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Assisted reproductive technology in Australia and New Zealand 2013

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The Fertility Society of Australia

Assisted reproductive technology in Australia and New Zealand 2013

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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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Please note that there is the potential for minor revisions of data in this report. Please check the online version at <http://npesu.unsw.edu.au/> for any amendments.

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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

Assisted reproductive technology (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. Each ART treatment involves a number of stages and is generally referred to as an ART treatment cycle. The embryos transferred to a women can either originate from the cycle in which they were created (fresh cycle) or be frozen and thawed before transfer (thaw cycle).

There were 71,516 ART treatment cycles reported from Australian and New Zealand clinics in 2013 (66,143 and 5,373 respectively) representing a 1.9% increase in Australia and 3.8% increase in New Zealand on 2012. This represented 13.7 cycles per 1,000 women of reproductive age (15–44 years) in Australia, compared with 5.9 cycles per 1,000 women of reproductive age in New Zealand. Women used their own oocytes or embryos (autologous cycles) in 95.1% of treatments. Embryos that had been frozen and thawed where used in 36.6% of autologous cycles.

There were 37,192 women who undertook 67,980 autologous fresh and/or thaw cycles in Australia and New Zealand in 2013. On average, 1.8 fresh and/or thaw cycles per woman were undertaken, with more cycles per woman in Australia (1.9 cycles per woman) than in New Zealand (1.5 cycles per woman). The number of cycles where PGD was performed increased from 2,294 in 2012 to 2,740 in 2013 (19.4% increase), representing 4.4% of cycles in which embryos were created or thawed.

Patient's age

The average age of women undergoing autologous cycles was 35.9. In contrast, the average age of women undergoing ART treatment using donor oocytes or embryos was approximately five years older at 40.7. Approximately, one in four (26.8%) women who underwent an autologous cycle in 2013 was aged 40 or older. The average age of male partners was 38.3, with one-third (35.5%) aged 40 or older.

Treatment outcomes and number of babies

Of the 71,516 initiated cycles, 23.8% (17,054) resulted in a clinical pregnancy and 18.2% (12,997) in a live delivery. The overall clinical pregnancy rate for cycles reaching embryo transfer was 31.0%. The live delivery rate per initiated fresh cycle was 16.3% and per fresh embryo transfer cycle was 23.7%. The live delivery rate per initiated thaw cycle was 22.0% and per thaw embryo transfer cycle was 23.6%.

There was a higher live delivery rate in younger women. For women aged under 30, the live delivery rate was highest for both autologous fresh and thaw cycles (27.2% and 27.8% respectively). For women aged over 44, the live delivery rate was 1.2% and 5.4% per initiated autologous fresh and thaw cycles respectively.

The live delivery rate per day 2–3 embryo transfer (cleavage stage) was 16.0% and per day 5-6 embryo transfer (blastocyst) was 28.4%. However, caution should be taken when comparing success rates following cleavage stage embryo and blastocyst transfer. Patient characteristics and prognosis are different between these groups, and generally fewer embryos are available for transfer and cryopreservation when blastocyst culture is used.

There were 13,939 babies born (including 13,715 liveborn babies) following ART treatment in 2013. Of these, 12,637 (90.7%) were from Australian clinics and 1,302 (9.3%) from New Zealand clinics. Over three-quarters of the liveborn babies (77.5%) were full-term singletons of normal birthweight.

Cycle-specific success rates

ANZARD includes data items that make it possible to follow a woman's consecutive ART treatment cycles. A cohort of 14,887 women was followed from the start of their first autologous fresh cycle during 2011, through subsequent fresh and thaw cycles until December 2013 or until they achieved a live delivery. The cycle-specific live delivery rate per initiated cycle for all women was 20.6% in their first cycle, and around 10% after seven cycles. For women aged 30-34 the cycle-specific live delivery rate was 28.1% in the first cycle and around 20% in the following nine cycles. Of women who did not achieve a live birth in a specific cycle, approximately one in four did not return for further ART treatment.

Trends in ART procedures

Treatment trends in the last five years include a shift from cleavage stage transfers to blastocyst transfers from 49.8% in 2009 to 61.1% in 2013; an increase in vitrification as a cryopreservation method from 33.2% of thaw blastocyst transfer cycles in 2009 to 82.9% in 2013; and continued use intracytoplasmic sperm injection (ICSI) in over 60% of embryo transfer cycles.

There was also a trend over the last five years of fresh cycles not proceeding to embryo transfer, from 23.4% of initiated cycles in 2009 to 32.5% of initiated cycles in 2013. The proportion of embryo transfer cycles transferring a cryopreserved embryo increased from 39.3% of cycles in 2009 to 44.7% in 2013.

In the last five years the live delivery rate per fresh embryo transfer cycle ranged from 23.0% to 23.7%, while the live delivery rate per frozen/thaw embryo transfer cycle increased from 18.3% to 23.4%.

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 32% decrease from 8.2% in 2009 to 5.6% (5.6% for Australia and 5.2% for New Zealand) in 2013. This was achieved by clinicians and patients shifting to single embryo transfer, with the proportion increasing from 69.7% in 2009 to 79.2% in 2013. Importantly, this decrease in the multiple delivery rate was achieved while live birth rates per embryo transfer increased from 21.2% in 2009 to 23.6% in 2013.

1 Introduction

Infertility affects approximately 15% of women of reproductive age at any given time, representing, the source of much personal suffering to millions around the world (World Health Organization 2010). 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 6 million children worldwide (ICMART 2015). The most recent national estimates indicate that 4.0% of all women who gave birth in Australia in 2012 received some form of ART treatment (Hilder et al. 2014).

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 2013 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 stimulation 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 using the woman's partner or donor sperm
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/embryo 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 2009 to 2013. Reporting of ART treatment cycles in Australia is a requirement for ART clinics to be licenced by the Reproductive Technology Accreditation Committee (RTAC). All ART clinics in Australia and New Zealand provided data to ANZARD for cycles performed in 2013.

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 2013 annual report presents cycle-specific success rates for women who started their first autologous fresh cycle during 2011. These women were followed from the start of their first autologous fresh cycle through subsequent fresh and thaw cycles until 31 December 2013, or until they achieved a live delivery (a delivery of at least one liveborn baby) up to and including 31 October 2014.

The 2013 data presented in this report were supplied by all 36 fertility centres (73 fertility clinics in Australia and seven fertility clinics in New Zealand), and compiled into ANZARD2.0.

Structure of this report

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

Chapter 2—'Overview of ART treatment in 2013', 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 2013', 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 2013', 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 2013', includes information on cycles, procedures and complications that do not fit into the chapters already described.

Chapter 6—'Donor sperm insemination cycles in 2013', presents data on DI cycles and their outcomes, including a description of pregnancy and perinatal outcomes.

Chapter 7—'Trends in ART treatment and outcomes: 2009–2013', 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 2013', presents information on the number of women undergoing ART treatment in 2013.

Chapter 9—'Cycle-specific rates for women who started their first autologous fresh ART treatment in 2011', presents information for a cohort of women who started their first autologous fresh ART treatment cycle during 2011, and these women were followed through subsequent fresh and thaw cycles until 31 December 2013 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 2013

There were 71,516 ART treatment cycles reported from Australian and New Zealand clinics in 2013 (Table 1). Of these, 92.5% (66,143) were from Australian clinics and 7.5% (5,373) were from New Zealand clinics. The number of ART treatment cycles in 2013 increased by 2.0% overall from the 70,082 cycles in 2012, with a 1.9% increase in Australia and 3.8% increase in New Zealand. In 2013, the number of ART treatment cycles represented 13.7 cycles per 1,000 women of reproductive age (15–44 years) in Australia, compared with 5.9 cycles per 1,000 women of reproductive age in New Zealand (Australian Bureau of Statistics 2014; Statistics New Zealand 2014).

More than 95% of cycles in 2013 were autologous cycles (where a woman intended to use, or used her own oocytes or embryos). Of the 67,980 autologous cycles, 43,084 (63.4%) were fresh cycles and 24,896 (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 0.3% were surrogacy arrangement cycles (Table 1).

Of all ART treatments in 2013, 23.8% (17,054) resulted in a clinical pregnancy and 18.2% (12,997) in a live delivery (Table 1). Of these clinical pregnancies, 15,494 (90.9%) were from Australian clinics and 1,560 (9.1%) from New Zealand clinics. There were 13,939 babies born (including 13,715 liveborn babies) following ART treatment in 2013. Of these, 12,637 (90.7%) were from Australian clinics and 1,302 (9.3%) from New Zealand clinics. Of the liveborn babies, 77.5% (10,633) were singletons at term (gestational age of 37–41 weeks) with normal birthweight (≥ 2,500 grams). The multiple delivery rate was 5.6%.

Table 1: Number of initiated ART treatment cycles by treatment type, Australia and New Zealand, 2013

	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	67,980	95.1	16,373	12,500	13,189	10,253
Fresh	43,084	60.2	9,134	7,030	*7,438*	*5,676*
Thaw	24,896	34.8	7,239	5,470	*5,751*	*4,577*
Oocyte recipient	1,918	2.7	526	384	406	291
Embryo recipient	387	0.5	110	78	84	58
Oocyte donation	1,000	1.4	0	0	*0*	*0*
GIFT[(a)]	4	0.0	0	0	0	0
Surrogacy arrangement cycles	227	0.3	45	35	36	31
Commissioning cycles[(b)]	*51*	*0.1*	*0*	*0*	*0*	*0*
Gestational carrier cycles[(c)]	*176*	*0.2*	*45*	*35*	*36*	*31*
Total	**71,516**	**100.00**	**17,054**	**12,997**	**13,715**	**10,633**

(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 2013

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 36.0. For women undergoing oocyte/embryo recipient cycles, the mean age was 40.7, five years older than for autologous cycles (35.9). Of all autologous and oocyte/embryo recipient cycles, one in four (26.8%) was undertaken by women aged 40 or older (Table 2). The average age of male partners was 38.3, with one-third (35.5%) aged 40 or older. For 17.9% 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, 2013

Age group (years)[(a)]	Autologous				Oocyte /embryo recipient		All	
	Fresh		Thaw					
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
< 30	4,552	10.6	2,705	10.9	77	3.3	7,334	10.4
30–34	10,964	25.4	7,827	31.4	231	10.0	19,022	27.1
35–39	15,114	35.1	9,434	37.9	547	23.7	25,095	35.7
40–44	11,551	26.8	4,616	18.5	875	38.0	17,042	24.2
≥ 45	903	2.1	314	1.3	575	24.9	1,792	2.5
Total	**43,084**	**100.0**	**24,896**	**100.0**	**2,305**	**100.0**	**70,285**	**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, 2013

Age group (years)[(a)]	Autologous				Oocyte /embryo recipient		All	
	Fresh		Thaw					
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
< 30	2,682	6.2	1,501	6.0	43	1.9	4,226	6.0
30–34	9,064	21.0	5,744	23.1	219	9.5	15,027	21.4
35–39	12,148	28.2	7,805	31.4	446	19.3	20,399	29.0
40–44	9,506	22.1	5,216	21.0	593	25.7	15,315	21.8
≥ 45	6,153	14.3	2,926	11.8	591	25.6	9,670	13.8
Not stated	3,531	8.2	1,704	6.8	413	17.9	5,648	8.0
Total	**43,084**	**100.0**	**24,896**	**100.0**	**2,305**	**100.0**	**70,285**	**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 70,285 initiated autologous and recipient cycles undertaken in 2013, two-thirds (66.3%) were undertaken by nulliparous women. Of autologous cycles (fresh and thaw), 66.2% were undertaken by nulliparous women, compared with 69.3% for oocyte/embryo recipient cycles (Table 4).

Table 4: Number of autologous and recipient cycles by parity and treatment type, Australia and New Zealand, 2013

	Autologous				Oocyte/embryo recipient		All	
	Fresh		Thaw					
Parity	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Nulliparous	30,188	70.1	14,836	59.6	1,597	69.3	46,621	66.3
Parous	9,135	21.2	8,320	33.4	547	23.7	18,002	25.6
Not stated	3,761	8.7	1,740	7.0	161	7.0	5,662	8.1
Total	**43,084**	**100.00**	**24,896**	**100.00**	**2,305**	**100.00**	**70,285**	**100.00**

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

Cause of infertility

Causes of infertility may 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 70,285 initiated autologous and recipient cycles, 20.9% reported male infertility factors as the only cause of infertility; 27.9% reported only female infertility factors; 13.3% reported combined male–female factors; 22.2% reported unexplained infertility; and 15.6% were not stated.

