI cycles, 81.3% resulted in a delivery, 15.7% ended in early pregnancy loss (including 15.2% miscarriages and 0.6% ectopic/heterotopic pregnancies), and 2.9% were unknown pregnancy outcomes. Of the 281 deliveries, 264 (77.0%) were singleton deliveries and 17 (5.0%) were twin deliveries.

Perinatal outcomes of babies

There were 298 babies born to women who had DI treatment, including 296 liveborn babies and two babies where the outcome was unknown. Of these liveborn babies, 35 (11.8%) were born preterm (less than 37 weeks gestation). The mean birthweight of liveborn babies following DI treatment was 3,277 grams. This was higher than the mean birthweight (3,210 grams) of liveborn babies following embryo transfer cycles. Twenty-eight liveborn babies (9.5%) were born with low birthweight (less than 2,500 grams).

7 Trends in ART treatment and outcomes: 2008–2012

This section includes autologous cycles, donation/recipient cycles, surrogacy cycles and GIFT cycles undertaken in Australia and New Zealand from 2008 to 2012. It does not include DI cycles.

ART treatment and outcomes

In 2012, 44,238 initiated fresh ART treatment cycles were undertaken in Australia and New Zealand. This is an increase of 3.8% on 2011 and an increase of 12.5% on 2008 (Table 39). Between 2008 and 2012, the pregnancy and live delivery rates per initiated fresh cycle ranged from 21.9% to 23.8% and from 16.4% to 18.1% respectively (Table 39).

Table 39: Number of fresh cycles by stage/outcome of treatment, Australia and New Zealand, 2008 to 2012

Stage/outcome of treatment	2008	2009	2010	2011	2012
Initiated cycles[(a)]	39,309	45,400	38,796	42,629	44,238
Cycles with OPU[(b)]	35,151	40,708	34,824	38,222	39,709
Embryo transfers	30,112	34,765	29,775	31,837	31,837
Clinical pregnancies	9,047	10,501	9,236	9,346	9,673
Live deliveries	6,935	8,009	7,014	7,117	7,275
Embryo transfers per initiated cycle (%)	*76.6*	*76.6*	*76.7*	*74.7*	*72.0*
Clinical pregnancies per initiated cycle (%)	*23.0*	*23.1*	*23.8*	*21.9*	*21.9*
Live deliveries per embryo transfer (%)	*23.0*	*23.0*	*23.6*	*22.4*	*22.9*
Live deliveries per initiated cycle (%)	*17.6*	*17.6*	*18.1*	*16.7*	*16.4*

(a) Included autologous cycles, oocyte donation cycles, oocyte/embryo recipient cycles, GIFT cycles and surrogacy cycles.

(b) Cycles with OPU includes cycles where no oocytes were collected during the procedure.

In comparison, 25,844 autologous thaw cycles were undertaken in 2012, an increase of 9.0% on 2011 and an increase of 14.3% on 2008 (Table 40). The live delivery rate following thaw cycles increased from 16.3% in 2008 to 20.3% in 2012 (Table 40).

Table 40: Number of thaw cycles by stage/outcome of treatment, Australia and New Zealand, 2008 to 2012

Stage/outcome of treatment	2008	2009	2010	2011	2012
Initiated cycles[(a)]	22,620	25,141	22,978	23,718	25,844
Embryo transfers	20,533	22,555	20,805	21,974	23,891
Clinical pregnancies	4,936	5,474	5,516	5,973	7,044
Live deliveries	3,698	4,118	4,155	4,523	5,246
Embryo transfers per initiated cycle (%)	*90.8*	*89.7*	*90.5*	*92.6*	*92.4*
Clinical pregnancies per initiated cycle (%)	*21.8*	*21.8*	*24.0*	*25.2*	*27.3*
Live deliveries per embryo transfer (%)	*18.0*	*18.3*	*20.0*	*20.6*	*22.0*
Live deliveries per initiated cycle (%)	*16.3*	*16.4*	*18.1*	*19.1*	*20.3*

(a) Included autologous cycles, oocyte/embryo recipient cycles and surrogacy cycles.

Multiple gestation deliveries

The decline in multiple gestation deliveries resulting from ART treatment continued in 2012. The proportion of multiple deliveries decreased from 8.4% in 2008 to 6.5% in 2012 (Table 41). The decline is primarily the result of the increasing uptake of SET (Table 44).

Table 41: Number of deliveries following ART treatment by gestation, Australia and New Zealand, 2008 to 2012

	2008		2009		2010		2011		2012	
Gestation	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
Singleton	9,880	91.6	11,272	91.8	10,382	92.1	10,977	93.1	11,919	93.5
Multiple	*903*	*8.4*	*1,006*	*8.2*	*890*	*7.9*	*815*	*6.9*	*826*	*6.5*
Twin	879	8.2	987	8.0	874	7.8	799	6.8	807	6.3
Higher order multiple	24	0.2	19	0.2	16	0.1	16	0.1	19	0.1
Total[(a)]	**10,783**	**100**	**12,278**	**100**	**11,272**	**100**	**11,792**	**100**	**12,745**	**100**

(a) Includes cycles in which gestation was unknown.

Women's age for autologous cycles

The majority of autologous cycles undertaken between 2008 and 2012 were in women aged 30 to 39. The average age of women having autologous cycles remained relatively stable over the period ranging from 35.7 to 35.9 years. The proportion of autologous cycles in women aged 40 and older increased from 23.3% in 2008 to 25.3% in 2011 and 2012 (Table 42).

Table 42: Number of fresh and thaw autologous cycles by women's age group, Australia and New Zealand, 2008 to 2012

	2008		2009		2010		2011		2012	
Age group (years)[(a)]	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
Mean	35.7		35.8		35.8		35.9		35.8	
< 30	6,373	10.8	7,303	10.9	6,469	11.0	6,720	10.7	7,353	11.0
30–34	16,154	27.5	17,979	26.7	15,641	26.7	17,129	27.2	18,132	27.2
35–39	22,572	38.4	25,953	38.6	22,224	37.9	23,314	37.0	24,344	36.5
40–44	12,663	21.6	14,853	22.1	13,194	22.5	14,670	23.3	15,763	23.6
≥ 45	977	1.7	1,141	1.7	1,046	1.8	1,231	2.0	1,118	1.7
Not stated	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	**58,740**	**100**	**67,229**	**100**	**58,574**	**100**	**63,064**	**100**	**66,710**	**100**

(a) Age at start of a treatment cycle.

Types of ART treatment and stage of embryo development

In Australia and New Zealand, the proportion of ART treatment cycles that used ICSI continued to increase, from 59.1% of cycles in 2008 to 64.7% in 2012. The number and proportion of blastocyst transfer cycles increased from 42.0% in 2008 to 59.8% in 2012 (Table 43).

