Assisted reproductive technology in Australia and New Zealand 2020

UNSW SYDNEY

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NPESU National Perinatal Epidemiology and Statistics Unit

FERTILITY SOCIETY OF AUSTRALIA AND NEW ZEALAND

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

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The ANZARD is a collaborative effort between the National Perinatal Epidemiology and Statistics Unit (NPESU), the Fertility Society of Australia and New Zealand (FSANZ) and ART Units in Australia and New Zealand. The NPESU is a unit within the Centre for Big Data Research in Health and the School of Women's and Children's Health of the University of New South Wales, Sydney (UNSW).

All assisted reproductive technology (ART) and donor insemination (DI) cycles undertaken in Australian and New Zealand ART Units must be reported to the ANZARD as part of their accreditation by the Reproductive Technology Accreditation Committee of the FSANZ.

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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
FSANZ	Fertility Society of Australia and New Zealand
FSH	follicle stimulating hormone
GIFT	gamete intrafallopian transfer
hCG	human chorionic gonadotropin
ICSI	intracytoplasmic sperm injection
IVF	in vitro fertilisation
IUI	intrauterine insemination
LMP	last menstrual period
NPESU	National Perinatal Epidemiology and Statistics Unit
OHSS	ovarian hyperstimulation syndrome
OPU	oocyte pick-up
PCOS	polycystic ovary syndrome
PESA	percutaneous epididymal sperm aspiration
PGT	preimplantation genetic testing
RTAC	Reproductive Technology Accreditation Committee
SET	single embryo transfer
SLK	statistical linkage key
UNSW	University of New South Wales
WHO	World Health Organization

Symbols

..	not applicable
%	percentage
n	number

Summary

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 female patient can either originate from the cycle in which they were created (fresh cycle) or be frozen (cryopreserved) and thawed before transfer (thaw cycle).

Almost 96,000 ART treatment cycles were performed in Australia and New Zealand in 2020

There were 95,699 ART treatment cycles performed in Australian and New Zealand ART Units in 2020 (87,206 and 8,493 respectively), representing an increase of 7.6% in Australia and 7.8% in New Zealand from 2019. This equates to 16.5 cycles per 1,000 women of reproductive age (15–44 years) in Australia, compared with 8.3 cycles per 1,000 women of reproductive age in New Zealand.

Women used their own oocytes or embryos (autologous cycles) in approximately 95% (90,529) of fresh and/or thaw cycles. These cycles were undertaken by 46,846 women, with more cycles per woman in Australia (2.0 cycles per woman) than in New Zealand (1.7 cycles per woman). Thawed embryos and oocytes were transferred in 37.1% of autologous cycles. There were 3,642 cycles where all oocytes or embryos were frozen for medical or non-medical fertility preservation, and 238 surrogacy gestational carrier cycles. More than 8% of cycles performed in 2020 underwent preimplantation genetic testing (PGT).

One in seven ART treatment cycles were in single females or female-female couples

Of the 93,275 autologous and recipient cycles, 10.2% were undertaken by single females and 3.9% by female-female intending parents. Almost one in four (24.9%) oocyte/embryo recipient cycles were in female-female intending parents. Cycles involving single males and male-male intending parent(s) are reported in Chapter 5.

The average age of female patients undertaking ART in 2020 was 35 years

The average age of female patients undergoing autologous and recipient cycles in 2020 was 35 years, with one in four (23.9%) aged 40 years or older. The average age of male partners was 38 years.

The cause of male infertility reported for the first time

Male factor infertility was reported in one in 3 cycles. The principal cause in the majority of these cycles (77%) was idiopathic (unexplained).

Thaw cycles had higher live birth rates than fresh cycles

Of the 93,275 autologous and recipient cycles, 58,585 resulted in an embryo transfer and 17,939 resulted in all oocytes/embryos being frozen. The overall clinical pregnancy rate for autologous and recipient cycles reaching embryo transfer was 36.3%.

The live birth rate per initiated autologous fresh cycle was 16.2% after freeze-all cycles were excluded, and 25.3% for fresh cycles reaching embryo transfer. The live birth rate per initiated autologous thaw cycle was 30.7% and for thaw cycles reaching embryo transfer cycle it was 31.3%.

There was a higher live birth rate in younger women. For women aged under 30 years, the live birth rate per embryo transfer was 40.8% for autologous fresh cycles and 35.9% for

autologous thaw cycles. For women older than 44 years, the live birth rate per embryo transfer was 1.2% for autologous fresh cycles and 7.7% for thaw cycles.

More than 18,000 babies were born following ART treatment in Australia and New Zealand

There were 18,462 babies born (including 18,257 liveborn babies) following ART treatment in 2020. Of these, 16,439 (89%) were from treatments performed in Australian ART Units and 2,023 (11%) were from New Zealand ART Units. Eight in ten liveborn babies (81.5%) were full-term singletons of normal birthweight.

One in four women achieved a live birth in their first ever IVF cycle

For the 17,757 women who commenced ART treatment in 2018 and were followed until December 2020, one in four (25.4%) achieved a live birth in their first cycle, and one in six (15.9%) in their eighth cycle. Approximately one in five women who did not achieve a live birth in a specific cycle, discontinued ART treatment during the period.

Trends in ART treatment continue: Decreased use of ICSI

The proportion of embryo transfer cycles that used embryos fertilised using intracytoplasmic sperm injection (ICSI) decreased from 62.9% in 2016 to 56.1% in 2020.

The proportion of embryo transfer cycles transferring a cryopreserved (frozen) embryo increased from 54% in 2016 to 60.5% in 2020. Of the 17,761 live birth events resulting from ART treatment in 2020, 64.9% resulted from thaw cycles, compared to 56.6% in 2016. The proportion of initiated fresh cycles that resulted in all oocytes/embryos being frozen (freeze-all cycles) increased from 20.1% in 2016 to 25.0% in 2020.

Laboratory trends in the last five years have included a continued shift from cleavage-stage transfers to blastocyst transfers (from 78.4% in 2016 to 89.4% in 2020); an increase in vitrification as a cryopreservation method (from 87.8% of thaw blastocyst transfer cycles in 2016 to 96.4% in 2020); and a decrease in the use of ICSI (from 62.9% of embryo transfer cycles in 2016 to 56.1% in 2020).

Live birth rates per thaw cycle continue to increase

In the last five years, the live birth rate per fresh embryo transfer cycle increased from 23.9% in 2016 to 25.5% in 2019 and to 25.4% in 2020. The live birth rate per thaw embryo transfer cycle increased from 28.2% in 2016 to 31.2% in 2020. Overall, live birth rates per embryo transfer have risen from 26.2% in 2016 to 27.6% in 2020.

The multiple birth rate continued to decline, to 2.8% of ART-conceived births

The decline in the multiple birth rate (twins and triplets) following ART treatment continues, from 3.7% in 2016 to 2.8% in 2020. This has been achieved by clinicians and patients shifting to the safer practice of single embryo transfer, with the proportion increasing from 87.7% in 2016 to 93% in 2020.