Intracytoplasmic sperm injection procedures

Of the 37,781 autologous fresh cycles where fertilisation was attempted, 68.0% used ICSI procedures and 32.0% used IVF procedures. Of fresh oocyte recipient cycles where fertilisation was attempted, 79.5% used ICSI procedures and 20.5% 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, 2013

	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	12,087	32.0	9,302	40.1	191	20.5	409	31.4
ICSI[c]	25,694	68.0	13,908	59.9	742	79.5	890	68.4
Not stated	-	-	1	0.0	-	-	2	0.2
Total	**37,781**	**100.0**	**23,211**	**100.0**	**933**	**100.0**	**1,301**	**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 54,926 fresh and thawed embryo transfer cycles, nearly three-quarters (79.2%) were single embryo transfer (SET) cycles and 20.1% were double embryo transfer (DET). In women aged under 35, 87.2% of embryo transfer cycles were SET cycles and 12.7% were DET cycles. In women aged 35 or older, three-quarters (74.0%) of cycles were SET cycles and 24.8% 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, 2013

	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	5,150	89.1	626	10.8	3	0.1	5,779	100.0
30–34	13,557	86.5	2,108	13.5	7	0.0	15,672	100.0
35–39	15,781	79.1	4,141	20.8	24	0.1	19,946	100.0
40–44	8,133	66.3	3,806	31.0	326	2.7	12,265	100.0
≥ 45	858	67.9	370	29.3	36	2.8	1,264	100.0
Total	**43,479**	**79.2**	**11,051**	**20.1**	**396**	**0.7**	**54,926**	**100.0**

(a) Age at start of a treatment cycle.

Stage of embryo development

Of the 54,926 embryo transfer cycles, 61.1% 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 72.0% of thaw cycles compared with 52.6% of fresh cycles (Table 7).

Table 7: Number of embryo transfer cycles by treatment type and stage of embryo development, Australia and New Zealand, 2013

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	14,069	47.4	6,502	28.0	281	39.2	511	39.3
Blastocyst	15,629	52.6	16,709	72.0	435	60.8	790	60.7
Total	**29,698**	**100.0**	**23,211**	**100.0**	**716**	**100.0**	**1,301**	**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 24,512 frozen/thawed embryo transfer cycles, over half (63.7%) involved the transfer of vitrified embryos. Four out of five (83.0%) frozen/thawed blastocyst transfer cycles had vitrified blastocysts transferred. By comparison, one in six (15.6%) 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, 2013

Type and procedure	Autologous				Oocyte/embryo recipient[a]			
	Cleavage embryo		Blastocyst		Cleavage embryo		Blastocyst	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Slow frozen	5,467	84.1	2,782	16.6	451	88.3	191	24.2
Vitrification[b]	1,035	15.9	13,927	83.4	59	11.5	598	75.7
Total	**6,502**	**100.0**	**16,709**	**100.0**	**511**	**100.0**	**790**	**100.0**

(a) Includes two cycles where cryopreservation method is unknown.

(b) Ultra-rapid cryopreservation.

3.2 Autologous fresh cycles

In 2013, there were 43,084 initiated autologous fresh cycles, comprising 42,532 (98.7%) FSH-stimulated cycles and 552 (1.3%) unstimulated cycles. There were 164 cycles in which thawed oocytes were used.

Of the 43,084 initiated autologous fresh cycles, 92.4% (39,825) were in Australian clinics and 7.6% (3,259) 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 43,084 initiated autologous fresh cycles in 2013, 91.8% had OPU performed; 68.9% had embryos transferred; 21.2% resulted in a clinical pregnancy; and 16.3% 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.

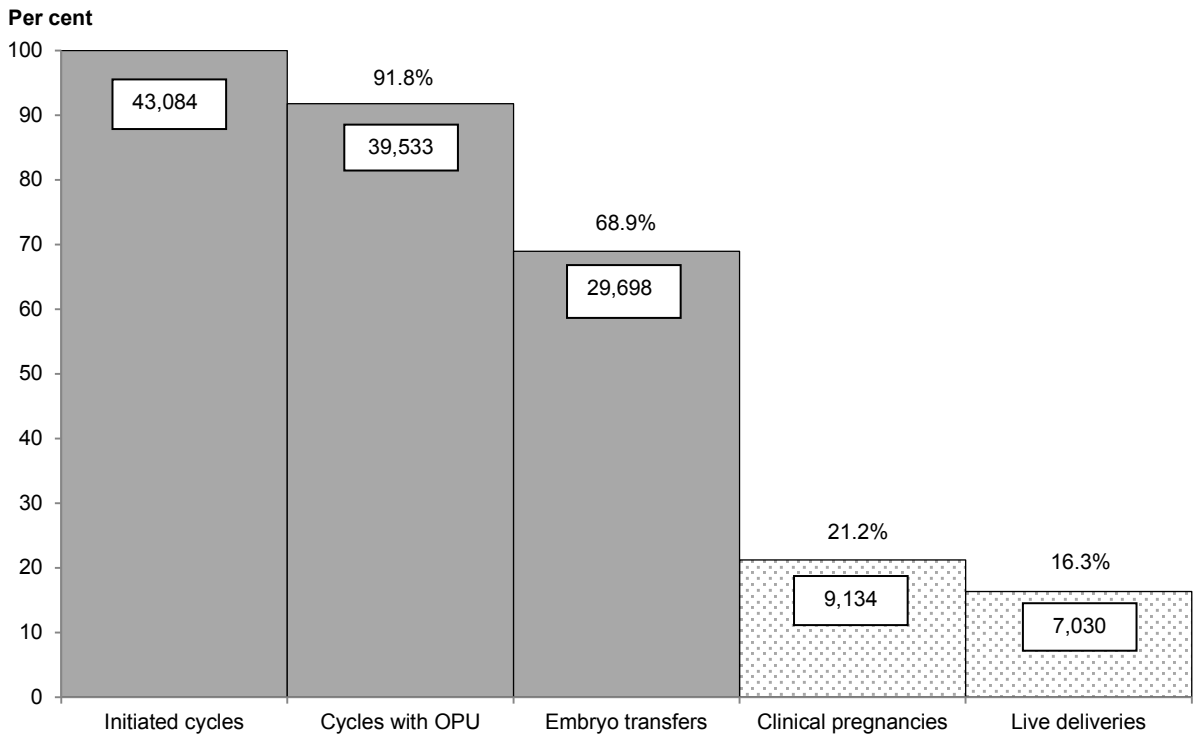

Figure 1: Progression of autologous fresh cycles, Australia and New Zealand, 2013

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 (39.4%). The rate declined with advancing women's age, with a rate of 9.2% for women aged 40–44 and 2.3% for women aged 45 or older (Table 9).

Table 9: Outcomes of autologous fresh cycles by women's age group, Australia and New Zealand, 2013

	Age group (years)[(a)]					
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
Initiated cycles	4,552	10,964	15,114	11,551	903	43,084
Cycles with OPU	4,218	10,301	13,987	10,249	778	39,533
Embryo transfer cycles	3,140	8,052	10,673	7,346	487	29,698
Clinical pregnancies	1,445	3,221	3,289	1,158	21	9,134
Live deliveries	1,236	2,644	2,461	678	11	7,030
Live deliveries per initiated cycle (%)	*27.2*	*24.1*	*16.3*	*5.9*	*1.2*	*16.3*
Live deliveries per embryo transfer cycle (%)	*39.4*	*32.8*	*23.1*	*9.2*	*2.3*	*23.7*
Live deliveries per clinical pregnancy (%)	*85.5*	*82.1*	*74.8*	*58.5*	*52.4*	*77.0*

(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 early-30s. For women aged 45 or older, only one live delivery resulted from every 80 initiated cycles compared with one live delivery from every four initiated cycles in women aged between 25 and 34.

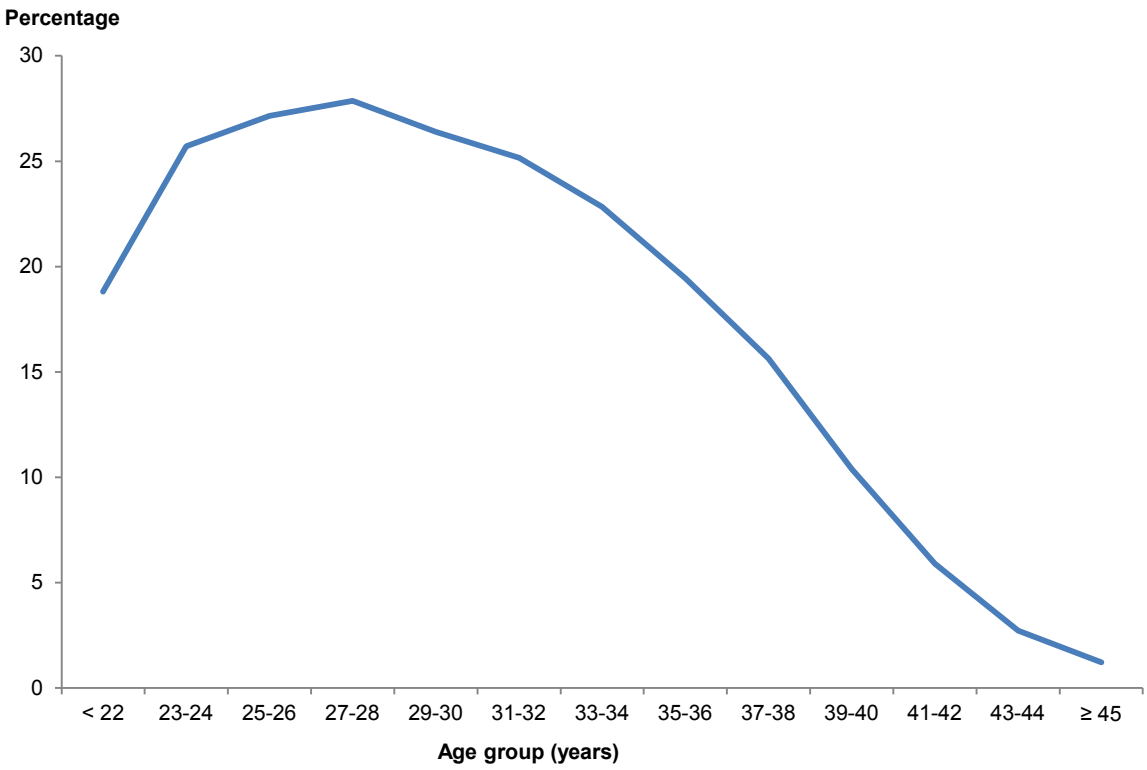

Figure 2: Live deliveries per initiated autologous fresh cycle by women's age at start of a treatment cycle, Australia and New Zealand, 2013

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 (19.3), followed by cycles reported with male factor infertility as the only cause of infertility (18.3) (Table 10).

Table 10: Outcomes of autologous fresh cycles by cause of infertility, Australia and New Zealand, 2013

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	8,941	73.1	22.9	18.3
Female factor	12,034	65.6	21.1	16.0
Tubal disease only	*1,669*	74.6	22.9	17.7
Endometriosis only	*2,072*	72.4	23.9	19.3
Other female factor only	*6,902*	60.7	19.8	14.5
Combined female factor	*1,391*	69.4	21.3	16.2
Combined male—female factors	5,861	68.0	21.3	16.5
Unexplained	9,849	70.3	20.9	15.9
Not stated	6,399	68.0	19.3	14.6
Total	**43,084**	**87.3**	**27.1**	**20.8**

Clinical pregnancies and live deliveries by number of embryos transferred

Overall, 74.7% of autologous fresh embryo transfer cycles were SET cycles, 24.2% were DET cycles and 1.1% 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 4.0% in women aged 40 or older.

Overall, the live delivery rate was 25.3% for SET cycles and 19.2% for DET cycles (Table 11). Of embryo transfer cycles in women aged under 35 and 35 to 39, the live delivery rate was higher for SET cycles than DET cycles (35.1% and 23.1% respectively). Of embryo transfer cycles in women aged 40 or older, the live delivery rate was slightly lower for SET (8.0%) cycles than DET (9.8%) cycles.

Table 11: Outcomes of autologous fresh embryo transfer cycles by women's age and number of embryos transferred, Australia and New Zealand, 2013

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	9,727	1,461	7,904	2,748	4,549	2,970	22,180	7,179
Clinical pregnancies	4,093	571	2,428	850	610	509	7,131	1,930
Live deliveries	3,417	462	1,828	627	362	292	5,607	1,381
Clinical pregnancies per embryo transfer cycle (%)	*42.1*	*39.1*	*30.7*	*30.9*	*13.4*	*17.1*	*32.2*	*26.9*
Live deliveries per embryo transfer cycle (%)	*35.1*	*31.6*	*23.1*	*22.8*	*8.0*	*9.8*	*25.3*	*19.2*

(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

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 12.5 percentage points higher than for cleavage stage embryo transfer cycles.

However, caution should be taken when comparing clinical pregnancy and live delivery rates following cleavage stage embryo and blastocyst transfer. Patient characteristics and prognosis are different between these groups, and generally fewer embryos are available for transfer and cryopreservation when blastocyst culture is used.

Table 12: Outcomes of autologous fresh embryo transfer cycles by women's age and stage of embryo development, Australia and New Zealand, 2013

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	4,523	6,669	5,003	5,670	4,543	3,290	14,069	15,629
Clinical pregnancies	1,475	3,191	1,210	2,079	519	660	3,204	5,930
Live deliveries	1,223	2,657	890	1,571	287	402	2,400	4,630
Clinical pregnancies per embryo transfer cycle (%)	*32.6*	*47.8*	*24.2*	*36.7*	*11.4*	*20.1*	*22.8*	*37.9*
Live deliveries per embryo transfer cycle (%)	*27.0*	*39.8*	*17.8*	*27.7*	*6.3*	*12.2*	*17.1*	*29.6*

(a) Age at start of a treatment cycle.

(b) CL: cleavage stage embryo.

(c) BL: blastocyst.