Table 43: Number of embryo transfer cycles by treatment type, Australia and New Zealand, 2008 to 2012

	2008		2009		2010		2011		2012	
Treatment type/procedure	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
Fertilisation procedure										
IVF	19,761	39.1	21,790	38.0	18,237	36.1	18,873	35.1	19,653	35.3
ICSI	29,864	59.1	34,489	60.2	31,564	62.4	34,006	63.2	36,067	64.7
Not stated	944	1.9	1,028	1.8	769	1.5	922	1.7	2	0.0
Stage of embryo development										
Cleavage stage	29,352	58.0	28,780	50.2	24,200	47.9	22,760	42.3	22,392	40.2
Blastocyst	21,217	42.0	28,527	49.8	26,370	52.1	31,041	57.7	33,330	59.8

Note: The 2008 ANZARD data have been updated to correct the previously reported misclassifications of cleavage stage and blastocyst transfers. The numbers and percentages of cleavage embryo and blastocyst transfer cycles for 2008 are different from previous annual reports.

Number of embryos transferred per embryo transfer cycle

There has been an ongoing shift in ART practice to SET cycles in Australia and New Zealand. In 2008, the proportion of SET cycles accounted for 67.8% of embryo transfer cycles and by 2012 this proportion had increased to 76.3% (Table 44).

Table 44: Percentage of embryo transfer cycles by number of embryos transferred, Australia and New Zealand, 2008 to 2012

Number of embryos transferred	2008	2009	2010	2011	2012
One embryo	67.8	69.7	69.6	73.2	76.3
Two embryos	31.6	29.6	29.5	26.0	23.0
Three or more embryos	0.6	0.7	0.8	0.7	0.7

8 Women undertaking autologous treatment in 2012

ANZARD was upgraded from a cycle-based data collection to a woman-based data collection for treatments undertaken from 2009 onwards (ANZARD2.0). This allows reporting of the number of women undergoing treatment and the number of cycles per woman over time. The upgrade to a woman-based data collection was achieved by introducing a statistical linkage key (SLK) that links successive treatment cycles undertaken by one woman. The SLK is a combination of the first two letters of a woman's first name, the first two letters of her surname and her date of birth. The SLK enables the number of women undergoing treatment across time to be reported.

This section presents the number of women who underwent autologous ART treatment in 2012. The number of cycles undertaken by a woman included both fresh and thaw cycles. For some women, if their fresh cycles were undertaken in previous years, only thaw cycles were reported and presented.

Women who undertook autologous treatment

There were 36,171 women who undertook 66,710 autologous fresh and/or thaw cycles in Australia and New Zealand in 2012. Of these women, 32,865 had treatment in Australia, 3,339 in New Zealand, and 33 had treatment in both Australia and New Zealand.

On average, 1.8 fresh and/or thaw cycles per woman were undertaken in 2012, with more cycles per woman in Australia (1.9 cycles per woman) than in New Zealand (1.5 cycles per woman). Almost half (49.2%) of the women in Australia had two or more autologous treatment cycles compared with one-third (33.3%) of women in New Zealand. In line with this, 9.9% of women in Australia had four or more cycles in 2012 compared with 3.0% of women in New Zealand (Table 45).

Table 45: Women undertaking autologous fresh and/or thaw cycles by number of cycles, Australia and New Zealand, 2012

	Australia		New Zealand		All	
Number of cycles	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
One	16,687	50.8	2,226	66.7	18,902	52.3
Two	8,674	26.4	762	22.8	9,433	26.1
Three	4,256	12.9	250	7.5	4,509	12.5
Four or more	3,248	9.9	101	3.0	3,327	9.2
Total	**32,865**	**100.0**	**3,339**	**100.0**	**36,171**	**100.0**

Note: Only women who undertook cycles in 2012 are included. Thirty-three women had treatment in both Australia and New Zealand.

Women who undertook autologous fresh cycles

There were 42,299 fresh cycles undertaken by 29,180 women in Australia and New Zealand in 2012, an average of 1.4 fresh cycles per woman. Younger women had fewer fresh cycles with one in five (21.5%) of women aged under 30 having two or more autologous fresh cycles. This partly reflects the higher success rate per initiated fresh autologous cycle among younger women, and the fact that younger women tend to have more cryopreserved embryos available for subsequent thaw cycles. Less than 1.0% of women aged under 30 had four or more cycles. This proportion increased to 6.0% for women aged 40 to 44 and 6.3% for women aged 45 or older (Table 46).

Table 46: Women undertaking autologous fresh cycles by number of cycles, Australia and New Zealand, 2012

	Age group (years)[(a)]					
Number of cycles	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
			Number			
One	2,859	6,161	7,101	3,776	267	20,164
Two	641	1,499	2,272	1,645	104	6,161
Three	114	380	746	703	32	1,975
Four or more	30	120	313	390	27	880
Total	**3,644**	**8,160**	**10,432**	**6,514**	**430**	**29,180**
			Per cent			
One	78.5	75.5	68.1	58.0	62.1	69.1
Two	17.6	18.4	21.8	25.3	24.2	21.1
Three	3.1	4.7	7.2	10.8	7.4	6.8
Four or more	0.8	1.5	3.0	6.0	6.3	3.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Age at start of first autologous fresh cycle in 2012.

Women who undertook autologous thaw cycles

There were 24,411 thaw cycles undertaken by 16,366 women in Australia and New Zealand in 2012, representing an average of 1.5 thaw cycles per woman. More than one-third (36.6%) of women aged under 30 had only two or more thaw cycles compared with one-quarter (26.0%) of women aged 45 or older (Table 47).

Advancing women's age was associated with a decrease in the proportion of women having two or more thaw cycles, while advancing women's age saw an increase in the proportion of women having two or more fresh cycles (Tables 46 and 47).

Table 47: Women undertaking autologous thaw cycles by number of cycles, Australia and New Zealand, 2012

	Age group (years)[(a)]					
Number of cycles	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
			Number			
One	1,203	3,238	4,101	2,146	162	10,850
Two	464	1,177	1,401	675	41	3,758
Three	154	388	459	192	15	1,208
Four or more	78	182	222	67	1	550
Total	**1,899**	**4,985**	**6,183**	**3,080**	**219**	**16,366**
			Per cent			
One	63.3	65.0	66.3	69.7	74.0	66.3
Two	24.4	23.6	22.7	21.9	18.7	23.0
Three	8.1	7.8	7.4	6.2	6.8	7.4
Four or more	4.1	3.7	3.6	2.2	0.5	3.4
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Age at start of first autologous thaw cycle in 2012.