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; Zegers-Hochschild et al. 2017). Infertility is increasingly being overcome through advancements in infertility treatment, in particular assisted reproductive technologies (ARTs). ARTs have evolved over the last four decades into a suite of mainstream medical interventions that have resulted in the birth of more than 10 million children worldwide (ESHRE n.d.). The most recent national estimates indicate that 5% of all women who gave birth in Australia in 2020 received some form of ART treatment (AIHW 2022).

The purpose of this annual report is to inform clinicians, researchers, government, patients 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 and New Zealand (FSANZ), in collaboration with the University of New South Wales (UNSW Sydney), is committed to providing informative annual statistics on ART treatments and is pleased to present the annual report on ART performed in Australia and New Zealand in 2020.

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. 2017). A typical fresh in vitro fertilisation (IVF) cycle involves the following five steps:

1. Controlled ovarian hyperstimulation during which an ovarian stimulation regimen, typically using follicle stimulating hormone (FSH) or gonadotrophins, is administered to a woman over a number of days to induce the maturation of multiple oocytes (eggs).
2. Oocyte pick-up (OPU) where oocytes are aspirated from ovarian follicles.
3. Fertilisation of the collected oocytes using the male intending parent or donor sperm.
4. Embryo maturation during which a fertilised oocyte is cultured for 2–4 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 fresh embryo into the uterus in order to achieve pregnancy.

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

Over the last four 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 testing (PGT), when DNA from oocytes or embryos is tested for chromosomal disorders or genetic diseases before embryo transfer
- oocyte donation, when a female patient donates her oocytes to others
- oocyte/embryo recipient, when a female patient receives oocytes or embryos from another individual/couple
- 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 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 medical and non-medical fertility preservation
- freeze-all cycles where all oocytes or embryos resulting from an OPU are cryopreserved for potential future use
- surrogacy arrangements, where a female patient, known as the 'gestational carrier' or 'surrogate', agrees to carry a child for another person or couple, known as the 'intending parent(s)', with the intention that the child will be raised by the intending parent(s). The oocytes and/or sperm used to create the embryo(s) in the cycle can be either from the intending parent(s) or from a donor(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 male intending parent's sperm, or donated sperm, also known as 'donor (sperm) insemination' (DI). Only DI performed at an ART Unit is reported to ANZARD.

Data used in this report

This report provides information on ART and DI treatments and the resulting treatment, pregnancy and birth outcomes. Also included is an analysis of trends in ART treatments and outcomes in the five years from 2016 to 2020. Reporting ART treatment cycles in Australia is a requirement for ART Units to be licensed by the FSANZ's Reproductive Technology Accreditation Committee (RTAC). All ART Units in Australia and New Zealand provided data to ANZARD for cycles performed in 2020, comprising 85 ART Units in Australia and 8 ART Units in New Zealand. The full list of contributing ART Units can be found in Appendix A.

ANZARD is a data collection which uses a statistical linkage key (SLK) that links successive treatment cycles undertaken by one female patient. The SLK is a combination of the first two letters of a female patient's first name, the first two letters of her surname and her date of birth. The SLK enables the number of female patients undergoing treatment across time to be reported. As a joint initiative of the NPESU at UNSW Sydney and FSANZ, ANZARD was upgraded in 2020 to the ANZARD 3.0 Data Dictionary for treatments performed in 2020 to accommodate new treatment types and reflect different types of patients involved in ART treatments. ANZARD 3.0 collects more information about the intending parents, causes of infertility, period of infertility, PGT, lab-only cycles and fertility preservation. As a result, there are new terms that are used in this report:

- lab-only cycles – a laboratory procedure with no planned patient involvement (e.g. attempted/actual oocyte thaw with the intention of fertilisation and freezing of all resulting embryos)

- sex of the intending parent(s) – the sex of the intending parent(s) presented in this report is based on their sex at birth to align with the type of ART treatment provided to the individual. This may not be the same as the gender of the intending parent(s).

A more detailed description of ANZARD 3.0 can be found in Appendices B and C.

Structure of this report

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

Chapter 2—'Overview of ART treatment in 2020', 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 2020', presents data on the number of cycles, cycle types and the outcomes of treatment in terms of discontinued treatment, clinical pregnancies and births.

Chapter 4—'Pregnancy and birth outcomes following autologous and recipient embryo transfer cycles in 2020', presents data on the outcomes of clinical pregnancies and births following autologous and recipient cycles including a description of perinatal outcomes.

Chapter 5—'Other cycle types, procedures and treatment complications in 2020', includes information on surrogacy and GIFT cycles, PGT and assisted hatching procedures.

Chapter 6—'Donor sperm insemination cycles in 2020', presents data on DI cycles and their outcomes, including a description of pregnancy and perinatal outcomes.

Chapter 7—'Trends in ART treatment and outcomes: 2016–2020', 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 2020', presents information on the number of women undergoing ART treatment in 2020.

Chapter 9—'Cycle-specific rates for women who started their first ART treatment cycle in 2018', presents information for a cohort of women who started their first autologous (non-freeze-all) fresh ART treatment cycle during 2018, and were followed through subsequent fresh and thaw cycles (excluding freeze-all cycles) until 31 December 2020 or until they achieved a live birth.

Appendices—Appendix A lists the contributing ART Units. Appendix B provides an overview of the ANZARD 3.0 Data Dictionary 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 2020

There were 95,699 ART treatment and lab-only cycles reported from Australian and New Zealand ART Units in 2020 (Table 1). Of these, 91.1% (87,206) were from Australian ART Units and 8.9% (8,493) were from New Zealand ART Units. The overall number of ART treatment and lab-only cycles in 2020 increased by 7.6% from the 88,929 cycles in 2019, with a 7.6% increase in Australia and 7.8% increase in New Zealand. In 2020, the number of ART treatment cycles represented 16.5 cycles per 1,000 women of reproductive age (15–44 years) in Australia, compared with 8.3 cycles per 1,000 women of reproductive age in New Zealand (Australian Bureau of Statistics 2020; Statistics New Zealand 2020).

Approximately 95% of cycles in 2020 were autologous cycles (where a female intending parent intended to use or used her own oocytes or embryos). Of the 90,529 autologous cycles, 55,032 (57.5%) were fresh cycles and 35,497 (37.1%) were thaw cycles. Other treatments represented a small proportion of cycles: 1.9% were oocyte recipient cycles, 0.9% were embryo recipient cycles, 1.0% were oocyte donation cycles and 0.4% were surrogacy arrangement cycles (Table 1).

Of all initiated ART cycles in 2020, 23.3% (22,257) resulted in a clinical pregnancy and 18.6% (17,761) in a live birth (Table 1). Of these clinical pregnancies, 19,797 (89%) were from Australian ART Units and 2,460 (11%) from New Zealand ART Units. There were 18,462 babies born (including 18,257 liveborn babies) following ART treatment in 2020. Of these, 16,439 (89%) were from Australian ART Units and 2,023 (11%) from New Zealand ART Units. Of the liveborn babies, 81.5% (14,872) were singletons at term (gestational age of 37–41 weeks) with normal birthweight (≥ 2,500 grams). The multiple birth rate was 2.8%.