Clinical pregnancies from autologous fresh embryo transfer cycles among fertility centres

The clinical pregnancy rate per autologous fresh embryo transfer cycle varied among the 34 fertility centres in 2013. This variation is measured using quartiles that rank a centre's clinical pregnancy rate per autologous fresh embryo transfer cycle within the top and bottom 25% or the middle 50% of centres. At least 60 autologous fresh embryo transfer cycles were performed in each centre and there were eight or nine centres in each quartile

The clinical pregnancy rate per autologous fresh embryo transfer ranged from 14.1% to 44.8% among fertility centres. The middle 50% of fertility centres (second and third quartiles) had live delivery rates between 25.4% and 32.8% (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 clinical pregnancy rate of an individual centre.

Table 13: Clinical pregnancies per autologous fresh embryo transfer by women's age group among fertility centres, Australia and New Zealand, 2013

	Clinical pregnancies per autologous fresh embryo transfer cycle (per cent)				
Age group (years)[(a)]	**Overall**	**First quartile**	**Second quartile**	**Third quartile**	**Fourth quartile**
< 35	41.7	44.8–51.9	41.7–44.7	35.5–41.6	18.3–35.4
35–39	30.8	32.6–43.5	27.7–32.5	23.9–27.6	13.3–23.8
≥ 40	15.1	17.1–35.3	14.3–17.0	10.0–14.2	2.9–9.9
All	**30.8**	**32.9–44.8**	**28.9–32.8**	**25.4–28.8**	**14.1–25.3**

(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 34 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 28.3% and 35.6%.

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.

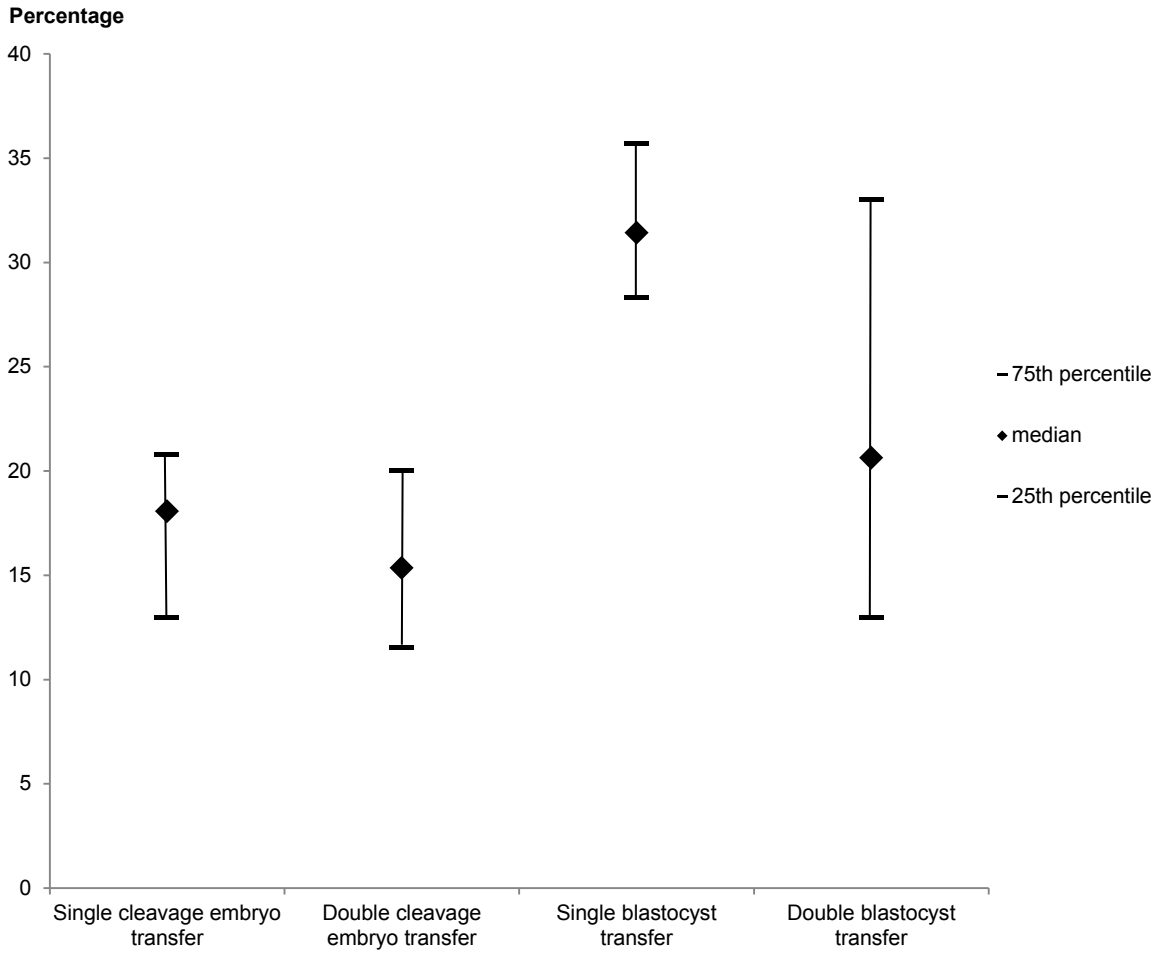

Figure 3: Live deliveries per autologous fresh embryo transfer cycle by number of embryos transferred and stage of embryo development among fertility centres, Australia and New Zealand, 2013

3.3 Autologous thaw cycles

There were 24,896 autologous thaw cycles reported in 2013 (Figure 4). Of these, 92.8% (23,112) were in Australian clinics and 7.2% (1,784) 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 24,896 initiated autologous thaw cycles, 93.2% had embryos transferred, 29.1% resulted in a clinical pregnancy and 22.0% resulted in a live delivery (Figure 4). Almost 1 in 15 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 2013 (22.0% and 16.3% respectively) (Figures 1 and 4). Thawed embryos originate from a previous fresh cycle and therefore the age of a thaw embryo is younger than the chronological age of a woman at the time of transfer.

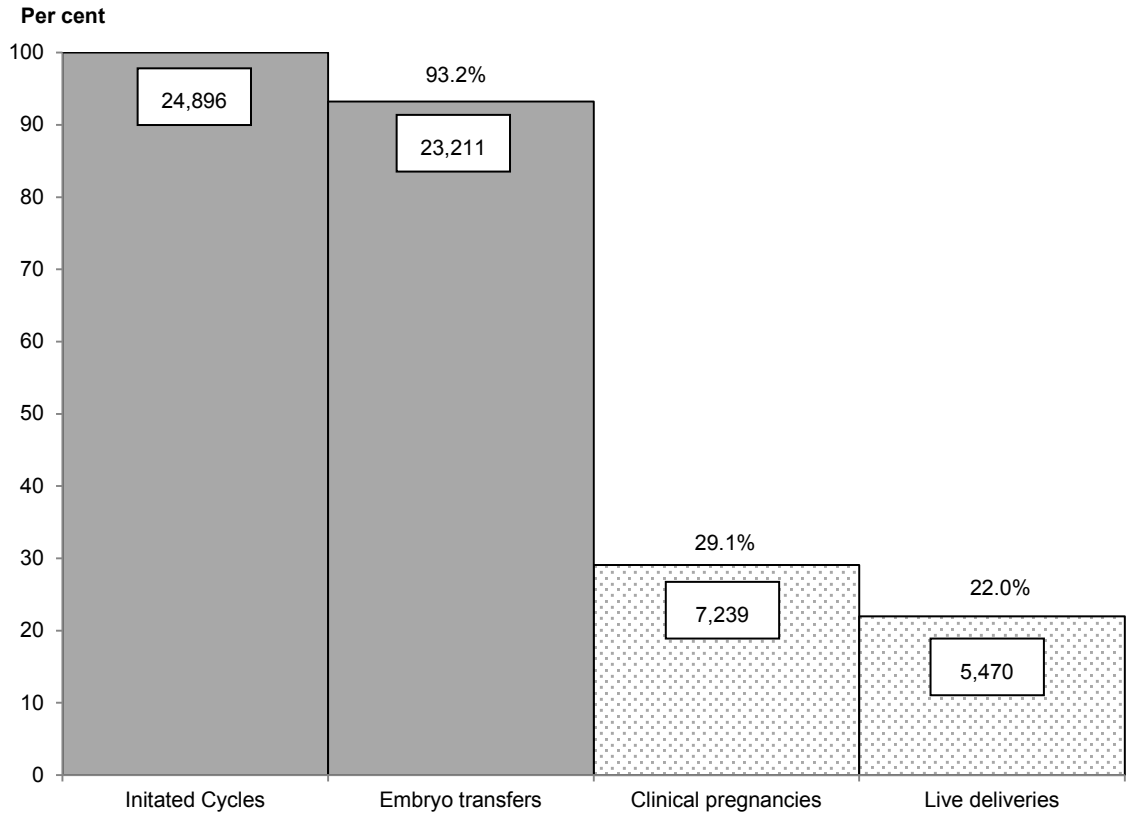

Figure 4: Progression of autologous thaw cycles, Australia and New Zealand, 2013

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, 2013

	Age group (years)[a]					
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
Initiated cycles	2,705	7,827	9,434	4,616	314	24,896
Embryo transfer cycles	2,577	7,418	8,799	4,157	260	23,211
Clinical pregnancies	954	2,578	2,750	931	26	7,239
Live deliveries	753	2,039	2,068	593	17	5,470
Live deliveries per initiated cycle (%)	*27.8*	*26.1*	*21.9*	*12.8*	*5.4*	*22.0*
Live deliveries per embryo transfer cycle (%)	*29.2*	*27.5*	*23.5*	*14.3*	*6.5*	*23.6*
Live deliveries per clinical pregnancy (%)	*78.9*	*79.1*	*75.2*	*63.7*	*65.4*	*75.6*

(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. For women aged 45 or older, 5.4% 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 (1.2%) (Figures 2 and 5).

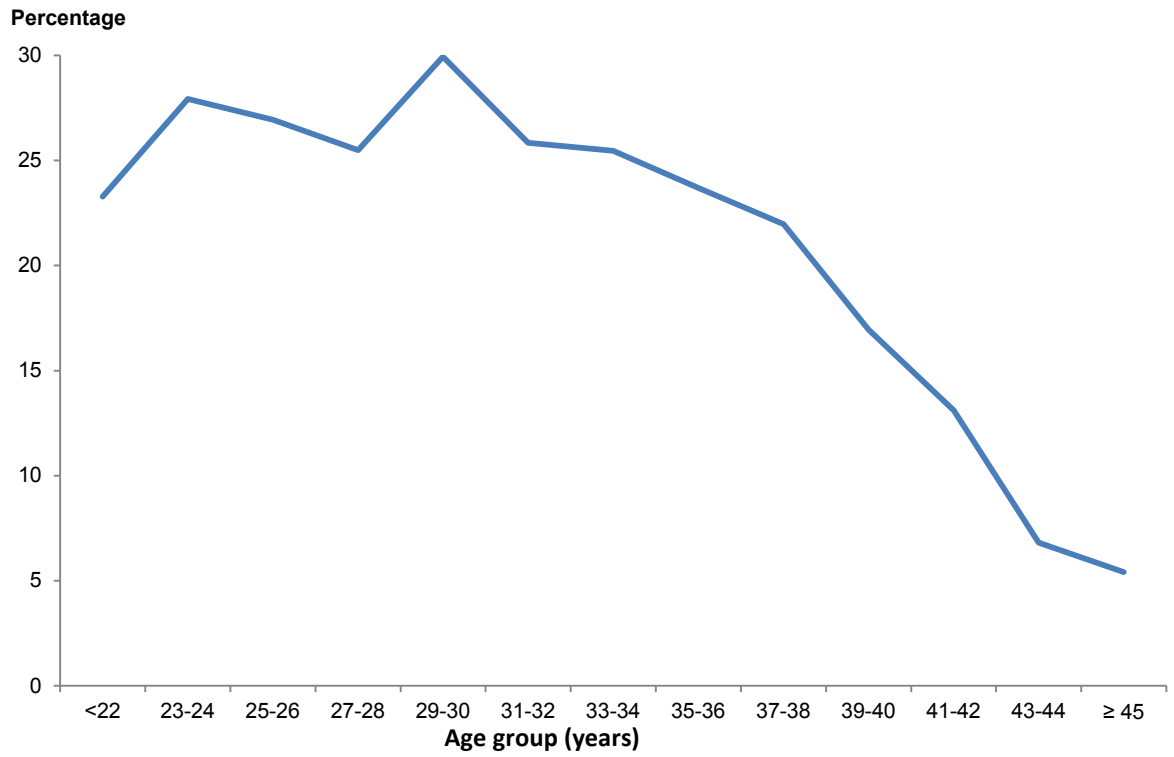

Figure 5: Live deliveries per initiated autologous thaw cycle by women's age at start of a treatment cycle, Australia and New Zealand, 2013

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 (23.3%) than those with female factor-only infertility (22.5%) (Table 15).