9 Cycle-specific rates for women who started their first autologous fresh ART treatment in 2009

ANZARD was upgraded from a cycle-based data collection to a woman-based data collection for treatments undertaken from 2009 onwards (ANZARD2.0). This allows reporting of the number of women undergoing treatment and number of cycles per woman over time. The upgrade to a woman-based data collection was achieved by introducing a statistical linkage key (SLK) that links successive treatment cycles undertaken by one woman. The SLK is a combination of the first two letters of a woman's first name, the first two letters of her surname and her date of birth. The SLK enables the number of women undergoing treatment across time to be reported.

This section presents information for the cohort of women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009. Women in this cohort were followed from the start of their first autologous fresh cycle through subsequent fresh and thaw cycles until 31 December 2012 or until they achieved a live delivery (a delivery of at least one liveborn baby) up to and including 31 October 2013.

This longitudinal perspective provides a measure of the outcomes of successive ART treatment cycles undertaken by the same woman. These women might have had additional treatment cycles after 2012 and their treatment information and resulting outcomes will be captured in subsequent annual reports. Therefore, in this dynamic cohort of women undergoing their first autologous fresh ART treatment between 1 January 2009 and 31 December 2009, the cycle-specific live delivery rates may change over time as more women return for treatment at a later date.

ART treatment cycles presented in Tables 48 to 53 include all initiated autologous fresh and thaw cycles, including those which did not proceed to oocyte collection or embryo transfer. Donor sperm insemination cycles, oocyte/embryo recipient cycles, oocyte/embryo donation cycles, surrogacy arrangement cycles and GIFT cycles were excluded. A pregnancy that ended before 20 weeks or with a stillbirth (fetal death) are not counted as a live delivery.

Table 48 presents the number of cycles by women's age group. Tables 49 to 53 present cycle-specific live delivery rates and non-progression rates for all women (Table 49) and women aged < 30, 30–34, 35–39 and 40–44 (Tables 50–53). Only the first 10 cycles are presented in Tables 49 to 53 due to the small number of women (180 women and 39 live deliveries) undertaking 11 or more treatment cycles between 1 January 2009 and 31 December 2012.

The cycle-specific live delivery rate for a specific cycle is calculated as the number of live deliveries divided by the number of women who commenced ART treatment in that cycle. For example, the cycle-specific rate of 15.6% for cycle three measures the proportion of women who undertook a third cycle and achieved a live delivery in that cycle (Table 49).

The non-progression rate for a specific cycle is calculated as the number of women who did not return for further ART treatment cycles before 31 December 2012 divided by the number of women who did not have a live delivery in that cycle. For example, the non-progression rate of 25.4% for cycle three measures the proportion of women who did not achieve a live delivery in cycle three, and did not progress to a fourth cycle (Table 49).

Number of cycles by women's age group

The SLK was used to identify a cohort of 16,565 women in Australia and New Zealand who undertook their first autologous fresh cycle in 2009 (Table 48). These women were followed through subsequent fresh and thaw cycles until 31 December 2012 or until they achieved a live delivery (a delivery of at least one liveborn baby) up to and including 31 October 2013.

Over three-quarters (76.1%) of these women had between one and three cycles, and almost one-quarter (23.9%) had four or more cycles (Table 48) .

Table 48: Number of cycles by women's age group for all women who started their first autologous fresh cycle between 1 January 2009 and 31 December 2009, Australia and New Zealand[(a)]

Cycle number	Age group (years)[(a)]					
	< 30	30–34	35–39	40–44	≥ 45	All
			Number			
One	1,031	2,119	2,237	1,059	101	6,547
Two	571	1,098	1,336	698	34	3,737
Three	311	653	867	474	21	2,326
Four	204	417	530	276	18	1,445
Five	121	236	368	185	7	917
Six	82	162	206	111	4	565
Seven	36	108	142	76	2	364
Eight	31	74	83	58	1	247
Nine	19	40	54	39	2	154
Ten or more	25	58	107	72	1	263
Total	**2,431**	**4,965**	**5,930**	**3,048**	**191**	**16,565**
			Per cent			
One	42.4	42.7	37.7	34.7	52.9	39.5
Two	23.5	22.1	22.5	22.9	17.8	22.6
Three	12.8	13.2	14.6	15.6	11.0	14.0
Four	8.4	8.4	8.9	9.1	9.4	8.7
Five	5.0	4.8	6.2	6.1	3.7	5.5
Six	3.4	3.3	3.5	3.6	2.1	3.4
Seven	1.5	2.2	2.4	2.5	1.0	2.2
Eight	1.3	1.5	1.4	1.9	0.5	1.5
Nine	0.8	0.8	0.9	1.3	1.0	0.9
Ten or more	1.0	1.2	1.8	2.4	0.5	1.6
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Age at start of first autologous fresh ART treatment cycle.

Note: Women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009 and were followed through subsequent fresh and thaw cycles until 31 December 2012 or delivery of a liveborn baby up to 31 October 2013.Totals and subtotals may not equal 100.0 due to rounding. Data should be interpreted with caution due to small numbers in certain cells.

Cycle-specific live delivery rates

Cycle-specific live delivery rates were calculated for the cohort of 16,565 women who were identified as having their first autologous fresh cycle in 2009. The cycle-specific live delivery rate for a specific cycle is calculated as the number of live deliveries divided by the number of women who commenced ART treatment in that cycle. After a woman's first autologous fresh cycle in 2009, subsequent cycles could be either fresh or thaw cycles, and once a woman had a live delivery any subsequent cycles and treatment outcomes were excluded from the analysis.

For all women identified as having their first autologous fresh cycle in 2009, the cycle-specific live birth rate ranged from 21.1% in the first cycle to 8.0% in the tenth cycle. Around one-quarter of women who did not achieve a live birth in a particular cycle did not proceed with further ART cycles (Table 49).

The cycle-specific rates where highest in women aged less than 35,and the non-progression rates where highest in women aged 40–44 (Tables 50 to 53).

Table 49: Cycle-specific live delivery rates for all women who started their first autologous fresh cycle between 1 January 2009 and 31 December 2009, Australia and New Zealand

Cycle number[(a)]	Number of women starting cycle[(b)]	Number of women who had a live delivery[(c)]	Cycle-specific live delivery rate (per cent)[(d)]	Number of women who did not progress to next treatment	Non-progression rate (per cent)[(e)(f)]
One	16,565	3,493	21.1	3,054	23.4
Two	10,018	1,680	16.8	2,057	24.7
Three	6,281	981	15.6	1,345	25.4
Four	3,955	567	14.3	878	25.9
Five	2,510	369	14.7	548	25.6
Six	1,593	228	14.3	337	24.7
Seven	1,028	152	14.8	212	24.2
Eight	664	92	13.9	155	27.1
Nine	417	48	11.5	106	28.7
Ten	263	21	8.0	62	25.6

(a) Cycle one represents a woman's first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009. Cycles two to ten could be either a fresh or thaw cycle undertaken by a woman until 31 December 2012 or delivery of a liveborn baby up to 31 October 2013.