Table 1: Number of initiated ART cycles by treatment type, Australia and New Zealand, 2020

Cycle type	Number of initiated ART cycles	Percent of initiated ART cycles	Number of clinical pregnancies	Number of live births	Number of liveborn babies	Number of liveborn singletons at term with normal birthweight
Autologous	90,529	94.6	21,213	16,915	17,393	14,186
Fresh	*55,032*	*57.5*	*7,732*	*6,002*	*6,169*	*4,990*
Thaw	*35,497*	*37.1*	*13,481*	*10,913*	*11,224*	*9,196*
Oocyte recipient[(a)]	1,839	1.9	597	477	486	370
Embryo recipient	907	0.9	342	277	286	234
Oocyte donation	1,003	1.0	..	..	..	..
Embryo donation	58	0.1	..	..	..	..
GIFT[(b)]	4	0.0	2	1	1	0
Surrogacy arrangement cycles	345	0.4	103	91	91	82
Commissioning cycles[(c)]	*107*	*0.1*	..	..	..	..
Surrogate gestational carrier cycles[(d)]	*238*	*0.2*	*103*	*91*	*91*	*82*
Lab-only cycles	1,014	1.1	..	..	..	..
Total	**95,699**	**100.0**	**22,257**	**17,761**	**18,257**	**14,872**

(a) The number of oocyte recipient cycles has decreased from previous years due to the classification under ANZARD 3.0 of cycles involving female-female couples where an embryo is provided from one female intending parent to another female intending parent as embryo recipient cycles.

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

(c) A variety of cycle types undertaken as part of surrogacy arrangements, e.g. cycles undertaken by intending parents providing their oocytes or embryos for use by the surrogate gestational carrier.

(d) A cycle undertaken by a female patient who carries, or intends to carry, a child on behalf of the intending parent(s) with an agreement that the child will be raised by the intending parent(s).

3 Autologous and donation/recipient cycles in 2020

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

An ‘autologous cycle’ is defined as an ART treatment cycle in which a female intending parent intends to use or uses her own oocytes or embryos to achieve a pregnancy.

A ‘donation cycle’ is defined as an ART treatment cycle in which a female patient 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 intending parent. 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 female intending parent(s) receives oocytes or embryos from another female patient.

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

3.1 Overview of autologous and recipient cycles

Intending parents

The ART cycles in this section include treatment and laboratory cycles undertaken by female-male, single female and female-female intending parents only. These cycles all involve the intention to transfer an embryo to a female patient. Cycles involving male-male and single male intending parents, such as surrogacy arrangement cycles, are covered in Chapter 5.

Of the 93,275 autologous and recipient cycles, approximately 86% were undertaken by female-male intending parents, followed by single females (10.2%) and female-female intending parents (3.9%). Almost one in four (24.9%) oocyte/embryo recipient cycles were in female-female intending parents (Table 2).

Table 2: Number of autologous and recipient cycles by intending parents and treatment type, Australia and New Zealand, 2020

	Autologous							
	Fresh		Thaw		Oocyte/Embryo recipient		All	
Intending parents	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Female-male couple	46,089	83.7	32,280	90.9	1,783	64.9	80,152	85.9
Single female	7,323	13.3	1,872	5.3	280	10.2	9,475	10.2
Female-female couple	1,620	2.9	1,345	3.8	683	24.9	3,648	3.9
Total	**55,032**	**100.0**	**35,497**	**100.0**	**2,746**	**100.0**	**93,275**	**100.0**

Age of female patients and their partners

The average age of female patients undergoing autologous and oocyte/embryo recipient cycles was 35 years. For female patients undergoing oocyte/embryo recipient cycles, the mean age was 39 years, four years older than for autologous cycles (35 years). Of all autologous and oocyte/embryo recipient cycles, 23.9% were undertaken by female patients aged 40 or older (Table 3).

Table 3: Number of autologous and recipient cycles by female patient age and treatment type, Australia and New Zealand, 2020

	Autologous							
	Fresh		Thaw		Oocyte/Embryo recipient		All	
Age group (years)[(a)]	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
< 30	5,190	9.4	3,709	10.4	160	5.8	9,059	9.7
30–34	14,442	26.2	11,378	32.1	450	16.4	26,270	28.2
35–39	20,848	37.9	14,123	39.8	651	23.7	35,622	38.2
40–44	13,355	24.3	5,883	16.6	828	30.2	20,066	21.5
≥ 45	1,197	2.2	404	1.1	657	23.9	2,258	2.4
Total	**55,032**	**100.0**	**35,497**	**100.0**	**2,746**	**100.0**	**93,275**	**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.

The average age of male partners was 38 years, with 34.7% aged 40 or older. The average age of female partners was 35 years (Table 4).

Table 4: Number of autologous and recipient cycles by female patients' partner age and treatment type, Australia and New Zealand, 2020

	Autologous							
	Fresh		Thaw		Oocyte/Embryo recipient		All	
Age group (years) of intending parent[(a)]	n	%	n	%	n	%	n	%
Male partner								
< 30	2,844	6.2	1,970	6.1	45	2.5	4,859	6.1
30–34	10,718	23.3	8,515	26.4	232	13.0	19,465	24.3
35–39	15,385	33.4	11,605	36.0	433	24.3	27,423	34.2
40–44	10,372	22.5	6,517	20.2	497	27.9	17,386	21.7
≥ 45	6,380	13.8	3,486	10.8	556	31.2	10,422	13.0
Not stated	390	0.8	187	0.6	20	1.1	597	0.7
Total male partners	**46,089**	**100.0**	**32,280**	**100.0**	**1,783**	**100.0**	**80,152**	**100.0**
Female partner								
< 30	243	15.0	185	13.8	73	10.7	501	13.7
30–34	499	30.8	375	27.9	243	35.6	1,117	30.6
35–39	474	29.3	414	30.8	269	39.4	1,157	31.7
40–44	270	16.7	254	18.9	81	11.9	605	16.6
≥ 45	133	8.2	115	8.6	16	2.3	264	7.2
Not stated	1	0.1	2	0.1	1	0.1	4	0.1
Total female partners	**1,620**	**100.0**	**1,345**	**100.0**	**683**	**100.0**	**3,648**	**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 93,275 initiated autologous and recipient cycles undertaken in 2020, 71.2% were undertaken by nulliparous women. Of autologous cycles (fresh and thaw), 72.5% were undertaken by nulliparous women, compared with 67% for oocyte/embryo recipient cycles.

Table 5: Number of autologous and recipient cycles by parity and treatment type, Australia and New Zealand, 2020

	Autologous							
	Fresh		Thaw		Oocyte/embryo recipient		All	
Parity	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Nulliparous	42,361	77.0	22,164	62.4	1,841	67.0	66,366	71.2
Parous	11,697	21.3	12,728	35.9	879	32.0	25,304	27.1
Not stated	974	1.8	605	1.7	26	0.9	1,605	1.7
Total	**55,032**	**100.0**	**35,497**	**100.0**	**2,746**	**100.0**	**93,275**	**100.0**

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

Cause of infertility

Causes of infertility may relate to either the female intending parent or her male partner, both, or may be unexplained. For ART cycles performed in 2020 (ANZARD 3.0), cause of infertility is reported for female-male intending parents undertaking ART to treat clinical infertility. The clinical diagnoses, including the primary cause of male infertility reported here for the first time, are made by the treating clinician. Diagnostic definitions may vary among ART Units and should be interpreted with considerable caution.