Table 15: Outcomes of autologous thaw cycles by cause of infertility, Australia and New Zealand, 2013

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	5,493	94.5	30.5	23.3
Female factor	6,602	93.6	30.1	22.5
Tubal disease only	*1,047*	*93.9*	*28.2*	*20.0*
Endometriosis only	*1,147*	*94.5*	*28.9*	*23.2*
Other female factor only	*3,633*	*93.4*	*31.4*	*23.5*
Combined female factor	*775*	*92.9*	*28.6*	*20.3*
Combined male–female factors	3,129	94.0	32.5	24.8
Unexplained	5,424	93.0	29.9	22.5
Not stated	4248	90.7	21.9	16.6
Total	**24,896**	**93.2**	**29.1**	**22.0**

Clinical pregnancies and live deliveries by number of embryos transferred

Overall, of the 23,211 embryo transfer cycles, 84.9% were SET cycles, 14.9% were DET cycles and 0.2% 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 1.0% in women aged 40 or older.

The live delivery rate was higher for SET than DET regardless of women's age (Table 16).

Table 16: Outcomes of autologous thaw embryo transfer cycles by women's age and number of embryos transferred, Australia and New Zealand, 2013

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	8,788	1,202	7,507	1,289	3,415	960	19,710	3,451
Clinical pregnancies	3,098	433	2,361	388	750	200	6,209	1,021
Live deliveries	2,457	335	1,779	289	487	122	4,723	746
Clinical pregnancies per embryo transfer cycle (%)	*35.3*	*36.0*	*31.5*	*30.1*	*22.0*	*20.8*	*31.5*	*29.6*
Live deliveries per embryo transfer cycle (%)	*28.0*	*27.9*	*23.7*	*22.4*	*14.3*	*12.7*	*24.0*	*21.6*

(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 13.6 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, 2013

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	2,502	7,493	2,383	6,416	1,617	2,800	6,502	16,709
Clinical pregnancies	569	2,963	433	2,317	198	759	1,200	6,039
Live deliveries	456	2,336	325	1,743	115	495	896	4,574
Clinical pregnancies per embryo transfer cycle (%)	*22.7*	*39.5*	*18.2*	*36.1*	*12.2*	*27.1*	*18.5*	*36.1*
Live deliveries per embryo transfer cycle (%)	*18.2*	*31.2*	*13.6*	*27.2*	*7.1*	*17.7*	*13.8*	*27.4*

(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 four out of five (83.4%) autologous thaw cycles where a blastocyst was transferred used vitrified embryos, compared with 15.9% of cycles where a cleavage embryo was transferred. The rates of clinical pregnancy were higher for the transfer of vitrified cleavage stage embryo and blastocyst transfer cycles. The rates of live delivery were higher for slow frozen cleavage stage embryos than vitrified embryos. In contrast, the rates of live delivery were higher for vitrified blastocyst transfer cycles than slow frozen blastocyst transfers (Table 18).

Table 18: Outcomes of autologous thaw embryo transfer cycles by stage of embryo development and embryo freezing methods, Australia and New Zealand, 2013

	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	5,467	1,035	2,782	13,927	8,249	14,962
Clinical pregnancies	999	201	873	5,166	1,872	5,367
Live deliveries	760	136	661	3,913	1,421	4,049
Clinical pregnancies per embryo transfer cycle (%)	*18.3*	*19.4*	*31.4*	*37.1*	*22.7*	*35.9*
Live deliveries per embryo transfer cycle (%)	*13.9*	*13.1*	*23.8*	*28.1*	*17.2*	*27.1*

(a) Ultra-rapid cryopreservation.

Clinical pregnancies from autologous thaw embryo transfer cycles among fertility centres

The clinical pregnancy per autologous thaw embryo transfer cycle ranged from 11.4% to 45.1% among the 34 fertility centres in 2013. The middle 50% of fertility centres (second and third quartiles) achieved rates between 23.4% and 36.2% (Table 19). At least 40 autologous thaw embryo transfer cycles were performed in each centre and there were eight or nine centres in each quartile.

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 clinical pregnancy rate of an individual centre.

Table 19: Clinical pregnancies per autologous thaw embryo transfer by women's age group among fertility centres, Australia and New Zealand, 2013

	Clinical pregnancies per autologous thaw embryo transfer cycle (per cent)				
Age group (years)[(a)]	**Overall**	**First quartile**	**Second quartile**	**Third quartile**	**Fourth quartile**
< 35	35.3	39.9–47.6	34.5–39.8	25.6–34.4	12.1–25.5
35–39	31.3	37.2–52.2	29.3–37.1	22.1–29.2	8.5–22.0
≥ 40	21.7	25.9–47.8	20.0–25.8	14.8–19.9	0.0–14.7
All	**31.2**	36.3–45.1	30.8–36.2	23.4–30.7	11.4–23.3

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

There was also variation among the 34 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 17.9% and 27.6%.

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.

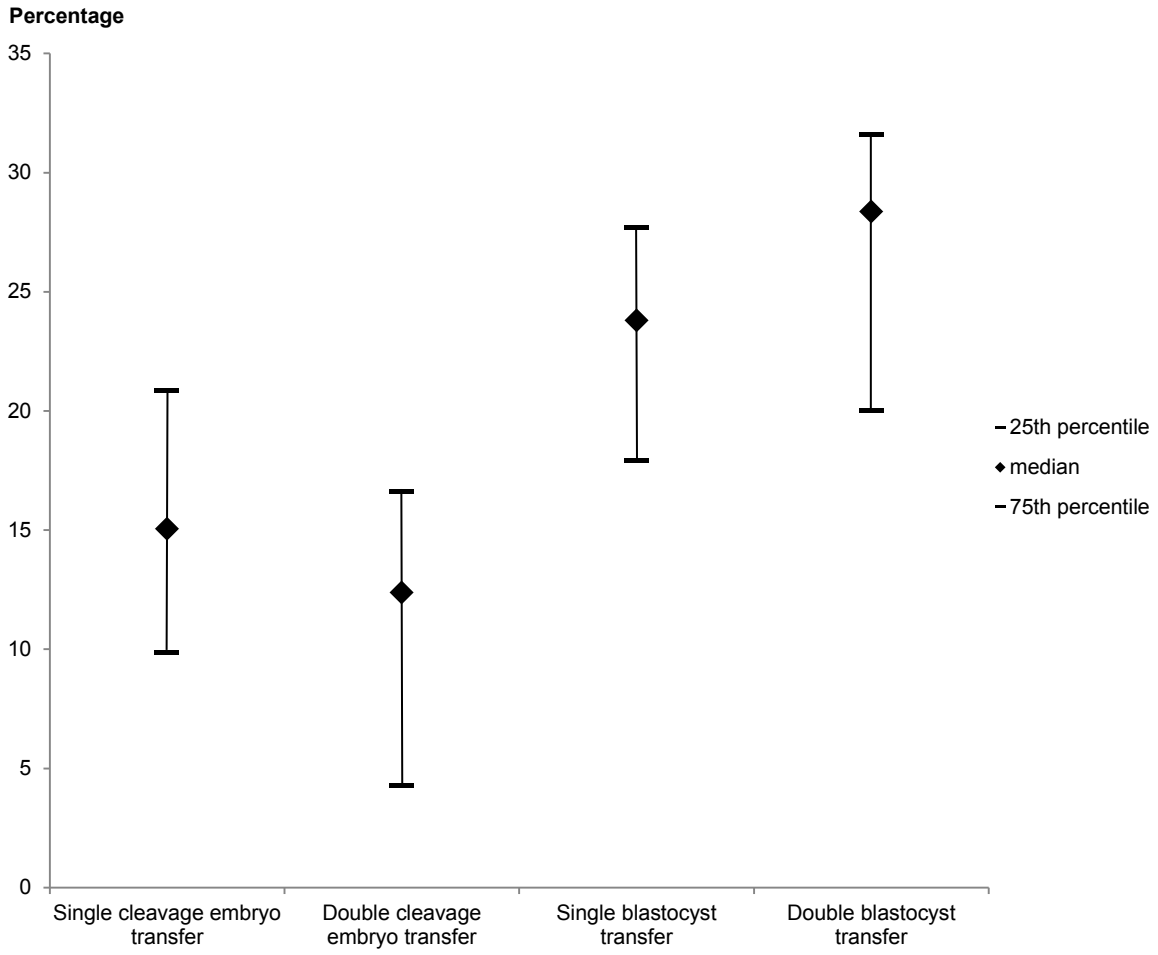

Figure 6: Live delivery rate of autologous thaw embryo transfer cycles by number of embryos transferred and stage of embryo development among fertility centres, Australia and New Zealand, 2013

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 2013, donation and recipient cycles accounted for 4.6% (3,305) of all treatment cycles in Australia and New Zealand. There were 1,000 initiated cycles where the intention was to donate oocytes, consisting of 897 (89.7%) cycles in Australia and 103 (10.3%) in New Zealand. There were 2,305 oocyte/embryo recipient cycles (Table 1), including 2,110 cycles in Australia and 195 cycles in New Zealand.

Oocyte donation cycles

Of the 1,000 cycles in Australia and New Zealand where the intention was to donate oocytes to a recipient, 48 (4.8%) cycles were cancelled before OPU, and a further 15 did not result in oocytes being donated.

The average age of women donating oocytes was 33.0 years, with 43.0% 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, 2013

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	229	221	96.5	216	94.3
30–34	340	319	93.8	317	93.2
35–39	351	337	96.0	330	94.0
≥ 40	79	75	94.9	74	93.7
Total[(b)]	**1,000**	**952**	**95.2**	**937**	**93.7**

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

(b) Total includes one cycle where donor's age was not stated.

Oocyte/embryo recipient cycles

There were 2,305 oocyte/embryo recipient cycles in 2013. Of these, 83.2% (1,918) were oocyte recipient cycles and 16.8% (387) were embryo recipient cycles (Table 1). The average age of women undertaking an oocyte/embryo recipient cycle was 40.7 years.

Progression of oocyte/embryo recipient cycles

Figure 7 shows the main stages of oocyte/embryo recipient cycles and the treatment outcomes. Of the 2,305 initiated oocyte/embryo recipient cycles undertaken in 2013, 27.6% resulted in a clinical pregnancy and 20.0% in a live delivery.

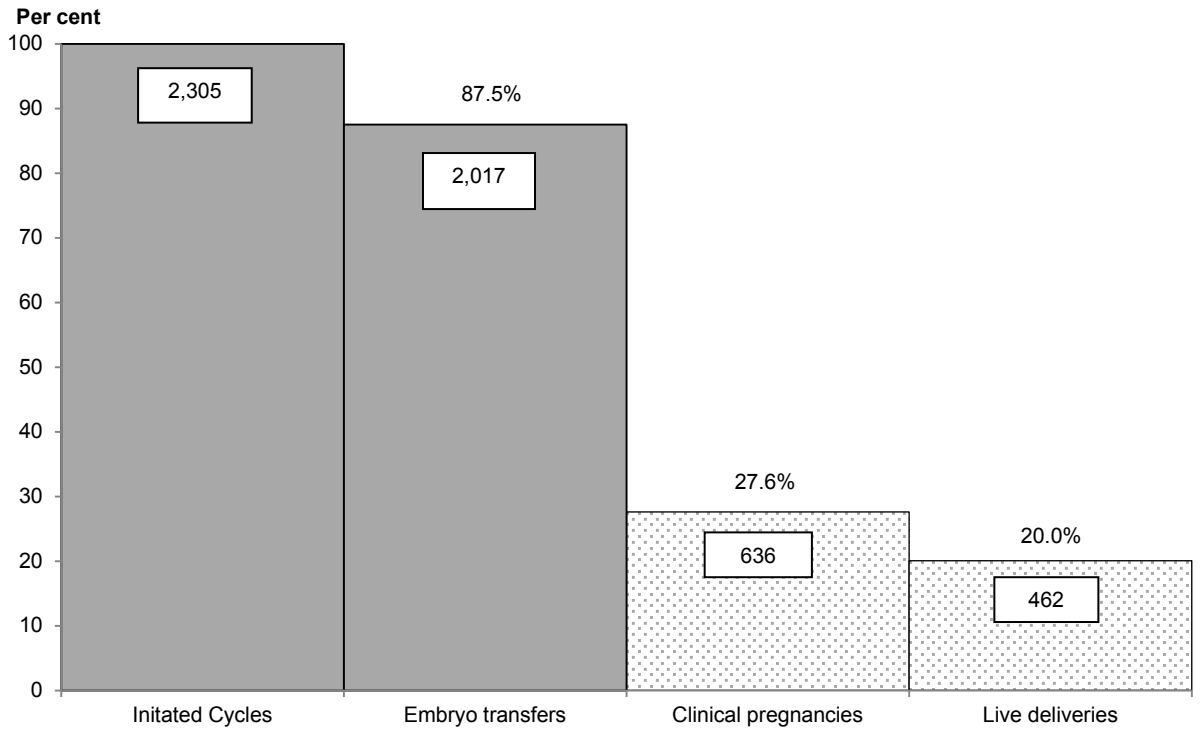

Figure 7: Progression of fresh and thaw oocyte/embryo recipient cycles, Australia and New Zealand, 2013

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

Of the 1,918 oocyte recipient cycles, 49.0% were fresh cycles and 51.0% were thaw cycles. The live delivery rate per initiated cycle was 20.3% for fresh oocyte recipient cycles, higher than for thawed oocyte recipient cycles (19.7%).

All 387 embryo recipient cycles were thaw cycles. The overall live delivery rate was 20.2% for embryo recipient cycles (Table 21).