(b) Women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009 and were followed through subsequent fresh and thaw cycles until 31 December 2012 or delivery of a liveborn baby up to 31 October 2013.

(c) A live delivery is the delivery of one or more liveborn infants, with the birth of twins or higher order multiples counted as one live delivery.

(d) The cycle-specific live delivery rate for a specific cycle is calculated as the number of live deliveries divided by the number of women who commenced ART treatment at that cycle.

(e) The non-progression rate for a specific cycle is calculated as the number of women who did not return for further ART treatment cycles before 31 December 2012 divided by the number of women who did not have a live delivery in that cycle.

(f) Reasons that a woman did not progress to the next treatment, such as poor prognosis, natural pregnancy, migration, financial, psychological and other unrelated reasons, were not collected in ANZARD.

Note: Further treatment cycles after the tenth cycle and resulting live deliveries are not presented in this table due to small numbers. Data should be interpreted with caution due to small numbers in certain cells.

Table 50: Cycle-specific live delivery rates for women aged less than 30 who started their first autologous fresh cycle between 1 January 2009 and 31 December 2009, Australia and New Zealand

Cycle number[a]	Number of women starting cycle[b]	Number of women who had a live delivery[c]	Cycle-specific live delivery rate (per cent)[d]	Number of women who did not progress to next treatment	Non-progression rate (per cent)[e][f]
One	2,431	663	27.3	368	20.8
Two	1,400	311	22.2	260	23.9
Three	829	174	21.0	137	20.9
Four	518	103	19.9	101	24.3
Five	314	52	16.6	69	26.3
Six	193	37	19.2	45	28.8
Seven	111	23	20.7	13	14.8
Eight	75	19	25.3	12	21.4
Nine	44	8	18.2	11	30.6
Ten	25	6	24.0	4	21.1

(a) Cycle one represents a woman's first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009. Cycles two to ten could be either a fresh or thaw cycle undertaken by a woman until 31 December 2012 or delivery of a liveborn baby up to 31 October 2013.

(b) Women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009 and were followed through subsequent fresh and thaw cycles until 31 December 2012 or delivery of a liveborn baby up to 31 October 2013.

(c) A live delivery is the delivery of one or more liveborn infants, with the birth of twins or higher order multiples counted as one live delivery.

(d) The cycle-specific live delivery rate for a specific cycle is calculated as the number of live deliveries divided by the number of women who commenced ART treatment at that cycle.

(e) The non-progression rate for a specific cycle is calculated as the number of women who did not return for further ART treatment cycles before 31 December 2012 divided by the number of women who did not have a live delivery in that cycle.

(f) Reasons that a woman did not progress to the next treatment, such as poor prognosis, natural pregnancy, migration, financial, psychological and other unrelated reasons, were not collected in ANZARD.

Note: Further treatment cycles after the tenth cycle and resulting live deliveries are not presented in this table due to small numbers. Data should be interpreted with caution due to small numbers in certain cells.

Table 51: Cycle-specific live delivery rates for women aged 30–34 who started their first autologous fresh cycle between 1 January 2009 and 31 December 2009, Australia and New Zealand

Cycle number[a]	Number of women starting cycle[b]	Number of women who had a live delivery[c]	Cycle-specific live delivery rate (per cent)[d]	Number of women who did not progress to next treatment	Non-progression rate (per cent)[e][f]
One	4,965	1,432	28.8	687	19.4
Two	2,846	637	22.4	461	20.9
Three	1,748	370	21.2	283	20.5
Four	1,095	216	19.7	201	22.9
Five	678	129	19.0	107	19.5
Six	442	87	19.7	75	21.1
Seven	280	66	23.6	42	19.6
Eight	172	36	20.9	38	27.9
Nine	98	20	20.4	20	25.6
Ten	58	7	12.1	12	23.5

(a) Cycle one represents a woman's first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009. Cycles two to ten could be either a fresh or thaw cycle undertaken by a woman until 31 December 2012 or delivery of a liveborn baby up to 31 October 2013.

(b) Women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009 and were followed through subsequent fresh and thaw cycles until 31 December 2012 or delivery of a liveborn baby up to 31 October 2013.

(c) A live delivery is the delivery of one or more liveborn infants, with the birth of twins or higher order multiples counted as one live delivery.

(d) The cycle-specific live delivery rate for a specific cycle is calculated as the number of live deliveries divided by the number of women who commenced ART treatment at that cycle.

(e) The non-progression rate for a specific cycle is calculated as the number of women who did not return for further ART treatment cycles before 31 December 2012 divided by the number of women who did not have a live delivery in that cycle.

(f) Reasons that a woman did not progress to the next treatment, such as poor prognosis, natural pregnancy, migration, financial, psychological and other unrelated reasons, were not collected in ANZARD.

Note: Further treatment cycles after the tenth cycle and resulting live deliveries are not presented in this table due to small numbers. Data should be interpreted with caution due to small numbers in certain cells.

Table 52: Cycle-specific live delivery rates for women aged 35–39 who started their first autologous fresh cycle between 1 January 2009 and 31 December 2009, Australia and New Zealand

Cycle number[a]	Number of women starting cycle[b]	Number of women who had a live delivery[c]	Cycle-specific live delivery rate (per cent)[d]	Number of women who did not progress to next treatment	Non-progression rate (per cent)[e][f]
One	5,930	1,160	19.6	1,077	22.6
Two	3,693	606	16.4	730	23.6
Three	2,357	366	15.5	501	25.2
Four	1,490	204	13.7	326	25.3
Five	960	156	16.3	212	26.4
Six	592	89	15.0	117	23.3
Seven	386	54	14.0	88	26.5
Eight	244	31	12.7	52	24.4
Nine	161	15	9.3	39	26.7
Ten	107	8	7.5	23	23.2

(a) Cycle one represents a woman's first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009. Cycles two to ten could be either a fresh or thaw cycle undertaken by a woman until 31 December 2012 or delivery of a liveborn baby up to 31 October 2013.

(b) Women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009 and were followed through subsequent fresh and thaw cycles until 31 December 2012 or delivery of a liveborn baby up to 31 October 2013.

(c) A live delivery is the delivery of one or more liveborn infants, with the birth of twins or higher order multiples counted as one live delivery.