Of the 80,152 initiated autologous and recipient cycles undertaken by female-male intending parents, 36.1% reported only female infertility factors, 20% reported male infertility factors as the only cause of infertility, 11.2% reported combined male-female factors and 28.7% reported infertility as 'unexplained'.

There were 6,319 (7.9%) cycles where the female intending parent had polycystic ovary syndrome (PCOS), regardless of whether it contributed to infertility.

Table 6: Number of autologous and recipient cycles by intending parent cause of infertility, Australia and New Zealand, 2020

	Autologous							
	Fresh		Thaw		Oocyte/embryo recipient		All	
Cause of infertility	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Tubal disease only	1,647	3.6	1,425	4.4	32	1.8	3,104	3.9
Endometriosis only	2,467	5.4	1,860	5.8	54	3.0	4,381	5.5
Other female factors only	10,284	22.3	6,406	19.8	854	47.9	17,544	21.9
Combined female factors only	2,229	4.8	1,567	4.9	99	5.6	3,895	4.9
Combined female-male factors	5,397	11.7	3,390	10.5	223	12.5	9,010	11.2
Male factor infertility only	9,213	20.0	6,669	20.7	146	8.2	16,028	20.0
Unexplained infertility	12,990	28.2	9,702	30.1	305	17.1	22,997	28.7
Not stated	90	0.2	81	0.3	3	0.2	174	0.2
Treatment not for infertility	1,772	3.8	1,180	3.7	67	3.8	3,019	3.8
Total	**46,089**	**100.0**	**32,280**	**100.0**	**1,783**	**100.0**	**80,152**	**100.0**

There were 25,038 autologous and recipient cycles where the male intending parent was reported as having male factor infertility (Table 7). In 77.4% of these cycles, the primary cause of male infertility was idiopathic (unexplained).

Table 7: Number of autologous and recipient cycles by male intending parent primary cause of infertility, Australia and New Zealand, 2020

	Autologous							
	Fresh		Thaw		Oocyte/embryo recipient		All	
Principal cause of male factor infertility	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Spermatogenic failure								
Idiopathic (unexplained)	*11,171*	*76.5*	*7,882*	*78.4*	*317*	*85.9*	*19,370*	*77.4*
Genetic – Klinefelter	*73*	*0.5*	*68*	*0.7*	*4*	*1.1*	*145*	*0.6*
Genetic – Y deletion	*43*	*0.3*	*19*	*0.2*	*6*	*1.6*	*68*	*0.3*
Genetic – other aneuploidies, single gene	*493*	*3.4*	*335*	*3.3*	*7*	*1.9*	*835*	*3.3*
Testis damage – cancer treatment	*363*	*2.5*	*231*	*2.3*	*3*	*0.8*	*597*	*2.4*
Testis damage - other (e.g. vascular, infective, trauma)	*426*	*2.9*	*284*	*2.8*	*7*	*1.9*	*717*	*2.9*
Gonadotrophin deficiency	*229*	*1.6*	*153*	*1.5*	*2*	*0.5*	*384*	*1.5*
Obstruction								
Vasectomy	*1,124*	*7.7*	*657*	*6.5*	*15*	*4.1*	*1,796*	*7.2*
Congenital absence of the vas deferens/cystic fibrosis	*140*	*1.0*	*113*	*1.1*	*3*	*0.8*	*256*	*1.0*
Obstructive disorder	*260*	*1.8*	*139*	*1.4*	*1*	*0.3*	*400*	*1.6*
Erectile and Ejaculatory								
Erectile dysfunction (incl. psychosexual)	*154*	*1.1*	*89*	*0.9*	*1*	*0.3*	*244*	*1.0*
Ejaculatory disorders (incl. spinal injury, retrograde and anejaculation)	*134*	*0.9*	*89*	*0.9*	*3*	*0.8*	*226*	*0.9*
Total	**14,610**	**100.0**	**10,059**	**100.0**	**369**	**100.0**	**25,038**	**100.0**

Intracytoplasmic sperm injection procedures

Of the 44,411 autologous fresh cycles where fertilisation was attempted, 61.7% used ICSI procedures and 38.3% used IVF procedures. Of fresh oocyte/embryo recipient cycles where fertilisation was attempted, 83.2% used ICSI procedures and 16.8% used IVF procedures (Table 8).

Table 8: Number of autologous and recipient cycles with fertilisation attempted by treatment type and procedure, Australia and New Zealand, 2020

	Autologous				Oocyte/embryo recipient			
	Fresh[(a)]		Thaw[(b)(d)]		Fresh[(a)]		Thaw[(b)(d)]	
Procedure	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
IVF	17,020	38.3	15,708	45.1	96	16.7	731	34.5
ICSI[(c)]	27,391	61.7	19,138	54.9	478	83.3	1,387	65.5
Not stated	0	0.0	..	..	0	0.0	..	..
Total	**44,411**	**100.0**	**34,846**	**100.0**	**574**	**100.0**	**2,118**	**100.0**

(a) Fresh cycles where fertilisation was attempted.

(b) Thaw cycles where embryos were transferred.

(c) Includes 1,700 mixed IVF/ICSI cycles.

(d) Where two or more thawed embryos were transferred, the number of mixed IVF/ICSI transfers cannot be differentiated from ICSI-only transfers. Of the 20,525 thaw ICSI cycles, 1,145 had two or more embryos transferred.

Number of embryos transferred

Of the 61,114 fresh and thaw embryo transfer cycles undertaken in autologous and recipient cycles, 93% were single embryo transfer (SET) cycles and 6.9% were double embryo transfer (DET). In women aged under 35, 96.3% of embryo transfer cycles were SET cycles and 3.7% were DET cycles. In women aged 35 or older, 90.9% of cycles were SET cycles and 8.9% were DET cycles (Table 9).

Table 9: Number of autologous and recipient cycles by number of embryos transferred and female patient age, Australia and New Zealand, 2020

	One		Two		Three or more		All	
Age group (years)[(a)]	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
< 30	5,702	97.0	175	3.0	0	0.0	5,877	9.6
30–34	17,320	96.0	717	4.0	0	0.0	18,037	29.5
35–39	22,023	94.1	1,367	5.8	4	0.0	23,394	38.3
40–44	10,547	85.8	1,727	14.0	23	0.2	12,297	20.1
≥ 45	1,250	82.8	229	15.2	30	2.0	1,509	2.5
Total	**56,842**	**93.0**	**4,215**	**6.9**	**57**	**0.1**	**61,114**	**100**

(a) Age at start of a treatment cycle.

Stage of embryo development

Of the 61,114 autologous and recipient embryo transfer cycles, 10.6% involved the transfer of day 2–4 embryos (cleavage-stage embryos) and 89.4% day 5–6 embryos (blastocysts). Of autologous cycles, blastocyst transfers made up 80.1% of fresh cycles compared with 95.7% of thaw cycles (Table 10).

Table 10: Number of embryo transfer cycles by treatment type and stage of embryo development, Australia and New Zealand, 2020

	Autologous				Oocyte/embryo recipient			
	Fresh		Thaw		Fresh		Thaw	
Stage of embryo development	n	%	n	%	n	%	n	%
Cleavage embryo	4,731	19.9	1,488	4.3	72	17.5	204	9.6
Blastocyst[(a)]	19,008	80.1	33,358	95.7	339	82.5	1,914	90.4
Total	**23,739**	**100.0**	**34,846**	**100.0**	**411**	**100.0**	**2,118**	**100.0**

(a) Includes 7 cycles where both blastocyst and cleavage-stage embryos were transferred.