Table 21: Outcomes of oocyte/embryo recipient cycles by treatment type, Australia and New Zealand, 2013

	Oocyte recipient			
Stage/outcome of treatment	Fresh	Thaw	Embryo recipient	All
Initiated cycles	939	979	387	2,305
Embryo transfer cycles	716	943	358	2,017
Clinical pregnancies	261	265	110	636
Live deliveries	191	193	78	462
Live deliveries per initiated cycle (%)	*20.3*	*19.7*	*20.2*	*20.0*
Live deliveries per embryo transfer cycle (%)	*26.7*	*20.5*	*21.8*	*22.9*
Live deliveries per clinical pregnancy (%)	*73.2*	*72.8*	*70.9*	*72.6*

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 20.0%, varying between 17.6% and 22.5% by recipient's age (Table 22). However, the live delivery rate of oocyte/embryo recipient cycles in recipients aged ≥ 45 (17.6%) was markedly higher than the rate for autologous fresh cycles (1.2%) and the rate for autologous thaw cycles (5.4%) 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, 2013

	Age group (years)[(a)]					
Stage/outcome of treatment	< 30	30–34	35–39	40–44	≥ 45	All
Initiated cycles	77	231	547	875	575	2,305
Embryo transfer cycles	62	202	474	762	517	2,017
Clinical pregnancies	17	70	144	263	142	636
Live deliveries	15	52	107	187	101	462
Live deliveries per initiated cycle (%)	*19.5*	*22.5*	*19.6*	*21.4*	*17.6*	*20.0*
Live deliveries per embryo transfer cycle (%)	*24.2*	*25.7*	*22.6*	*24.5*	*19.5*	*22.9*
Live deliveries per clinical pregnancy (%)	*88.2*	*74.3*	*74.3*	*71.1*	*71.1*	*72.6*

(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 20.8% compared to 5.1% 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, 2013

	Age group (years)[a]				
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**≥ 40**	**All[b]**
Initiated cycles	457	725	738	136	2,305
Embryo transfer cycles	402	631	629	108	2,017
Clinical pregnancies	147	204	205	13	636
Live deliveries	106	157	137	7	462
Live deliveries per initiated cycle (%)	*23.2*	*21.7*	*18.6*	*5.1*	*20.0*
Live deliveries per embryo transfer cycle (%)	*26.4*	*24.9*	*21.8*	*6.5*	*22.9*
Live deliveries per clinical pregnancy (%)	*72.1*	*77.0*	*66.8*	*53.8*	*72.6*

(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 2,017 oocyte/embryo recipient cycles where embryos were transferred, 78.8% were SET, 20.9% were DET and seven cycles (0.3%) 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 2.5 percentage points (22.4% and 24.9% respectively) (Table 24).

Table 24: Outcomes of oocyte/embryo recipient cycles by recipient's age and number of embryos transferred, Australia and New Zealand, 2013

	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	192	71	370	104	1,027	246	1,589	421
Clinical pregnancies	60	27	108	36	319	85	487	148
Live deliveries	46	21	80	27	230	57	356	105
Clinical pregnancies per embryo transfer cycle (%)	*31.3*	*38.0*	*29.2*	*34.6*	*31.1*	*34.6*	*30.6*	*35.2*
Live deliveries per embryo transfer cycle (%)	*24.0*	*29.6*	*21.6*	*26.0*	*22.4*	*23.2*	*22.4*	*24.9*

(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 11.7 percentage points (15.8% and 27.5% respectively) (Table 25).

Table 25: Outcomes of oocyte/embryo recipient cycles by recipient's age and stage of embryo development, Australia and New Zealand, 2013

	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	104	160	169	305	519	760	792	1225
Clinical pregnancies	22	65	43	101	130	275	195	441
Live deliveries	15	52	24	83	86	202	125	337
Clinical pregnancies per embryo transfer cycle (%)	*21.2*	*40.6*	*25.4*	*33.1*	*25.0*	*36.2*	*24.6*	*36.0*
Live deliveries per embryo transfer cycle (%)	*14.4*	*32.5*	*14.2*	*27.2*	*16.6*	*26.6*	*15.8*	*27.5*

(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

Three-quarters (75.8%) of oocyte/embryo recipient thaw cycles where a blastocyst was transferred used vitrified embryos, compared with 11.6% 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, 2013

	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	451	59	191	598	642	657
Clinical pregnancies	106	12	54	203	160	215
Live deliveries	63	4	42	162	105	166
Clinical pregnancies per embryo transfer cycle (%)	*23.5*	*20.3*	*28.3*	*33.9*	*24.9*	*32.7*
Live deliveries per embryo transfer cycle (%)	*14.0*	*6.8*	*22.0*	*27.1*	*16.4*	*25.3*

(a) Ultra-rapid cryopreservation.

4 Pregnancy and birth outcomes following autologous and recipient embryo transfer cycles in 2013

4.1 Clinical pregnancies

Clinical pregnancies overview

Of the 54,926 autologous and recipient embryo transfer cycles undertaken in Australian and New Zealand fertility centres, 17,009 resulted in a clinical pregnancy. Of these, 15,457 (90.9%) were reported from fertility centres in Australia and 1,552 (9.1%) from New Zealand centres. Clinical pregnancies that resulted from other cycles are described in Chapter 5.

Of the 17,009 clinical pregnancies, over three-quarters (77.4%) resulted in a delivery and 21.0% resulted in early pregnancy loss (less than 20 weeks gestation and less than 400 grams birthweight). The outcomes of 283 (1.7%) clinical pregnancies were not known because women could not be followed up or contacted by fertility centres.

Fetal hearts by number of embryos transferred

Of the 17,009 clinical pregnancies, 81.9% had one fetal heart (single fetus) detected, 5.4% 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 19.8% 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, 2013

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)]	1,380	10.0	425	13.7	21	25.3	1,826	10.7
1	11,879	85.9	2,001	64.6	50	60.2	13,930	81.9
2	272	2.0	613	19.8	9	10.8	894	5.3
3 or 4	11	0.1	13	0.4	1	1.2	25	0.1
Not stated	285	2.1	47	1.5	2	2.4	334	2.0
Total	**13,827**	**100.0**	**3,099**	**100.0**	**83**	**100.0**	**17,009**	**100.0**

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

Early pregnancy loss

There were 3,569 early pregnancy losses (less than 20 weeks gestation and less than 400 grams birthweight) following embryo transfers, representing 21.0% of clinical pregnancies (Table 28).

Pregnancies following SET resulted in a lower rate of early pregnancy loss (19.8%) and higher delivery rate (78.4%) 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, 2013

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	2,743	19.8	788	25.4	38	45.8	3,569	21.0
Miscarriage	*2,518*	*18.2*	*717*	*23.1*	*34*	*41.0*	*3,269*	*19.2*
Reduction or termination	*88*	*0.6*	*18*	*0.6*	*0*	*0.0*	*106*	*0.6*
Ectopic or heterotopic pregnancy	*137*	*1.0*	*53*	*1.7*	*4*	*4.8*	*194*	*1.1*
Delivery	10,843	78.4	2,269	73.2	45	54.2	13,157	77.4
Not stated	241	1.7	42	1.4	0	0.0	283	1.7
Total	**13,827**	**100.0**	**3,099**	**100.0**	**83**	**100.0**	**17,009**	**100.0**

4.2 Deliveries

There were 13,157 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, 98.5% (12,962) 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, 2013

Pregnancy outcome	Autologous				Oocyte /embryo recipient		All	
	Fresh		Thaw					
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Live delivery	7,030	98.5	5,470	98.5	462	98.9	12,962	98.5
< 37 weeks	*971*	13.6	*624*	11.2	*93*	19.9	*1,688*	12.8
≥ 37 weeks	*6,059*	84.9	*4,846*	87.2	*369*	79.0	*11,274*	85.7
Fetal death (stillbirth)[(a)]	67	0.9	43	0.8	5	1.1	115	0.9
Not stated	38	0.5	42	0.8	0	0.0	80	0.6
Total	**7,135**	**100.0**	**5,555**	**100.0**	**467**	**100.0**	**13,157**	**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 13,157 deliveries, 5.6% had multiple deliveries (Table 30), a lower proportion than in 2012 (6.5%) (Macaldowie et al. 2014). By comparison, the proportion of multiple deliveries in Australia from all conceptions in 2012 was 1.5% (Hilder et al. 2014).

Twin deliveries accounted for 5.5% of deliveries following embryo transfer cycles in 2013. Of twin deliveries, more than two-thirds were from DET (501/719) and almost one-third were from SET cycles (212/719). Of the 2,269 deliveries following DET cycles, 22.1% were twins, markedly higher than the proportion following SET cycles (2.0%) (Table 30).

Table 30: Deliveries by gestation and number of embryos transferred, Australia and New Zealand, 2013

Gestation	One embryo		Two embryos		Three or more embryos		Total	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Singleton	10,625	98.0	1,762	77.7	38	84.4	12,425	94.4
Multiple	*218*	*2.0*	*507*	*22.3*	*7*	*15.6*	*732*	*5.6*
Twin	212	2.0	501	22.1	6	13.3	719	5.5
Higher order multiple	6	0.1	6	0.3	1	2.2	13	0.1
Total	**10,843**	**100.0**	**2,269**	**100.0**	**45**	**100.0**	**13,157**	**100.0**

Deliveries by maternal age

The average age of women at the time of delivery was 35.0. This is five years older than the average age (30.1) of women who gave birth in Australia in 2012 (Hilder et al. 2014).

Women aged 40 or older had a lower proportion (5.1%) of multiple deliveries compared with women aged under 35 (5.6%) and women aged 35–39 (5.7%). Of deliveries following DET, the proportion of multiple deliveries was higher for women aged under 35 (28.8%) compared with women aged 35–39 (23.7%) and women aged 40 or older (12.8%) (Table 31).

Table 31: Deliveries by gestation and maternal age group, Australia and New Zealand, 2013

	Age group (years)[a]								
	< 35			35–39			≥ 40		
Gestation	One embryo	Two embryos	All[b]	One embryo	Two embryos	All[b]	One embryo	Two embryos	All[b]
					Number				
Singleton	5,183	521	5,704	4,006	696	4,703	1,436	545	2,018
Multiple	*125*	*211*	*337*	*70*	*216*	*286*	*23*	*80*	*109*
Twin	121	209	331	68	212	280	23	80	108
Higher order multiple	4	2	6	2	4	6	0	0	1
Total	**5,308**	**732**	**6,041**	**4,076**	**912**	**4,989**	**1,459**	**625**	**2,127**
					Per cent				
Singleton	97.6	71.2	94.4	98.3	76.3	94.3	98.4	87.2	94.9
Multiple	*2.4*	*28.8*	*5.6*	*1.7*	*23.7*	*5.7*	*1.6*	*12.8*	*5.1*
Twin	2.3	28.6	5.5	1.7	23.2	5.6	1.6	12.8	5.1
Higher order multiple	0.1	0.3	0.1	0.0	0.4	0.1	0.0	0.0	0.0
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

Half (50.1%) 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 2012 (32.0%) (Hilder et al. 2014). 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: 39.1% of women aged less than 30 had a caesarean section compared with 83.5% of women aged 45 or older (Table 32).

The caesarean section rate varied by plurality, with 48.4% for singleton deliveries, 79.6% for twin deliveries and 76.9% for triplet deliveries.

Table 32: Deliveries by method of delivery and maternal age group, Australia and New Zealand, 2013

	Age group (years)[(a)]					
Method of delivery	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**Total**
			Number			
Caesarean section	612	2,033	2,595	1,205	152	6,597
Other	939	2,410	2,364	725	30	6,468
Not stated	15	32	30	15	0	92
Total	**1,566**	**4,475**	**4,989**	**1,945**	**182**	**13,157**
			Per cent			
Caesarean section	39.1	45.4	52.0	62.0	83.5	50.1
Other	60.0	53.9	47.4	37.3	16.5	49.2
Not stated	1.0	0.7	0.6	0.8	0.0	0.7
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 13,902 babies born to women who had autologous and recipient embryo transfer cycles, 90.7% (12,608) were reported from fertility centres in Australia and 9.3% (1,294) from fertility centres in New Zealand. Of the 13,902 babies, 89.4% were singletons, 10.3% were twins and 0.3% were triplets. There were 13,679 liveborn babies (98.4%). The birth status was not reported for 0.6% of babies.

Sex distribution in liveborn babies

There were 6,920 (50.6%) liveborn male babies, 6,677 (48.8%) liveborn female babies and 82 (0.6%) liveborn babies where sex was not stated. For the 13,597 liveborn babies where the baby's sex was stated, the sex ratio was 103.6 male babies for every 100 female babies, similar to the ratio for all Australian liveborn babies born in 2012 (106.4) (Hilder et al. 2014).

Liveborn babies following cleavage embryo transfers had a sex ratio of 101.2 male babies for every 100 female babies. In comparison, liveborn babies following blastocyst transfers had a sex ratio of 104.5 male babies for every 100 female babies. In comparison, in 2012, liveborn babies following cleavage embryo transfers had a sex ratio of 93.4 male babies for every 100 female babies, and liveborn babies following blastocyst transfers had a sex ratio of 112.3 male babies for every 100 female babies (Macaldowie et al. 2014).

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 2012 (Hilder et al. 2014).