(d) The cycle-specific live delivery rate for a specific cycle is calculated as the number of live deliveries divided by the number of women who commenced ART treatment at that cycle.

(e) The non-progression rate for a specific cycle is calculated as the number of women who did not return for further ART treatment cycles before 31 December 2012 divided by the number of women who did not have a live delivery in that cycle.

(f) Reasons that a woman did not progress to the next treatment, such as poor prognosis, natural pregnancy, migration, financial, psychological and other unrelated reasons, were not collected in ANZARD.

Note: Further treatment cycles after the tenth cycle and resulting live deliveries are not presented in this table due to small numbers. Data should be interpreted with caution due to small numbers in certain cells.

Table 53: Cycle-specific live delivery rates for women aged 40–44 who started their first autologous fresh cycle between 1 January 2009 and 31 December 2009, Australia and New Zealand

Cycle number[a]	Number of women starting cycle[b]	Number of women who had a live delivery[c]	Cycle-specific live delivery rate (per cent)[d]	Number of women who did not progress to next treatment	Non-progression rate (per cent)[e][f]
One	3,048	235	7.7	824	29.3
Two	1,989	126	6.3	572	30.7
Three	1,291	71	5.5	403	33.0
Four	817	44	5.4	232	30.0
Five	541	32	5.9	153	30.1
Six	356	14	3.9	97	28.4
Seven	245	9	3.7	67	28.4
Eight	169	6	3.6	52	31.9
Nine	111	5	4.5	34	32.1
Ten	72	0	0.0	22	30.6

(a) Cycle one represents a woman's first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009. Cycles two to ten could be either a fresh or thaw cycle undertaken by a woman until 31 December 2012 or delivery of a liveborn baby up to 31 October 2013.

(b) Women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009 and were followed through subsequent fresh and thaw cycles until 31 December 2012 or delivery of a liveborn baby up to 31 October 2013.

(c) A live delivery is the delivery of one or more liveborn infants, with the birth of twins or higher order multiples counted as one live delivery.

(d) The cycle-specific live delivery rate for a specific cycle is calculated as the number of live deliveries divided by the number of women who commenced ART treatment at that cycle.

(e) The non-progression rate for a specific cycle is calculated as the number of women who did not return for further ART treatment cycles before 31 December 2012 divided by the number of women who did not have a live delivery in that cycle.

(f) Reasons that a woman did not progress to the next treatment, such as poor prognosis, natural pregnancy, migration, financial, psychological and other unrelated reasons, were not collected in ANZARD.

Note: Further treatment cycles after the tenth cycle and resulting live deliveries are not presented in this table due to small numbers. Data should be interpreted with caution due to small numbers in certain cells.

Appendix A: Contributing fertility clinics

Australian Capital Territory

Canberra Fertility Centre, Deakin (Dr Martyn Stafford-Bell)

Genea—Canberra, Deakin (Associate Professor Mark Bowman)

ISIS Fertility, Barton (Dr Nicole Sides)

New South Wales

Demeter Laboratories, Liverpool (Dr David Knight)

Fertility East, Bondi Junction (Dr Joel Bernstein)

Fertility First, Hurstville (Dr Anne Clark)

IVF Australia—Central Coast, Gosford (Dr Malcolm Tucker)

IVF Australia—East, Maroubra (Dr Graeme Hughes)

IVF Australia—Hunter, New Lambton Heights (Dr Steven Raymond, Dr Andrew Hedges)

IVF Australia—North, Greenwich (Dr Frank Quinn)

IVF Australia—Southern Sydney, Kogarah (Dr Andrew Kan)

IVF Australia—West, Westmead (Associate Professor Peter Illingworth)

Next Generation Fertility, Parramatta (Dr Kim Matthews)

Reproductive Medicine Albury, Albury (Dr Scott Giltrap)

Royal Hospital for Women, Randwick (Dr Stephen Steigrad)

Genea, Sydney (Associate Professor Mark Bowman)

Genea—Coffs Harbour, Coffs Harbour (Associate Professor Mark Bowman)

Genea—Illawarra, Wollongong (Associate Professor Mark Bowman)

Genea—Lismore, Lismore (Associate Professor Mark Bowman)

Genea—Liverpool, Liverpool (Associate Professor Mark Bowman)

Genea—Newcastle, Merewether (Associate Professor Mark Bowman)

Genea—Northwest, Baulkham Hills (Associate Professor Mark Bowman)

Genea—Orange, Orange (Associate Professor Mark Bowman)

Genea—RPAH, Camperdown (Associate Professor Mark Bowman)

Westmead Fertility Centre, Westmead (Dr Howard Smith)

Northern Territory

Repromed Darwin, Tiwi (Dr Richard Henshaw)

Queensland

Assisted Conception Australia, Greenslopes (Dr Clare Boothroyd)

Cairns Fertility Centre, Cairns (Dr John Yovich)

City Fertility Centre, Brisbane (Dr Ashish Das)

City Fertility Centre Southside, Robina (Dr Ashish Das)

City Fertility Centre Southside, Sunnybank (Dr Ashish Das)

Coastal IVF, Maroochydore (Dr Paul Stokes)

Fertility Solutions Bundaberg, Bundaberg (Dr James Orford)

Fertility Solutions Sunshine Coast, Nambour (Dr James Orford)

IVF Caboolture, Caboolture (Dr James Moir)

IVF Sunshine Coast, Birtinya (Dr James Moir)

Life Fertility Centre, Spring Hill (Dr Glenn Sterling)

Monash IVF Gold Coast, Southport (Dr Irving Korman)

Monash IVF Queensland, Sunnybank (Dr Bruce Dunphy)

Monash IVF Rockhampton, Rockhampton (Professor Gab Kovacs)

Monash IVF Townsville, Townsville (Professor Gab Kovacs)

QFG Cairns, Cairns (Dr Robert Miller)

QFG Gold Coast, Benowa (Dr Andrew Cary)

QFG Mackay, North Mackay (Dr Lance Herron)

QFG Toowoomba IVF, Toowoomba (Dr John Esler)

QFG Townsville, Hyde Park (Dr Ron Chang)

Queensland Fertility Group, Brisbane (Dr David Molloy)

The Wesley/Monash IVF Services, Auchenflower (Dr John Allan)

South Australia

City Fertility Centre Adelaide, Henly Beach (Dr Marcin Stankiewicz)

Fertility SA, Adelaide (Dr Jodie Semmler)

Flinders Reproductive Medicine, Bedford Park (Dr Enzo Lombardi)

Repromed, Dulwich (Associate Professor Kelton Tremellen)