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 36,964 frozen/thawed embryo transfer cycles, 95.7% involved the transfer of vitrified embryos. Of the frozen/thawed blastocyst transfer cycles, 96.4% had vitrified embryos transferred. By comparison, 80.9% of frozen/thawed cleavage-stage embryo transfer cycles used vitrified embryos (Table 11).

Table 11: Number of embryo transfer cycles by cryopreservation method and stage of embryo development, Australia and New Zealand, 2020

	Autologous				Oocyte/embryo recipient			
	Cleavage embryo		Blastocyst		Cleavage embryo		Blastocyst	
Cryopreservation method	n	%	n	%	n	%	n	%
Slow frozen	281	18.9	1,171	3.5	41	20.1	94	4.9
Vitrification[(a)]	1,207	81.1	32,187	96.5	163	79.9	1,820	95.1
Total	**1,488**	**100.0**	**33,358**	**100.0**	**204**	**100.0**	**1,914**	**100.0**

(a) Includes 8 cycles where both vitrified and slow-frozen embryos were transferred.

Live births from initiated autologous fresh and thaw, and recipient cycles among ART Units

Figure 1 reports on live births per initiated fresh (excluding freeze-all) and thaw autologous cycles, and recipient cycles among 90 ART Units that performed more than 50 of these cycles combined in 2020.

The highest live birth rate was around 35% and the lowest was less than 14%. These data should be interpreted with caution because of the small number of patients who underwent autologous and recipient cycles in some ART Units. The live birth rates among ART Units may also vary because of differences in the characteristics and prognosis of patients treated, and different approaches to the use of ARTs and other fertility treatments.

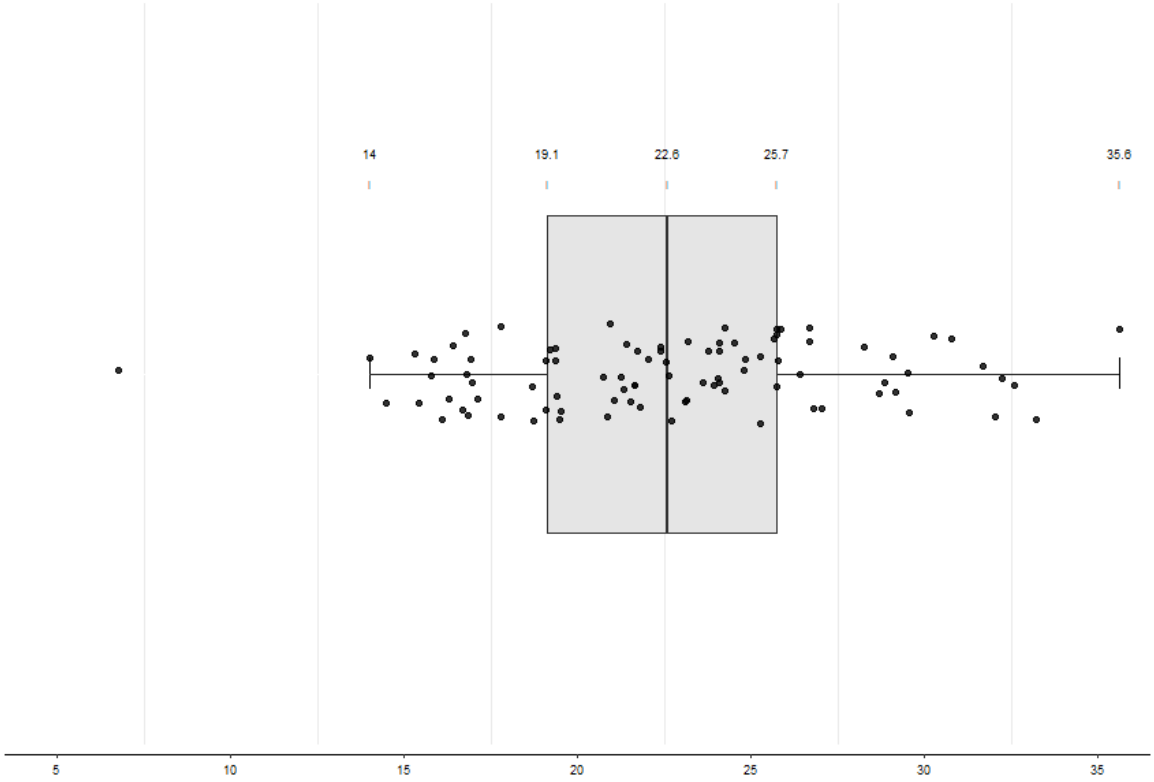
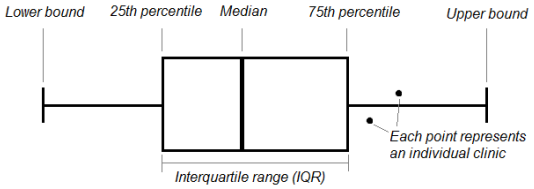


Figure 1: Live birth rate per initiated autologous fresh (excluding freeze-all) and thaw and recipient cycle (%) among ART Units, Australia and New Zealand, 2020

How to interpret Figure 1



- Figure 1 reports on live births per initiated fresh (excluding freeze-all) and thaw autologous cycles, and recipient cycles (%) among the 90 ART Units that performed more than 50 of these cycles combined in 2020.
- Each point represents an ART Unit.
- A percentile indicates the value below which a given percentage of ART Units' live birth rates fall. For example, 50% of ART Units had a live birth rate less than the median (22.6%).
- The interquartile range (IQR) indicates the range of live birth rates achieved by the middle 50% of ART Units (IQR: 19.1%–25.7%).
- The upper and lower bounds represent the range in which it would be expected that approximately 98% of ART Units will fall (14%–35.6%).
- These data should be interpreted with caution because of the small number of patients who underwent autologous and recipient cycles in some ART Units. The live birth rates among ART Units may also vary because of differences in the characteristics and prognosis of patients treated, and different approaches to the use of ARTs and other fertility treatments.

For more information on ART Unit success rates, refer to the YourIVFSuccess website (yourivfsuccess.com.au).

3.2 Autologous fresh cycles

In 2020, there were 55,032 initiated autologous fresh cycles, comprising 53,901 (97.9%) FSH-stimulated cycles and 1,131 (2.1%) unstimulated cycles. Of the initiated autologous fresh cycles, 92.7% (50,987) were in Australian ART Units and 7.4% (4,045) were in New Zealand ART Units.

Progression of autologous fresh cycles

Figure 2 shows the main stages of autologous fresh cycles and the resulting treatment outcomes. Of the 55,032 initiated autologous fresh cycles in 2020, 90.3% had OPU performed, 32.6% were freeze-all cycles and 43.1% had embryos transferred (Figure 2). A treatment cycle 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.

Freeze-all cycles are fresh ART treatment cycles where all oocytes or embryos are frozen for potential future use. This increasingly common practice (Table 42) is used for a variety of reasons, including reducing the risk of ovarian hyperstimulation syndrome (OHSS), improving endometrial–embryo synchronicity, as part of a PGT cycle, for fertility preservation or as a deliberate treatment option used by some clinicians.