One in six babies (16.6%) were preterm (less than 37 weeks gestation), which was markedly higher than the proportion of preterm babies (8.5%) born in Australia in 2012 (Hilder et al. 2014). The average gestational age of ART singletons was 38.3 weeks, marginally less than the average gestational age of 38.8 weeks for all singletons born in Australia in 2012 (Hilder et al. 2014). The average gestational age for ART twins was 34.8 weeks (Table 33), marginally less than the average gestational age of 35.0 weeks for all twins born in Australia in 2012 (Hilder et al. 2014).

Table 33: Babies by gestational age and plurality, Australia and New Zealand, 2013

Gestational age (weeks)	Singletons		Twins		Higher order multiples		Total	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Mean	*38.3*		*34.8*		*32.2*		*37.9*	
≤ 27	153	1.2	54	3.8	6	15.4	213	1.5
28–31	113	0.9	108	7.5	0	0.0	221	1.6
32–36	1,041	8.4	806	56.1	30	76.9	1,877	13.5
≥ 37	11,118	89.5	470	32.7	3	7.7	11,591	83.4
Total	**12,425**	**100.0**	**1,438**	**100.0**	**39**	**100.0**	**13,902**	**100.0**
≤ 36	*1,307*	*10.5*	*968*	*67.3*	*36*	*92.3*	*2,311*	*16.6*

Figure 8 shows the distribution of gestational age for singletons and twins born to women who had autologous and recipient embryo transfer cycles in 2013. Singletons following SET cycles had a lower proportion of preterm birth (10.3%) than singletons following DET cycles (11.7%). The overall proportions of preterm singletons (10.5%) and twins (67.0%) born to women who had embryo transfer cycles in 2013 were higher than the overall proportions of preterm singletons and twins born in Australia in 2012 (6.9% and 60.8% respectively) (Hilder et al. 2014).

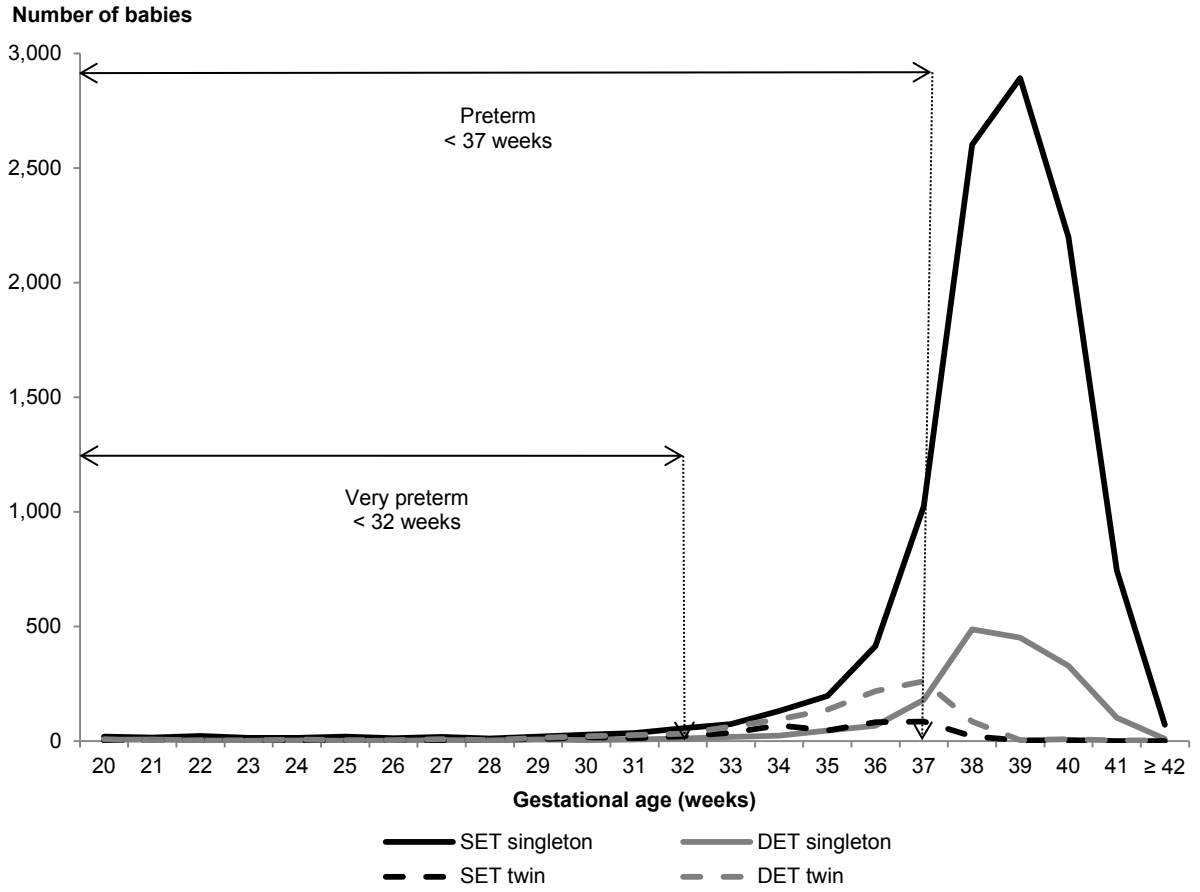

Figure 8: Number of babies born following embryo transfer cycles by gestational age, Australia and New Zealand, 2013

Birthweight of liveborn babies

The average birthweight for liveborn babies to women who had autologous and recipient embryo transfer cycles was 3,216 grams. Over 12% of these babies were low birthweight (less than 2,500 grams) (Table 34).

The average birthweight was 3,319 grams and 2,340 grams for liveborn ART singletons and twins respectively. These were lower than the mean birthweight of all liveborn singletons (3,397 grams) and twins (2,379 grams) in Australia in 2012 (Hilder et al. 2014). Low birthweight was reported for 6.7% of liveborn singletons following SET, and 7.3% of liveborn singletons following DET.

Table 34: Liveborn babies by birthweight group and plurality, Australia and New Zealand, 2013

	Singletons				
Birthweight (grams)	SET[a]	DET[b]	Twins	Higher order multiples	Total[c]
			Number		
< 1,000	55	7	24	6	92
1,000–1,499	57	13	84	2	156
1,500–1,999	156	29	217	14	416
2,000–2,499	429	78	460	16	987
2,500–2,999	1,648	326	434	1	2,419
3,000–3,499	3,906	649	138	0	4,705
3,500–3,999	2,972	438	10	0	3,430
≥ 4,000	1,121	164	3	0	1,289
Not stated	133	28	24	0	185
Total	**10,477**	**1,732**	**1,394**	**39**	**13,679**
< 2,500	*697*	*127*	*785*	*38*	*1,651*
			Per cent		
< 1,000	*0.5*	*0.4*	*1.7*	*15.4*	*0.7*
1,000–1,499	*0.5*	*0.8*	*6.0*	*5.1*	*1.1*
1,500–1,999	*1.5*	*1.7*	*15.6*	*35.9*	*3.0*
2,000–2,499	*4.1*	*4.5*	*33.0*	*41.0*	*7.2*
2,500–2,999	*15.7*	*18.8*	*31.1*	*2.6*	*17.7*
3,000–3,499	*37.3*	*37.5*	*9.9*	*0.0*	*34.4*
3,500–3,999	*28.4*	*25.3*	*0.7*	*0.0*	*25.1*
≥ 4,000	*10.7*	*9.5*	*0.2*	*0.0*	*9.4*
Not stated	*1.3*	*1.6*	*1.7*	*0.0*	*1.4*
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
< 2,500	*6.7*	*7.3*	*56.3*	*97.4*	*12.1*

(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 173 reported perinatal deaths, including 138 fetal deaths and 35 neonatal deaths. The perinatal mortality rate in 2013 was 12.4 deaths per 1,000 births (Table 35), which was higher than the rate of 9.6 per 1,000 births for all births in Australia in 2012 (Hilder et al. 2014). Singletons had a lower perinatal mortality rate (10.4 deaths per 1,000 births) compared with multiples (29.8 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 2013, information relating to pregnancy outcomes was not stated for 0.6% of clinical pregnancies.

Table 35: Perinatal mortality of babies by type of death and plurality, Australia and New Zealand, 2013

Birth outcome	Singletons	Multiples	Total
		Number	
Fetal death (stillbirth)[(a)]	104	34	138
Neonatal death	25	10	35
Perinatal death[(b)]	129	44	173
All birth	**12,425**	**1,477**	**13,902**
All live birth	12,246	1,433	13,679
		Rate[(c)]	
Fetal deaths per 1,000 births	*8.4*	*23.0*	*9.9*
Neonatal deaths per 1,000 live births	*2.0*	*7.0*	*2.6*
Perinatal deaths per 1,000 births	*10.4*	*29.8*	*12.4*

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

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

(c) 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 85 babies.

5 Other cycle types, procedures and treatment complications in 2013

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 227 gestational surrogacy cycles in 2013, including 176 gestational carrier cycles and 51 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 176 gestational carrier cycles, 137 (77.8%) involved the transfer of at least one embryo, 45 (25.6%) resulted in a clinical pregnancy and 35 (19.9%) resulted in a live delivery.

5.2 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 indication for PGD is not recorded in ANZARD. The number of cycles where PGD was performed in 2013 increased by 19.4% from 2,294 in 2012 (Macaldowie et al. 2014) to 2,740 in 2013, representing 4.4% of cycles in which embryos were created or thawed. Over two-thirds (68.8%) of PGD cycles were fresh embryo cycles (Table 36). Almost two-thirds (64.8%) of the 2,740 cycles where PGD was performed were in woman aged 35 or older.

Of the 2,740 PGD cycles, 48.1% (1,319) had embryos transferred and resulted in 538 clinical pregnancies and 426 live deliveries. The clinical pregnancy rate and live birth rate per embryo transfer was 40.8% and 32.3% respectively.

Table 36: Number of cycles with PGD by type of embryo, Australia and New Zealand, 2013

	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	36,657	1,885	5.1
Thaw	25,899	855	3.3
Total	**62,556**	**2,740**	**4.4**

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 1,385 assisted hatching cycles reported in 2013 that were not associated with PGD. Of these, 1,242 (89.7%) had embryos transferred, resulting in 310 (22.4%) clinical pregnancies and 215 (15.5%) live deliveries. There were 218 births following assisted hatching cycles, including 198 singletons and 20 twins.

5.4 GIFT cycles

Gamete intrafallopian transfer (GIFT) is an ART treatment where mature oocytes and sperm are placed directly into a woman's fallopian tubes. In 2013, there were four GIFT cycles, of which none resulted in a clinical pregnancy.

5.5 Ovarian hyperstimulation syndrome

Ovarian hyperstimulation syndrome (OHSS) is a complication of controlled ovarian stimulation 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 294 OHSS cases reported in 2013 that were admitted to hospital. A higher number of oocytes retrieved at OPU is associated with OHSS (Table 37). However, caution should be used when interpreting these data because OHSS is not well reported.

Table 37: Number of cycles with OPU performed and OHSS by number of oocytes collected, Australia and New Zealand, 2013

	Number of oocytes collected						
	None	**1–4**	**5–9**	**10–14**	**15–19**	**≥ 20**	**All**
Cycles with OHSS	0	8	37	61	64	124	294
Cycles with OPU	815	9,826	14,490	8,963	4,100	2,616	40,810
OHSS per OPU cycle (%)	*0.0*	*0.1*	*0.3*	*0.7*	*1.6*	*4.7*	*0.7*

6 Donor sperm insemination cycles in 2013

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 2013, there were 2,621 DI cycles reported, which included 27.6% (724) undertaken with controlled ovarian hyperstimulation and 68.0% (1,782) undertaken in unstimulated cycles. Of all DI cycles, 14.2% resulted in a clinical pregnancy and 11.1% resulted in a live delivery (Table 38). The multiple birth rate following DI cycles was 4.1%.

The average age of women who had a DI cycle was 34.9. 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, 14.5% resulted in a live delivery, compared with 3.4% 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, 2013

	Age group (years)[(a)]				
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**≥ 40**	**Total**
DI cycles	435	721	958	507	2,621
Clinical pregnancies	76	132	130	34	372
Live deliveries	57	111	107	17	292
Clinical pregnancies per DI cycle (%)	17.5	18.3	13.6	6.7	14.2
Live deliveries per DI cycle (%)	13.1	15.4	11.2	3.4	11.1
Live deliveries per clinical pregnancy (%)	75.0	84.1	82.3	50.0	78.5

(a) Age at start of a treatment cycle.

Clinical pregnancies following DI cycles

Of the 372 clinical pregnancies following DI cycles, 78.5% resulted in a delivery, 18.0% ended in early pregnancy loss (including 16.9% miscarriages and 1.1% ectopic/heterotopic pregnancies), and 2.7% were unknown pregnancy outcomes. Of the 294 deliveries, 282 (95.9%) were singleton deliveries, 10 (3.4%) were twin deliveries and 2 (0.7%) were triplet deliveries.

Perinatal outcomes of babies

There were 308 babies born to women who had DI treatment, including 306 liveborn and two stillborn babies. Of these liveborn babies, 35 (11.4%) were born preterm (less than 37 weeks gestation). The mean birthweight of liveborn babies following DI treatment was 3,344 grams. This was higher than the mean birthweight (3,216 grams) of liveborn babies following embryo transfer cycles. Twenty-three liveborn babies (7.5%) were born with low birthweight (less than 2,500 grams).