Tasmania

TasIVF, Hobart (Dr Bill Watkins)

Victoria

Ballarat IVF, Wendouree (Dr Russell Dalton)

City Fertility Centre Melbourne, Melbourne (Dr David Wilkinson)

Melbourne IVF, East Melbourne (Dr Lyndon Hale)

Monash IVF, Bendigo (Dr Mark Jalland)

Monash IVF Clayton, Clayton (Dr Peter Lutjen)

Monash IVF Casterton, Casterton (Professor David Healy)

Monash IVF Geelong, Geelong (Professor Gab Kovacs)

Monash IVF Hawthorn, Hawthorn Hospital, Richmond (Dr Peter Lutjen)

Monash IVF Sale, Sale (Associate Professor Luk Rombauts)

Monash IVF Sunshine, St Albans (Dr Gareth Weston)

Reproductive Services, Parkville (Dr Lyndon Hale)

Western Australia

Concept Fertility Centre, Subiaco (Dr Rob Mazzucchelli)

Fertility North, Joondalup (Dr Vince Chapple)

Fertility Specialists South, Attadale (Dr Roger Hart)

Fertility Specialists WA, Claremont (Dr Roger Hart)

Hollywood Fertility Centre, Hollywood (Dr Simon Turner)

PIVET Medical Centre, Leederville (Dr John Yovich)

The Keogh Institute for Medical Research, Nedlands (Dr Bronwyn Stuckey)

New Zealand

Fertility Associates, Auckland (Dr Mary Birdsall)

Fertility Associates Christchurch, Christchurch (Dr Greg Phillipson)

Fertility Associates Hamilton, Hamilton (Dr VP Singh)

Fertility Associates Wellington, Wellington (Dr Andrew Murray)

Fertility Plus, Auckland (Dr Barry Lowe)

Repromed Auckland, Auckland (Dr Guy Gudex)

The Otago Fertility Services, Dunedin (Associate Professor Wayne Gillett)

Appendix B: Data used in this report

The data presented in this report are supplied by 37 fertility centres in Australia and New Zealand and are compiled into ANZARD2.0. ANZARD2.0 includes autologous treatment cycles, treatment involving donated oocytes or embryos, and treatment involving surrogacy arrangements. ANZARD2.0 collects data on the use of ART techniques such as ICSI, oocyte/embryo freezing methods, PGD and cleavage/blastocyst transfers. In addition to ART procedures, ANZARD2.0 also collects data on artificial insemination cycles using donated sperm (DI) from fertility centres. The outcomes of pregnancies, deliveries and babies born following ART and DI treatments are also maintained in ANZARD2.0. This includes the method of birth, birth status, birthweight, gestational age, plurality, perinatal mortality and selected information on maternal morbidity.

Data validation

Most fertility centres have computerised data information management systems and are able to provide NPESU with high-quality data. All data processed by NPESU undergo a validation process, with data queries being followed up with fertility centre staff. In 2012, information relating to pregnancy and birth outcomes was not provided for 1.6% of clinical pregnancies.

The Reproductive Technology Accreditation Committee of FSA also plays a role in ensuring the quality of ANZARD2.0 data by validating selected records against clinic files in their annual inspections.

Data presentation

Chapters 2 to 7 of this report present information on ART and DI treatment cycles that took place in fertility clinics in Australia and New Zealand in 2012, and the resulting pregnancies and births. The babies included in this report were conceived following treatment cycles undertaken in 2012, and were born in either 2012 or 2013. Data presented in Chapters 2 to 7 are for treatment cycles and not women. It is possible for an individual woman to undergo more than one treatment cycle in a year or experience more than one pregnancy. This means that information reported about patient characteristics in Chapters 2 to 7, such as age, parity and cause of infertility, is based on calculations in which individuals may be counted more than once. The rates of clinical pregnancy and live delivery in Chapters 2 to 7 were measured per initiated cycle. Where the number of initiated cycles was not available, the rates were calculated per embryo transfer cycle.

Chapter 8 presents information on women undergoing ART treatment cycles in 2012.

Chapter 9 presents longitudinal information on the cohort of women who were identified as starting their first autologous fresh ART cycle in 2009.

Where applicable, percentages in tables have been calculated including the ‘Not stated’ category. Throughout the report, for totals, percentages may not add up to 100.0 and, for subtotals, they may not add up to the sum of the percentages for the categories. This is due to a rounding error.

Data limitations

Follow-up of pregnancy and birth outcomes is limited because the ongoing care of pregnant patients is often carried out by non-ART practitioners. The method of follow-up varies by fertility centres and includes follow-up with the patient or clinician or the use of routine data sourced from a health department. 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. Fertility centre staff invest great effort in validating such information by obtaining medical records from clinicians or hospitals.

Appendix C: ANZARD2.0 data items

Variable	Data domain
Unit identifier	3-digit code for clinics provided by NPESU.
Site of the unit	Where the cycle was initiated.
Unit patient ID/medical record number	Unique ID for patient.
First two letters of first name	First two letters of female patient first name.
First two letters of surname	First two letters of female patient surname.
Female patient date of birth	DD/MM/YYYY.
Husband/male partner date of birth	DD/MM/YYYY.
Age of oocyte/embryo donor	Completed age at time of OPU.
Cause of infertility: tubal disease	Yes–in the opinion of the treating clinician or clinic there is sub-fertility due to tubal disease. No–other.
Cause of infertility: endometriosis	Yes–in the opinion of the treating clinician or clinic there is sub-fertility due to endometriosis. No–other.
Cause of infertility: other female factors	Yes–in the opinion of the treating clinician or clinic there is sub-fertility due to other female factors apart from tubal disease and endometriosis. Possible examples could include fibroids, ovulation disorders or premature ovarian failure. No–other.
Cause of infertility: male factor	Yes–in the opinion of the treating clinician or clinic there is a significant male factor problem. No–other.
Cause of infertility: unexplained	Yes–in the opinion of the clinic or clinician there is sub-fertility without any apparent explanation. No–if yes answered to any of the previous cause of infertility fields.
Any pregnancies ≥ 20 weeks	Yes–if the female patient has had a pregnancy of 20 complete weeks or more by ART or by a different partner. No–if the female patient has had no previous pregnancy of 20 complete weeks or more.
Cycle ID	Unique cycle identifier.
Cycle date	Cycle date is coded by: 1. The first date where FSH/stimulation drug is administered 2. The date of LMP for unstimulated cycles (including natural fresh cycles and thaw cycles) 3. The date of embryos disposed for embryo disposal cycles 4. The date of oocytes/embryos imported or exported for oocyte/embryo import/export cycles 5. The date of embryos donated for frozen embryos donation cycles 6. The date of embryos received for non-transfer embryo recipient cycles.
Surrogacy arrangement	Yes–if surrogacy arrangement is involved in this cycle. No–if surrogacy arrangement is not involved in this cycle.
Ovarian stimulation	Yes–FSH administered. Does not include clomiphene or hCG alone unless FSH was also given. No–other.
First ever FSH stimulated cycle for OPU	Yes–if the current cycle is the first ever FSH stimulated cycle with the intention of OPU. No–other.
Date of intrauterine insemination	DD/MM/YYYY.
Date of cancellation for cancelled OPU	Date of the last day FSH is administered in a cancelled cycle. DD/MM/YYYY.