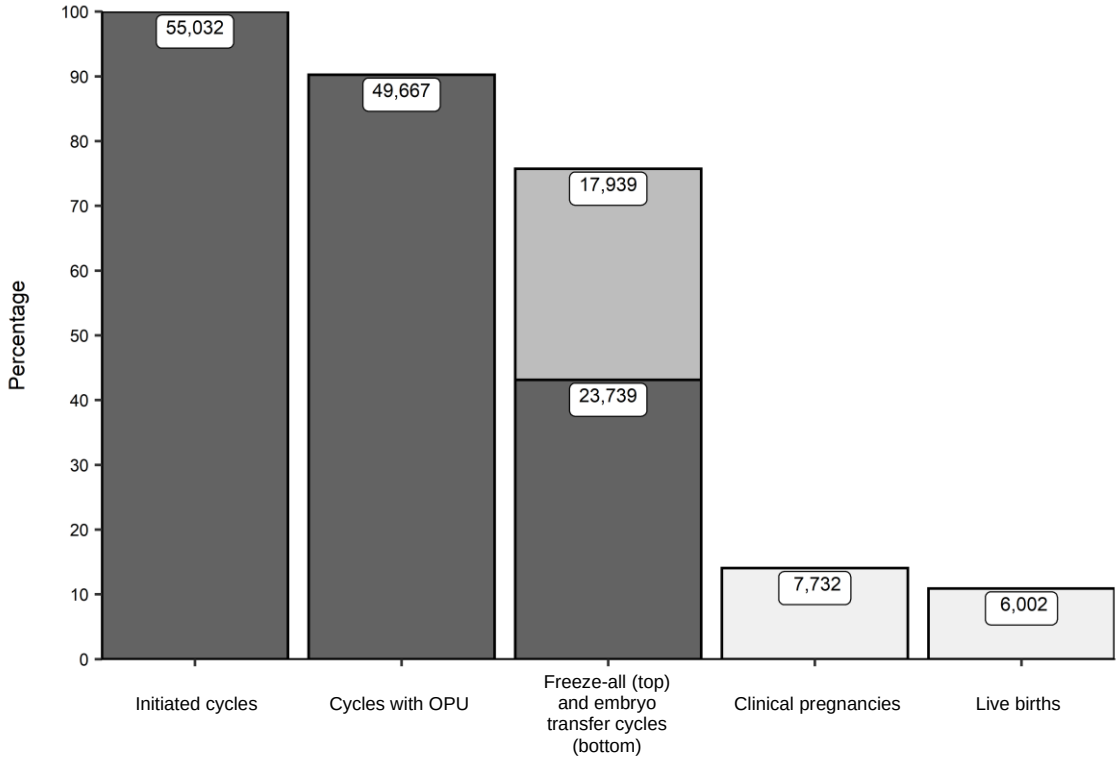


Figure 2: Progression of autologous fresh cycles, Australia and New Zealand, 2020

Fertility preservation

Fertility preservation is where a female patient freezes or intends to freeze all oocytes or resulting embryos for potential future use. This is the first time the reason for fertility preservation was reported to ANZARD by ART Units. There were 3,642 initiated autologous fresh cycles performed for fertility preservation. Of these over one-third (37.6%) were reported as being for non-medical reasons (e.g. not having a partner). Of the 3,642 initiated autologous fresh cycles, 3,132 (86%) resulted in all available oocytes or embryos being cryopreserved for fertility preservation. The majority (92.5%) of these freeze-all cycles were for oocyte cryopreservation (2,899).

Table 12: Number of autologous fresh fertility preservation cycles for female patients by age and treatment type, Australia and New Zealand, 2020

Reason for fertility preservation	< 35	35–39	≥ 40	All
Medical reason – cancer diagnosis	397	149	36	582
Medical reason – other	691	823	176	1,690
Non-medical reason	441	752	177	1,370
Total	**1,529**	**1,724**	**389**	**3,642**

Clinical pregnancies and live births by women's age

Maternal age is one of the key factors associated with the outcomes of autologous fresh cycles. The highest live birth rate per embryo transfer cycle was in women aged under 30 (40.8%). The rate declined with advancing age, with a rate of 9.4% for females aged 40–44 and 1.2% for females aged 45 or older (Table 13). In women aged 45 or older, 786 cycles (65.7%) occurred in women aged 45 years and 215 cycles (17.8%) in women age 46 years, with the remaining 196 cycles (16.4%) occurring in women aged 47 or older.

In women aged under 30 years, freeze-all cycles accounted for 43% of initiated fresh cycles with the rate decreasing to 9.5% in women 45 years or older. Of the 55,032 initiated autologous fresh cycles, all oocytes were cryopreserved in 4,179 cycles (7.6%) and all embryos were cryopreserved in 13,760 cycles (25%).

Table 13: Outcomes of autologous fresh cycles by female patient age, Australia and New Zealand, 2020

	Age group (years)[a]					
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
Initiated cycles	5,190	14,442	20,848	13,355	1,197	55,032
Cycles with OPU	4,754	13,339	18,963	11,630	981	49,667
Freeze-all cycles[b]	2,232	5,507	7,217	2,869	114	17,939
Embryo transfer cycles	2,076	6,415	8,947	5,799	502	23,739
Clinical pregnancies	969	2,770	2,993	977	23	7,732
Live births	848	2,340	2,262	546	6	6,002
Live births per initiated cycle (%)	*16.3*	*16.2*	*10.8*	*4.1*	*0.5*	*10.9*
Live births per initiated cycle (excluding freeze-all)[c] (%)	*28.7*	*26.2*	*16.6*	*5.2*	*0.6*	*16.2*
Live births per embryo transfer cycle (%)	*40.8*	*36.5*	*25.3*	*9.4*	*1.2*	*25.3*
Live births per clinical pregnancy (%)	*87.5*	*84.5*	*75.6*	*55.9*	*26.1*	*77.6*

(a) Age at start of a treatment cycle.
(b) Freeze-all cycles are fresh ART treatment cycles where all oocytes or embryos are cryopreserved for potential future use.
(c) Live births per initiated cycle (excluding freeze-all) were calculated using live births as the numerator and initiated fresh cycles minus freeze-all cycles as the denominator.

Figure 3 shows age-specific live birth rates per initiated autologous fresh cycle (excluding freeze-all cycles) by two-year age groups. The 95% confidence intervals represent the uncertainty surrounding the live birth rates for otherwise similar female patients of that age group. The wider 95% confidence intervals for women in age groups under 30 years indicate greater uncertainty in the birth rates for these female patients as being representative of all female patients of similar age and characteristics.

The highest live birth rates were in females between the ages of 25 and 30 years. For women aged 45 or older, only 1 live birth resulted from every 167 initiated cycles compared with 1 live birth from every 3 initiated cycles in women aged between 27 and 28.