7 Trends in ART treatment and outcomes: 2009–2013

This section includes autologous cycles, donation/recipient cycles, surrogacy cycles and GIFT cycles undertaken in Australia and New Zealand from 2009 to 2013. It does not include DI cycles.

ART treatment and outcomes

In 2013, 45,115 initiated fresh ART treatment cycles were undertaken in Australia and New Zealand. This is an increase of 2.0% on 2012 and a decrease of 0.6% on 2009 (Table 39).

The proportion of initiated fresh cycles reaching embryo transfer has decreased from 76.7% in 2010 to 67.5% in 2013 partly due to changes in clinical practice, for example, increasing proportions of cycles where all embryos are frozen and subsequently transferred in thaw cycles (Table 39). This practice reduces the risk of OHSS in some patients and is a treatment option used by some clinicians.

Between 2009 and 2013, the clinical pregnancy and live delivery rates per initiated fresh cycle ranged from 20.9% to 23.8% and from 16.0% to 18.1% respectively (Table 39).

Table 39: Number of fresh cycles by stage/outcome of treatment, Australia and New Zealand, 2009 to 2013

Stage/outcome of treatment	2009	2010	2011	2012	2013
Initiated cycles[(a)]	45,400	38,796	42,629	44,238	45,115
Cycles with OPU[(b)]	40,708	34,824	38,222	39,709	40,524
Embryo transfers	34,765	29,775	31,837	31,837	30,460
Clinical pregnancies	10,501	9,236	9,346	9,673	9,410
Live deliveries	8,009	7,014	7,117	7,275	7,230
Embryo transfers per initiated cycle (%)	*76.6*	*76.7*	*74.7*	*72.0*	*67.5*
Clinical pregnancy per embryo transfer (%)	*30.2*	*31.0*	*29.4*	*30.4*	*30.9*
Clinical pregnancies per initiated cycle (%)	*23.1*	*23.8*	*21.9*	*21.9*	*20.9*
Live deliveries per embryo transfer (%)	*23.0*	*23.6*	*22.4*	*22.9*	*23.7*
Live deliveries per initiated cycle (%)	*17.6*	*18.1*	*16.7*	*16.4*	*16.0*

(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, 26,401 initiated thaw cycles were undertaken in 2013, an increase of 2.2% on 2012 and an increase of 5.0% on 2009 (Table 40). The live delivery rate following thaw cycles increased from 18.3% in 2009 to 23.4% in 2013 (Table 40).

Table 40: Number of thaw cycles by stage/outcome of treatment, Australia and New Zealand, 2009 to 2013

Stage/outcome of treatment	2009	2010	2011	2012	2013
Initiated cycles[(a)]	25,141	22,978	23,718	25,844	26,401
Embryo transfers	22,555	20,805	21,974	23,891	24,607
Clinical pregnancies	5,474	5,516	5,973	7,044	7,644
Live deliveries	4,118	4,155	4,523	5,246	5,767
Embryo transfers per initiated cycle (%)	*89.7*	*90.5*	*92.6*	*92.4*	*93.2*
Clinical pregnancy per embryo transfer (%)	*24.3*	*26.5*	*27.2*	*29.5*	*31.1*
Clinical pregnancies per initiated cycle (%)	*21.8*	*24.0*	*25.2*	*27.3*	*29.0*
Live deliveries per embryo transfer (%)	*18.3*	*20.0*	*20.6*	*22.0*	*23.4*
Live deliveries per initiated cycle (%)	*16.4*	*18.1*	*19.1*	*20.3*	*21.8*

(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 2013. The proportion of multiple deliveries decreased from 8.2% in 2009 to 5.6% in 2013 (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, 2009 to 2013

	2009		2010		2011		2012		2013	
Gestation	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Singleton	11,272	91.8	10,382	92.1	10,977	93.1	11,919	93.5	12,460	94.4
Multiple	*1,006*	*8.2*	*890*	*7.9*	*815*	*6.9*	*826*	*6.5*	*733*	*5.6*
Twin	987	8.0	874	7.8	799	6.8	807	6.3	720	5.5
Higher order multiple	19	0.2	16	0.1	16	0.1	19	0.1	13	0.1
Total[(a)]	**12,278**	**100.0**	**11,272**	**100.0**	**11,792**	**100.0**	**12,745**	**100.0**	**13,193**	**100.0**

(a) Includes cycles in which gestation was unknown.

Women's age for autologous cycles

The majority of autologous cycles undertaken between 2009 and 2013 were in women aged 30 to 39. The average age of women having autologous cycles remained relatively stable over the period ranging from 35.8 to 35.9 years. The proportion of autologous cycles in women aged 40 and older increased from 23.8% in 2009 to 25.6% in 2013 (Table 42).

Table 42: Number of fresh and thaw autologous cycles by women's age group, Australia and New Zealand, 2009 to 2013

Age group (years)[(a)]	2009		2010		2011		2012		2013	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Mean	35.8		35.8		35.9		35.8		35.9	
< 30	7,303	10.9	6,469	11.0	6,720	10.7	7,353	11.0	7,257	10.7
30–34	17,979	26.7	15,641	26.7	17,129	27.2	18,132	27.2	18,791	27.6
35–39	25,953	38.6	22,224	37.9	23,314	37.0	24,344	36.5	24,548	36.1
40–44	14,853	22.1	13,194	22.5	14,670	23.3	15,763	23.6	16,167	23.8
≥ 45	1,141	1.7	1,046	1.8	1,231	2.0	1,118	1.7	1,217	1.8
Total	**67,229**	**100.0**	**58,574**	**100.0**	**63,064**	**100.0**	**66,710**	**100.0**	**67,980**	**100.0**

(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 embryo transfer cycles that used embryos created with ICSI ranged from 60.2% in 2009 to 64.7% in 2012. The number and proportion of blastocyst transfer cycles increased from 49.8% in 2009 to 61.1% in 2013 (Table 43). The proportion of thaw embryo transfer cycles that used vitrified embryos increased for both cleavage stage embryos and blastocysts (Table 44).

Table 43: Number of embryo transfer cycles by treatment type, Australia and New Zealand, 2009 to 2013

Treatment type and procedure	2009		2010		2011		2012		2013	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Fertilisation procedure										
IVF	21,790	38	18,237	36.1	18,873	35.1	19,653	35.3	19,900	36.1
ICSI	34,489	60.2	31,564	62.4	34,006	63.2	36,067	64.7	35,162	63.9
Not stated	1,028	1.8	769	1.5	922	1.7	2	0.0	1	0.0
Stage of embryo development										
Cleavage stage	28,780	50.2	24,200	47.9	22,760	42.3	22,392	40.2	21,408	38.9
Blastocyst	28,527	49.8	26,370	52.1	31,041	57.7	33,330	59.8	33,655	61.1

Table 44: Number of embryo transfer cycles by cryopreservation method and stage of embryo development, Australia and New Zealand, 2009 to 2013

Type and procedure	2009		2010		2011		2012		2013	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Cleavage stage	**10,633**	**100.0**	**8,760**	**100.0**	**7,962**	**100.0**	**7,735**	**100.0**	**7,049**	**100.0**
Slow frozen	*10,440*	*98.2*	*8,360*	*95.4*	*7,381*	*92.7*	*6,839*	*88.4*	*5,951*	*84.4*
Vitrification[(a)]	*178*	*1.7*	*393*	*4.5*	*573*	*7.2*	*892*	*11.5*	*1,097*	*15.6*
Not stated	*15*	*0.1*	*7*	*0.1*	*8*	*0.1*	*4*	*0.1*	*1*	*0.0*
Blastocyst	**11,922**	**100.0**	**12,045**	**100.0**	**14,012**	**100.0**	**16,156**	**100.0**	**17,558**	**100.0**
Slow frozen	*7,960*	*66.8*	*4,495*	*37.3*	*3,769*	*26.9*	*3,734*	*23.1*	*2,982*	*17.0*
Vitrification[(a)]	*3,954*	*33.2*	*7,539*	*62.6*	*10,230*	*73.0*	*12,409*	*76.8*	*14,558*	*82.9*
Not stated	*8*	*0.1*	*11*	*0.1*	*13*	*0.1*	*13*	*0.1*	*18*	*0.1*

(a) Ultra-rapid cryopreservation.

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 2009, the proportion of SET cycles accounted for 69.7% of embryo transfer cycles and by 2013 this proportion had increased to 79.2% (Table 44).

Table 45: Percentage of embryo transfer cycles by number of embryos transferred, Australia and New Zealand, 2009 to 2013

Number of embryos transferred	2009	2010	2011	2012	2013
One embryo	69.7	69.6	73.2	76.3	79.2
Two embryos	29.6	29.5	26.0	23.0	20.1
Three or more embryos	0.7	0.8	0.7	0.7	0.7

8 Women undertaking autologous treatment in 2013

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 2013. 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 37,192 women who undertook 67,980 autologous fresh and/or thaw cycles in Australia and New Zealand in 2013. Of these women, 33,732 had treatment in Australia, 3,469 in New Zealand, and 9 had treatment in both Australia and New Zealand.

On average, 1.8 fresh and/or thaw cycles per woman were undertaken in 2013, with more cycles per woman in Australia (1.9 cycles per woman) than in New Zealand (1.5 cycles per woman). Almost half (48.9%) of the women in Australia had two or more autologous treatment cycles compared with one-third (33.9%) of women in New Zealand. In line with this, 9.5% of women in Australia had four or more cycles in 2013 compared with 2.0% of women in New Zealand (Table 46).

Table 46: Women undertaking autologous fresh and/or thaw cycles by number of cycles, Australia and New Zealand, 2013

	Australia		New Zealand		All	
Number of cycles	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
One	17,253	51.1	2,293	66.1	19,531	52.5
Two	8,936	26.5	869	25.1	9,808	26.4
Three	4,338	12.9	239	6.9	4,580	12.3
Four or more	3,205	9.5	68	2.0	3,273	8.8
Total	**33,732**	**100.0**	**3,469**	**100.0**	**37,192**	**100.0**

Note: Only women who undertook cycles in 2013 are included. Nine women had treatment in both Australia and New Zealand.

Women who undertook autologous fresh cycles

There were 43,083 fresh cycles undertaken by 29,914 women in Australia and New Zealand in 2013, an average of 1.4 fresh cycles per woman. Younger women had fewer fresh cycles with one in five (20.2%) 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 6.2% for women aged 45 or older (Table 47).

Table 47: Women undertaking autologous fresh cycles by number of cycles, Australia and New Zealand, 2013

	Age group (years)[(a)]					
Number of cycles	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
			Number			
One	2,972	6,265	7,205	3,959	320	20,721
Two	595	1,601	2,332	1,755	102	6,385
Three	134	377	716	660	49	1,936
Four or more	22	113	297	409	31	872
Total	**3,723**	**8,356**	**10,550**	**6,783**	**502**	**29,914**
			Per cent			
One	79.8	75.0	68.3	58.4	63.7	69.3
Two	16.0	19.2	22.1	25.9	20.3	21.3
Three	3.6	4.5	6.8	9.7	9.8	6.5
Four or more	0.6	1.4	2.8	6.0	6.2	2.9
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Age at start of first autologous fresh cycle in 2013.

Women who undertook autologous thaw cycles

There were 24,896 thaw cycles undertaken by 16,988 women in Australia and New Zealand in 2013, representing an average of 1.5 thaw cycles per woman. One-third (34.0%) of women aged under 30 had two or more thaw cycles compared with one-fifth (19.0%) of women aged 45 or older (Table 48).

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 47 and 48).

Table 48: Women undertaking autologous thaw cycles by number of cycles, Australia and New Zealand, 2013

	Age group (years)[(a)]					
Number of cycles	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
			Number			
One	1,226	3,499	4,312	2,276	188	11,501
Two	414	1,199	1,437	652	32	3,734
Three	161	420	465	213	9	1,268
Four or more	57	172	187	66	3	485
Total	**1,858**	**5,290**	**6,401**	**3,207**	**232**	**16,988**
			Per cent			
One	66.0	66.1	67.4	71.0	81.0	67.7
Two	22.3	22.7	22.4	20.3	13.8	22.0
Three	8.7	7.9	7.3	6.6	3.9	7.5
Four or more	3.1	3.3	2.9	2.1	1.3	2.9
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Age at start of first autologous thaw cycle in 2013.

9 Cycle-specific rates for women who started their first autologous fresh ART treatment in 2011

ANZARD was upgraded from a cycle-based data collection to a woman-based data collection for treatments undertaken from 2011 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 2011 and 31 December 2011. Women in this cohort were followed from the start of their first autologous fresh cycle through subsequent fresh and thaw cycles until 31 December 2013 or until they achieved a live delivery (a delivery of at least one liveborn baby) up to and including 31 October 2014.

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 2013 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 2011 and 31 December 2011, 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 49 to 54 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 49 presents the number of cycles by women's age group. Tables 50 to 54 present cycle-specific live delivery rates and non-progression rates for all women (Table 50) and women aged < 30, 30–34, 35–39 and 40–44 (Tables 51–54). Only the first 10 cycles are presented in Tables 49 to 53 due to the small number of women (134 women and 28 live deliveries) undertaking 11 or more treatment cycles between 1 January 2011 and 31 December 2013.