Variable	Data domain
OPU date	Date of oocyte pickup.
Number of eggs retrieved	Number of eggs retrieved at OPU.
Number of eggs donated	Number of eggs donated to someone else.
Number of eggs received	Number of eggs received from someone else.
Number of eggs imported	Records number of oocytes imported into the current unit from another unit.
Number of eggs exported	Records number of oocytes exported from the current unit into another unit.
Number of oocytes slow frozen	Number of oocytes frozen by slow freezing method in this cycle.
Number of oocytes vitrified	Number of oocytes frozen by vitrification in this cycle.
Number of slow frozen oocytes thawed	Number of slow frozen oocytes thawed in this cycle.
Number of vitrified oocytes warmed	Number of vitrified oocytes warmed in this cycle.
Freezing date of thawed/warmed oocytes	DD/MM/YYYY.
Number of eggs GIFT	Number of eggs replaced in a GIFT procedure.
Number of eggs IVF	Number of eggs treated (inseminated) with IVF.
Number of eggs ICSI	Number of eggs treated with ICSI.
Site of sperm used	Site of sperm extraction: ejaculated, epididymal (whether by open biopsy or by PESA), testicular or other.
Person who provided sperm	Husband/partner (h), known donor (k), anonymous donor (a), unknown (u).
Number of eggs fertilised normally	Number of eggs fertilised normally.
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.
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.
Number of embryos imported from another clinic	Records number of embryos imported into the unit from another unit.
Number of embryos received from another patient/ clinic	Records the number of embryos that a patient/couple received from another patient/couple.
Number of slow frozen cleavage embryos thawed	Number of slow frozen cleavage embryos thawed with the intention of performing an embryo transfer.
Number of vitrified cleavage embryos warmed	Number of vitrified cleavage embryos warmed with the intention of performing an embryo transfer.
Number of slow frozen blastocysts thawed	Number of slow frozen blastocysts thawed with the intention of performing an embryo transfer.
Number of vitrified blastocysts warmed	Number of vitrified blastocyst embryos warmed with the intention of performing an embryo transfer.
Freezing date of thawed/warmed embryos	Freezing date of thawed/warmed embryos.
Thawed/warmed embryos originally from oocyte donor or embryo donor	o–embryo from donated oocyte. e–donated embryo.
ET date	Embryo transfer date.
Number of cleavage embryos transferred	Number of cleavage stage embryos transferred.
Number of blastocyst transferred	Number of blastocyst stage embryos transferred.
Any embryos ICSI?	Yes–any embryos transferred were fertilised by ICSI. No–no transferred embryos were fertilised by ICSI.

Variable	Data domain
Number of cleavage embryos slow frozen	Number of cleavage embryos frozen by slow freezing method in this cycle.
Number of cleavage embryos vitrified	Number of cleavage embryos frozen by vitrification in this cycle.
Number of blastocysts slow frozen	Number of blastocysts frozen by slow freezing method in this cycle.
Number of blastocysts vitrified	Number of blastocysts frozen by vitrification method in this cycle.
Number of embryos exported	Number of embryos exported from the current unit to another unit.
Number of embryos donated	Number of embryos donated to another patient.
Number of potentially usable frozen embryos discarded	Frozen embryos disposed in accordance with patient's request or Government regulation.
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 fetal heart) 3. Examination of products of conception reveal chorionic villi 4. A definite ectopic pregnancy that has been diagnosed laparoscopically or by ultrasound.
Date pregnancy ended	Date on which delivery, miscarriage or termination takes place.
Number of fetal hearts	Number of fetal hearts seen on first ultrasound (intrauterine only).
Ectopic pregnancy	If this pregnancy is an ectopic pregnancy, or a combined ectopic and uterine pregnancy (heterotopic). n–No e–Ectopic h–Heterotopic
Elective termination of pregnancy	Yes–pregnancy is terminated. No–pregnancy not terminated.
Selective reduction performed	Yes–If selective reduction has been performed due to fetal abnormality/other reasons. No–If no selective reduction has been performed.
Fetal abnormality in a pregnancy ending < 20 weeks or by selective reduction	Fetal abnormality in a pregnancy ending < 20 weeks or by selective reduction.
Maternal complications of pregnancy	Maternal complications of pregnancy.
Number of babies delivered	Include all liveborn and stillborn babies after 20 weeks gestation or at least 400 grams birthweight.
Caesarean delivery	Yes–delivery by planned or emergency caesarean section. No–other.
Baby 1 outcome	Liveborn, stillborn or neonatal death.
Baby 1 sex	Male or female.
Baby 1 birthweight	Weight in grams.
Baby 1 abnormality	Describes any known congenital malformation.
Baby 1 date of neonatal death	Date of neonatal death.
Baby 2 outcome	Liveborn, stillborn or neonatal death.
Baby 2 sex	Male or female.
Baby 2 weight	Weight in grams.
Baby 2 abnormality	Describes any known congenital malformation.
Baby 2 date of neonatal death	Date of neonatal death.
Baby 3 outcome	Liveborn, stillborn or neonatal death.
Baby 3 sex	Male or female.
Baby 3 weight	Weight in grams.

Variable	Data domain
Baby 3 abnormality	Describes any known congenital malformation.
Baby 3 date of neonatal death	Date of neonatal death.
Baby 4 outcome	Liveborn, stillborn or neonatal death.
Baby 4 sex	Male or female.
Baby 4 weight	Weight in grams.
Baby 4 abnormality	Describes any known congenital malformation.
Baby 4 date of neonatal death	Date of neonatal death.
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.
OHSS	Answer yes if OHSS occurred.
Morbidity detail	Describes symptoms of treatment-related morbidity.
Postcode	Postcode of patient residential area.
Comments	Any comments on this cycle.

Glossary

This report categorises ART treatments according to whether a woman used her own oocytes or embryos, or oocytes or embryos were donated by another woman or couple, and whether the embryos were transferred soon after fertilisation or following cryopreservation.