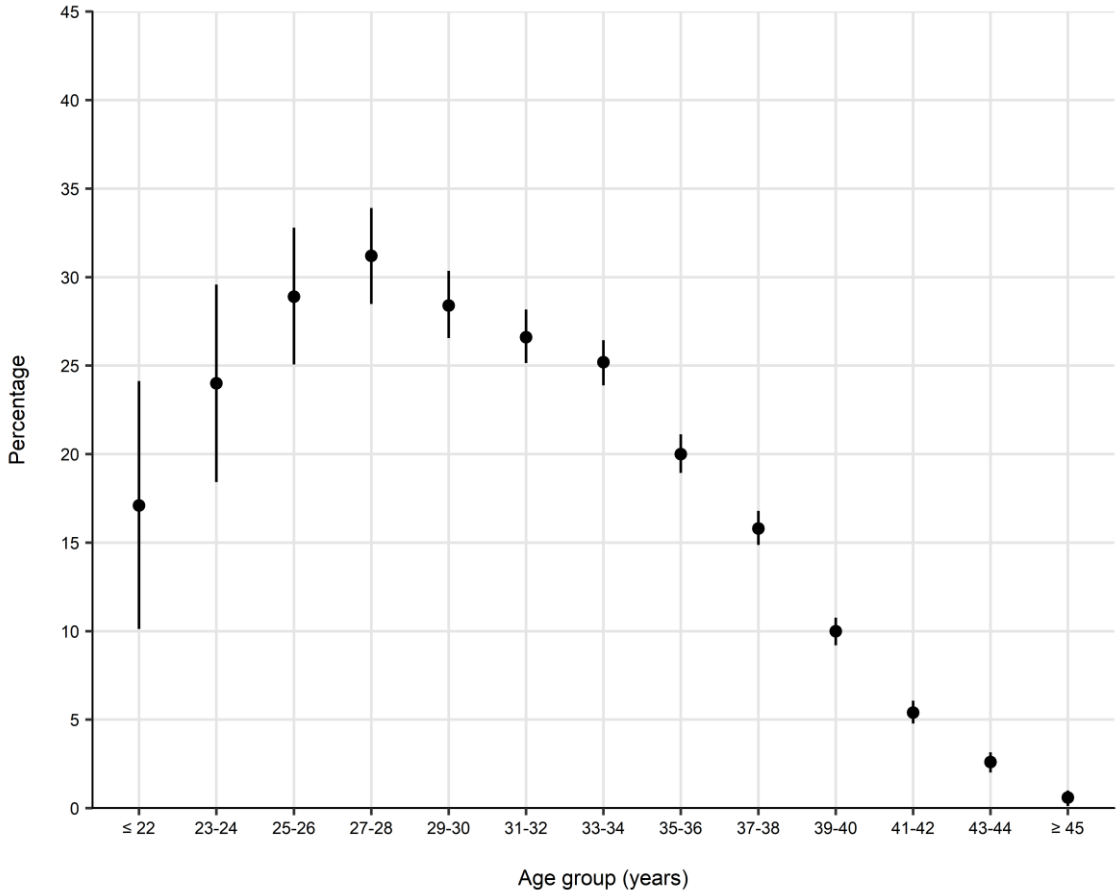


Figure 3: Live birth rate (with 95% confidence intervals) per initiated autologous fresh cycle (excluding freeze-all**) by female patient's age at start of a treatment cycle, Australia and New Zealand, 2020**

Clinical pregnancies and live births by cause of infertility

Causes of infertility may relate to either the female intending parent or her male partner, both, or may be unexplained. For ART cycles performed in 2020 (ANZARD 3.0), cause of infertility is reported for female-male intending parents undertaking ART to treat clinical infertility. The clinical diagnosis reported to ANZARD is made by the treating clinician. However, the diagnostic definitions may vary among ART Units and should be interpreted with considerable caution.

There were 1,772 autologous fresh cycles where ART was performed for reasons other than to treat medical infertility. Examples include chromosomal testing, human leukocyte antigens (HLA) matching and fertility preservation.

There were 46,089 initiated autologous fresh cycles undertaken by female-male intending parents. Cycles where tubal disease was reported as the only cause of infertility in the female intending parent had the highest live birth rate (21%) (Table 14). The cause of infertility was unexplained in the intending parents in 28.2% of autologous fresh cycles.

Table 14: Outcomes of autologous fresh cycles by intending parent cause of infertility, Australia and New Zealand, 2020

Cause of infertility	Number of initiated cycles	Embryo transfer cycles per initiated cycle (%)	Clinical pregnancies per initiated non-freeze-all cycle[(a)] (%)	Live births per initiated non-freeze-all cycle[(b)] (%)
Tubal disease only	1,647	54.5	26.3	21.0
Endometriosis only	2,467	48.8	25.5	20.6
Other female factors only	10,284	40.2	16.0	12.0
Combined female factors only	2,229	42.7	16.9	12.6
Combined female-male factors	5,397	42.9	18.1	13.7
Male factor infertility only	9,213	50.5	25.7	20.4
Unexplained infertility	12,990	50.7	22.1	17.2
Not stated	90	51.1	20.0	16.7
Non-medical infertility	1,772	26.5	23.0	18.8
Total	**46,089**	**46.1**	**21.1**	**16.4**

(a) Clinical pregnancies per initiated non-freeze-all cycle is calculated using clinical pregnancies as the numerator and initiated cycles minus freeze-all cycles as the denominator.

(b) Live births per initiated non-freeze-all cycle is calculated using live births as the numerator and initiated cycles minus freeze-all cycles as the denominator.

There were 14,610 autologous fresh cycles where the male intending parent was reported as having male factor infertility (Table 14). In 76.5% of these cycles, the primary cause of male infertility was idiopathic (unexplained).

The overall live birth rate per initiated non-freeze-all cycle was 18%, ranging from 13.4% for gonadotrophin deficiency to 23.1% for testis damage – other (Table 15).

Table 15: Outcomes of autologous fresh cycles by male intending parent principal cause of infertility, Australia and New Zealand, 2020

Primary cause of male infertility	Number of initiated cycles	Embryo transfer cycles per initiated cycle (%)	Clinical pregnancies per initiated non-freeze-all cycle (%)[a]	Live births per initiated non-freeze-all cycle (%)[b]
Spermatogenic failure				
Idiopathic (unexplained)	11,171	48.6	23.1	18.0
Genetic – Klinefelter	73	45.2	21.3	14.9
Genetic – Y deletion	43	41.9	21.4	21.4
Genetic - other aneuploidies, single gene	493	28.8	18.1	15.4
Testis damage – cancer treatment	363	43.3	24.5	20.1
Testis damage – other (e.g. vascular, infective, trauma)	426	50.2	27.8	23.1
Gonadotrophin deficiency	229	37.1	19.5	13.4
Obstruction				
Vasectomy	1,124	46.7	18.8	14.5
Congenital absence of the vas deferens/cystic fibrosis	140	47.9	27.4	21.1
Obstructive disorder	260	52.7	28.5	23.0
Erectile and ejaculatory				
Erectile dysfunction (incl. psychosexual)	154	50.6	23.6	22.8
Ejaculatory disorders (incl. spinal injury, retrograde and anejaculation)	134	59.0	28.2	21.8
Total	**14,610**	**47.7**	**23.0**	**18.0**

(a) Clinical pregnancies per initiated non-freeze-all cycle is calculated using clinical pregnancies as the numerator and initiated cycles minus freeze-all cycles as the denominator.