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 16.3% for cycle three measures the proportion of women who undertook a third cycle and achieved a live delivery in that cycle (Table 50).

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 2013 divided by the number of women who did not have a live delivery in that cycle. For example, the non-progression rate of 23.5% for cycle three measures the proportion of women who did not achieve a live delivery in their third cycle, and did not progress to a fourth cycle (Table 50).

Number of cycles by women's age group

The SLK was used to identify a cohort of 14,887 women in Australia and New Zealand who undertook their first autologous fresh cycle in 2011 (Table 48). These women were followed through subsequent fresh and thaw cycles until 31 December 2013 or until they achieved a live delivery (a delivery of at least one liveborn baby) up to and including 31 October 2014.

Three-quarters (74.4%) of these women had between one and three cycles, and one-quarter (25.6%) had four or more cycles (Table 49).

Table 49: Number of cycles by women's age group for all women who started their first autologous fresh cycle between 1 January 2011 and 31 December 2011, Australia and New Zealand[(a)]

	Age group (years)[(a)]					
Cycle number	**< 30**	**30-34**	**35-39**	**40-44**	**≥ 45**	**All**
			Number			
One	917	1,802	1,711	877	78	5,385
Two	562	1,058	1,243	634	50	3,547
Three	325	621	742	431	24	2,143
Four	191	424	549	256	19	1,439
Five	107	237	359	173	8	884
Six	65	189	216	98	4	572
Seven	31	97	136	73	5	342
Eight	30	57	77	40	0	204
Nine	14	34	58	33	0	139
Ten or more	23	46	93	67	3	232
Total	**2,265**	**4,565**	**5,184**	**2,682**	**191**	**14,887**
			Per cent			
One	40.5	39.5	33.0	32.7	40.8	36.2
Two	24.8	23.2	24.0	23.6	26.2	23.8
Three	14.3	13.6	14.3	16.1	12.6	14.4
Four	8.4	9.3	10.6	9.5	9.9	9.7
Five	4.7	5.2	6.9	6.5	4.2	5.9
Six	2.9	4.1	4.2	3.7	2.1	3.8
Seven	1.4	2.1	2.6	2.7	2.6	2.3
Eight	1.3	1.2	1.5	1.5	0.0	1.4
Nine	0.6	0.7	1.1	1.2	0.0	0.9
Ten or more	1.0	1.0	1.8	2.5	1.6	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 undertaken in 2011.

Note: Women who started their first autologous fresh ART treatment cycle between 1 January 2011 and 31 December 2011 and were followed through subsequent fresh and thaw cycles until 31 December 2013 or delivery of a liveborn baby up to 31 October 2014.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 14,887 women who were identified as having their first autologous fresh cycle in 2011. 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 2011, subsequent cycles could be either fresh or thaw cycles. 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 2011, the cycle-specific live birth rate ranged from 20.6% in the first cycle to 9.2% in the ninth 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 50).

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 51 to 54).

Table 50: Cycle-specific live delivery rates for all women who started their first autologous fresh cycle between 1 January 2011 and 31 December 2011, Australia and New Zealand

Cycle number[a]	Number of women starting cycle	Number of women who had a live delivery[b]	Cycle-specific live delivery rate (per cent)[c]	Number of women who did not progress to next treatment	Non-progression rate (per cent)[d][e]
One	14,887	3,071	20.6	2,314	19.6
Two	9,502	1,748	18.4	1,799	23.2
Three	5,955	969	16.3	1,174	23.5
Four	3,812	609	16.0	830	25.9
Five	2,373	354	14.9	530	26.3
Six	1,489	206	13.8	366	28.5
Seven	917	111	12.1	231	28.7
Eight	575	57	9.9	147	28.4
Nine	371	34	9.2	105	31.2
Ten	232	24	10.3	74	35.6

(a) Cycle one represents a woman's first autologous fresh ART treatment cycle between 1 January 2011 and 31 December 2011. Cycles two to ten could be either a fresh or thaw cycle undertaken by a woman until 31 December 2013 or delivery of a liveborn baby up to 31 October 2014.

(b) 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.

(c) 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.

(d) 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 2013 divided by the number of women who did not have a live delivery in that cycle.

(e) 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 less than 30 who started their first autologous fresh cycle between 1 January 2011 and 31 December 2011, Australia and New Zealand

Cycle number[(a)]	Number of women starting cycle	Number of women who had a live delivery[(b)]	Cycle-specific live delivery rate (per cent)[(c)]	Number of women who did not progress to next treatment	Non-progression rate (per cent)[(d)(e)]
One	2,265	606	26.8	311	18.7
Two	1,348	350	26.0	212	21.2
Three	786	193	24.6	132	22.3
Four	461	106	23.0	85	23.9
Five	270	56	20.7	51	23.8
Six	163	32	19.6	33	25.2
Seven	98	15	15.3	16	19.3
Eight	67	17	25.4	13	26.0
Nine	37	6	16.2	8	25.8
Ten	23	3	13.0	6	30.0

(a) Cycle one represents a woman's first autologous fresh ART treatment cycle between 1 January 2011 and 31 December 2011. Cycles two to ten could be either a fresh or thaw cycle undertaken by a woman until 31 December 2013 or delivery of a liveborn baby up to 31 October 2014.

(b) 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.

(c) 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.

(d) 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 2013 divided by the number of women who did not have a live delivery in that cycle.

(e) 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 30–34 who started their first autologous fresh cycle between 1 January 2011 and 31 December 2011, Australia and New Zealand

Cycle number[(a)]	Number of women starting cycle	Number of women who had a live delivery[(b)]	Cycle-specific live delivery rate (per cent)[(c)]	Number of women who did not progress to next treatment	Non-progression rate (per cent)[(d)(e)]
One	4,565	1,281	28.1	521	15.9
Two	2,763	647	23.4	411	19.4
Three	1,705	353	20.7	268	19.8
Four	1,084	236	21.8	188	22.2
Five	660	124	18.8	113	21.1
Six	423	90	21.3	99	29.7
Seven	234	40	17.1	57	29.4
Eight	137	22	16.1	35	30.4
Nine	80	15	18.8	19	29.2
Ten	46	10	21.7	12	33.3

(a) Cycle one represents a woman's first autologous fresh ART treatment cycle between 1 January 2011 and 31 December 2011. Cycles two to ten could be either a fresh or thaw cycle undertaken by a woman until 31 December 2013 or delivery of a liveborn baby up to 31 October 2014.

(b) 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.

(c) 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.

(d) 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 2013 divided by the number of women who did not have a live delivery in that cycle.

(e) 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 35–39 who started their first autologous fresh cycle between 1 January 2011 and 31 December 2011, Australia and New Zealand

Cycle number[(a)]	Number of women starting cycle	Number of women who had a live delivery[(b)]	Cycle-specific live delivery rate (per cent)[(c)]	Number of women who did not progress to next treatment	Non-progression rate (per cent)[(d)(e)]
One	5,184	978	18.9	733	17.4
Two	3,473	628	18.1	615	21.6
Three	2,230	340	15.2	402	21.3
Four	1,488	228	15.3	321	25.5
Five	939	151	16.1	208	26.4
Six	580	69	11.9	147	28.8
Seven	364	47	12.9	89	28.1
Eight	228	12	5.3	65	30.1
Nine	151	11	7.3	47	33.6
Ten	93	8	8.6	35	41.2

(a) Cycle one represents a woman's first autologous fresh ART treatment cycle between 1 January 2011 and 31 December 2011. Cycles two to ten could be either a fresh or thaw cycle undertaken by a woman until 31 December 2013 or delivery of a liveborn baby up to 31 October 2014.

(b) 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.

(c) 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.

(d) 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 2013 divided by the number of women who did not have a live delivery in that cycle.

(e) 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 54: Cycle-specific live delivery rates for women aged 40–44 who started their first autologous fresh cycle between 1 January 2011 and 31 December 2011, Australia and New Zealand

Cycle number[(a)]	Number of women starting cycle	Number of women who had a live delivery[(b)]	Cycle-specific live delivery rate (per cent)[(c)]	Number of women who did not progress to next treatment	Non-progression rate (per cent)[(d)(e)]
One	2,682	201	7.5	676	27.2
Two	1,805	123	6.8	511	30.4
Three	1,171	82	7.0	349	32.0
Four	740	39	5.3	217	31.0
Five	484	23	4.8	150	32.5
Six	311	15	4.8	83	28.0
Seven	213	9	4.2	64	31.4
Eight	140	6	4.3	34	25.4
Nine	100	2	2.0	31	31.6
Ten	67	3	4.5	19	29.7

(a) Cycle one represents a woman's first autologous fresh ART treatment cycle between 1 January 2011 and 31 December 2011. Cycles two to ten could be either a fresh or thaw cycle undertaken by a woman until 31 December 2013 or delivery of a liveborn baby up to 31 October 2014.

(b) 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.

(c) 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.

(d) 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 2013 divided by the number of women who did not have a live delivery in that cycle.

(e) 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)

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)

Hunter IVF (IVF Australia), New Lambton Heights (Associate Professor Peter Illingworth)

IVF Australia—Central Coast, Gosford (Associate Professor Peter Illingworth)

IVF Australia—Eastern Sydney, Maroubra (Associate Professor Peter Illingworth)

IVF Australia—North Shore, Greenwich (Associate Professor Peter Illingworth)

IVF Australia—Western Sydney, Westmead (Associate Professor Peter Illingworth)

Next Generation Fertility, Parramatta (Dr Peter Benny)

Reproductive Medicine Albury, Albury (Dr Scott Giltrap)

Royal Hospital for Women, Randwick (Prof William Ledger)

The Fertility Centre – Liverpool, Liverpool (Associate Professor Peter Illingworth)

Westmead Fertility Centre, Westmead (Dr Howard Smith)

Northern Territory

Repromed Darwin, Tiwi (Dr Richard Henshaw)

Queensland

Affordable IVF, Buderim (Dr James Orford)

Assisted Conception Australia, Greenslopes (Dr Clare Boothroyd)

Cairns Fertility Centre, Cairns (Dr John Yovich)

City Fertility Centre, Brisbane (Dr Ashish Das)

City Fertility Centre —Gold Coast, Robina (Dr Andrew Davidson)

Coastal IVF, Maroochydore (Dr Paul Stokes)

Fertility Solutions Sunshine Coast, Nambour (Dr James Orford)

IVF Sunshine Coast, Buderim (Dr James Orford)

Life Fertility Centre, Spring Hill (Dr Glenn Sterling)

Monash IVF Gold Coast, Southport (Dr Irving Korman)

Monash IVF North Lakes, North Lakes (Dr Bruce Dunphy)

Monash IVF Queensland, Sunnybank (Dr Bruce Dunphy)

Monash IVF Rockhampton, Rockhampton (Dr Mark Leydon)

Monash IVF Townsville, Townsville (Dr Mark Leydon)

Monash IVF Auchenflower, Auchenflower (Dr John Chenoweth)

QFG Cairns, Cairns (Dr John Esler)

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, Spring Hill (Dr David Molloy)

The Fertility Centre, Springwood (Dr David Molloy)

South Australia

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

Fertility SA, Adelaide (Professor Robert Norman)

Flinders Reproductive Medicine, Bedford Park (Dr Enzo Lombardi)

Repromed, Dulwich (Dr Christine Kirby)

Tasmania

TasIVF, Hobart (Dr Bill Watkins)

Victoria

Ballarat IVF, Wendouree (Dr Russell Dalton)

City Fertility Centre Melbourne, Melbourne (Dr David Wilkinson)

City Fertility Centre Bundoora, Melbourne (Dr David Wilkinson)

Melbourne IVF, East Melbourne (Dr Lyndon Hale)

Melbourne IVF—Mount Waverley, Mount Waverley (Dr Lyndon Hale)

Monash IVF—Clayton, Clayton (Dr Nicole Hope)

Monash IVF—Bendigo, Bendigo (Dr Mark Jalland)

Monash IVF—Frankston, Frankston (Dr Alon Talmor)

Monash IVF—Geelong, Geelong (Professor Gab Kovacs)

Monash IVF—Richmond, Richmond (Dr Lyn Burmeister)

Monash IVF—Sale, Sale (Dr Gareth Weston)

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 Simon Kelly)

Fertility Associates Christchurch, Christchurch (Dr Sarah Wakeman)

Fertility Associates Hamilton, Hamilton (Dr VP Singh)

Fertility Associates Wellington, Wellington (Dr Andrew Murray)

Fertility Plus, Auckland (Dr Neil Johnson)

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 36 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 2013, information relating to pregnancy and birth outcomes was not provided for 1.7% 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 2013, and the resulting pregnancies and births. The babies included in this report were conceived following treatment cycles undertaken in 2013, and were born in either 2013 or 2014. 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 2013.

Chapter 9 presents longitudinal information on the cohort of women who were identified as starting their first autologous fresh ART cycle in 2011.

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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There were 71,516 ART treatment cycles reported from Australian and New Zealand clinics in 2013. Of these, 23.8% resulted in a clinical pregnancy and 18.2% in a live delivery (the birth of at least one liveborn baby). There were 13,715 liveborn babies following ART treatment in 2013.