Artificial insemination: a range of techniques for placing sperm into the female genital tract, and can be used with controlled ovarian hyperstimulation or in unstimulated cycles. These techniques are referred to as 'donor insemination' (DI) in this report.

ART (assisted reproductive technology): treatments or procedures that involve the in vitro handling of human oocytes (eggs) and sperm or embryos for the purposes of establishing a pregnancy. ART does not include artificial insemination.

Assisted hatching: when the outer layer of the embryo, the zona pellucida, is either thinned or perforated in the laboratory to aid 'hatching' of the embryo, the aim being to potentially improve the chance of implantation in the uterus.

Autologous cycle: an ART treatment cycle in which a woman intends to use, or uses, her own oocytes or embryos. GIFT cycles are classified separately from autologous cycles.

Blastocyst: an embryo comprising around 100 cells usually developed by five or six days after fertilisation.

Caesarean section: an operative delivery by surgical incision through the abdominal wall and uterus.

Cleavage stage embryo: an embryo comprising about eight cells usually developed by two or three days after fertilisation.

Clinical pregnancy: a pregnancy in which at least one of the following criteria is met:

- known to be ongoing at 20 weeks
- evidence by ultrasound of an intrauterine sac (with or without a fetal heart)
- examination of products of conception reveal chorionic villi, or
- an ectopic pregnancy has been diagnosed by laparoscope or by ultrasound.

Controlled ovarian hyperstimulation: medical treatment to induce the development of multiple ovarian follicles in order to obtain multiple oocytes at oocyte pick-up (OPU).

Cryopreservation: freezing embryos for potential future ART treatment.

Delivery: a birth event in which one or more babies of 20 weeks or more gestation or of 400 grams or more birthweight are born.

DI (donor insemination) cycle: an artificial insemination cycle in which sperm not from the woman's partner (donor sperm) is used.

Discontinued cycle: an ART cycle that does not proceed to oocyte pick-up (OPU) or embryo transfer.

Donation cycle: an ART treatment cycle where a woman intends to donate, or donates, her oocytes to others. A donation cycle may result in the donation of either oocytes or embryos to a recipient woman. The use of donor sperm does not alter the donor status of the cycle.

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

Embryo: an egg that has been fertilised by a sperm and has undergone one or more divisions.

Embryo transfer: a procedure whereby embryo(s) are placed in the uterus or fallopian tube. The embryo(s) can be fresh or thawed following cryopreservation, and may include the transfer of cleavage stage embryos or blastocysts.

Fetal death (stillbirth): the birth of an infant after 20 or more weeks gestation or 400 grams or more birthweight that shows no signs of life.

Fresh cycle: an ART treatment cycle that intends to use, or uses, embryo(s) that have not been cryopreserved (frozen).

Gestational age: the completed weeks of gestation of the fetus. This is calculated as follows:

- cycles with embryos transferred: (pregnancy end date – embryo transfer date + 16 days) for transfer of cleavage stage embryos and (pregnancy end date – embryo transfer date + 19 days) for transfer of blastocysts
- GIFT cycles: (pregnancy end date – OPU date) + 14 days
- DI cycles: (pregnancy end date – date of insemination) + 14 days.

GIFT (gamete intrafallopian transfer): an ART treatment where mature oocytes and sperm are placed directly into a woman's fallopian tubes so that in vivo fertilisation may take place. GIFT cycles are classified separately from autologous cycles.

Heterotopic pregnancy: a double gestation pregnancy in which implantation takes place both inside and outside the uterine cavity.

ICSI (intracytoplasmic sperm injection): a procedure whereby a single sperm is injected directly into the oocyte to aid fertilisation. If an embryo transfer cycle involves the transfer of at least one embryo created using ICSI, it is counted as an ICSI cycle.

IVF (in vitro fertilisation): an ART procedure that involves extracorporeal fertilisation.

Live birth: according to the World Health Organization (WHO) definition, a live birth is defined as the complete expulsion or extraction from its mother of a product of conception irrespective of the duration of the pregnancy, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of the voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such a birth is considered liveborn. In this report, live births are included if they meet the WHO definition and if they are of 20 weeks or more gestation or 400 grams or more birthweight.

Live delivery: a live delivery is the delivery of one or more liveborn infants, with the birth of twins, triplets or more counted as one live delivery.

Low birthweight: a birthweight of less than 2,500 grams.

OHSS (ovarian hyperstimulation syndrome): the complication of ovulation stimulation therapy, which involves the administration of follicle stimulating hormone (FSH). OHSS symptoms include abdominal pain and fluid retention.

Oocyte (egg): a female reproductive cell.

OPU (oocyte pick-up): the procedure to collect oocytes from ovaries, usually by ultrasound-guided transvaginal aspiration and rarely by laparoscopic surgery.

Parity: a classification of a woman in terms of the number of previous pregnancies experienced that reached 20 weeks or more gestation.

Parous: refers to a woman who has had at least one previous pregnancy of 20 weeks or more gestation.

PGD (preimplantation genetic diagnosis): a procedure where embryonic cells are removed and screened for chromosomal disorders or genetic diseases before embryo transfer.

Nulliparous: refers to a woman who has never had a pregnancy of 20 weeks or more gestation.

Perinatal death: a fetal death (stillbirth) or neonatal death of at least 20 weeks gestation or at least 400 grams birthweight.

Preterm: a gestation of less than 37 weeks.

Recipient cycle: an ART treatment cycle in which a woman receives oocytes or embryos from another woman.

Secondary sex ratio: the number of male liveborn babies per 100 female liveborn babies.

Surrogacy arrangement: an arrangement where a woman, known as the 'gestational carrier' agrees to carry a child for another person or couple, known as the 'intended parent(s)', with the intention that the child will be raised by the intended parent(s). The oocytes and/or sperm used to create the embryo(s) in the surrogacy cycle can be either from the intended parents or from a donor(s).

Thaw cycle: an ART treatment cycle in which cryopreserved embryos are thawed with the intention of performing embryo transfer.

Thawed embryo: an embryo thawed after cryopreservation. It is used in thaw cycles.

Vitrification: an ultra-rapid cryopreservation method that prevents ice formation within the suspension which is converted to a glass-like solid.

Note: The International Committee Monitoring Assisted Reproductive Technologies (ICMART) has published an ART glossary for the terms used in ART data collections (Zegers-Hochschild et al. 2009). However, the terminology used in this report may differ from that in the ICMART glossary.

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In 2012, there were 70,082 assisted reproductive technology (ART) treatment cycles performed in Australian and New Zealand. Of these, 23.9% resulted in a clinical pregnancy and 17.9% in a live delivery (the birth of at least one liveborn baby). There were 13,312 liveborn babies following ART treatment in 2012.