(b) Live births per initiated non-freeze-all cycle is calculated using live births as the numerator and initiated cycles minus freeze-all cycles as the denominator.

Clinical pregnancies and live births by stage of embryo development and number of embryos transferred

Overall, 89.9% of autologous fresh embryo transfer cycles were SET cycles, 9.9% were DET cycles and 0.2% had three or more embryos transferred. In female patients aged 30 to 39, three or more fresh embryos were transferred in 2 cycles, compared with 38 cycles in females aged 40 or older.

There were more blastocyst (80.1%) than cleavage-stage embryo transfer cycles (19.9%). The rates of clinical pregnancy and live birth were higher in blastocyst transfer cycles than in cleavage-stage embryo transfer cycles for both SET and DET cycles (Table 16). Caution should be taken when comparing clinical pregnancy and live birth rates following cleavage-stage embryo and blastocyst transfer. Patient characteristics, prognosis and treatment strategies may be different between these groups, and generally fewer embryos are available for transfer and cryopreservation when blastocyst culture is used.

The overall live birth rate per embryo transfer cycle was 26.3% for SET cycles and 15.9% for DET cycles (Table 16). Caution should be taken when comparing live birth rates following SET and DET cycles because patient characteristics and prognoses are different between these groups.

Table 16: Outcomes of autologous fresh embryo transfer cycles by stage of embryo development and number of embryos transferred, Australia and New Zealand, 2020

	Cleavage		Blastocyst		Total	
Stage/outcome of treatment	**SET[(a)]**	**DET[(b)(c)(d)]**	**SET[(a)]**	**DET[(b)(c)(d)]**	**SET[(a)]**	**DET[(b)(c)(d)]**
Embryo transfer cycles	3,811	920	17,539	1,469	21,350	2,389
Clinical pregnancies	914	197	6,249	372	7,163	569
Live births	727	131	4,894	250	5,621	381
Clinical pregnancies per embryo transfer cycle (%)	*24.0*	*21.4*	*35.6*	*25.3*	*33.6*	*23.8*
Live births per embryo transfer cycle (%)	*19.1*	*14.2*	*27.9*	*17.0*	*26.3*	*15.9*

(a) SET: single embryo transfer.

(b) DET: double embryo transfer.

(c) Includes 5 cycles where both cleavage-stage embryos and blastocysts were transferred.

(d) Includes cycles where three or more embryos were transferred.

3.3 Autologous thaw cycles

There were 35,497 autologous thaw cycles reported in 2020 (Figure 4). Of these, 89.4% (31,721) were in Australian ART Units and 10.6% (3,776) in New Zealand ART Units.

Progression of autologous thaw cycles

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

Of the 35,497 initiated autologous thaw cycles, 98.2% had embryos transferred, 38% resulted in a clinical pregnancy and 30.7% resulted in a live birth (Figure 4).

The rate of live births per initiated cycle was higher for autologous thaw cycles than for autologous fresh cycles excluding freeze-all cycles in 2020 (30.7% and 16.2% respectively) (Table 13 and Table 17).

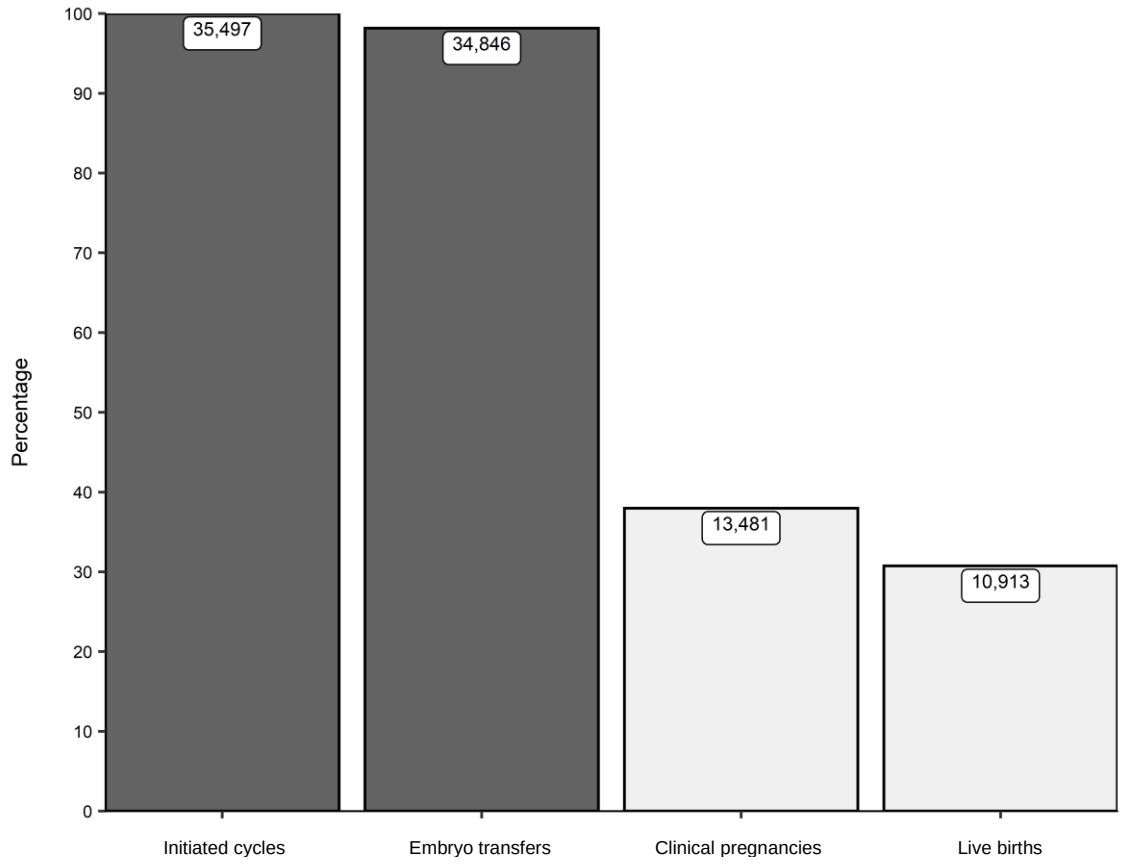


Figure 4: Progression of autologous thaw cycles, Australia and New Zealand, 2020

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

The live birth rate per initiated thaw cycle and per thaw embryo transfer cycle was similar for women aged < 30 years and women aged 30–34 years, with live birth rates declining for older women (Table 17).

The overall live birth rate per initiated autologous thaw cycle was 30.7%, which is 14.5 percentage points higher than in autologous fresh cycles (excluding freeze-all cycles) (16.2%) (Table 13 and Table 17).

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. Also, there has been an increasing trend towards freeze-all cycles in recent years (Table 42), resulting in more women undergoing thaw cycles without undertaking a previous fresh embryo transfer. This may contribute to the higher success rates following autologous thaw cycles compared to autologous fresh cycles (Table 13 and Table 17).

Table 17: Outcomes of autologous thaw cycles by female patient age, Australia and New Zealand, 2020

	Age group (years)[a]					
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
Initiated cycles	3,709	11,378	14,123	5,883	404	35,497
Embryo transfers	3,654	11,207	13,861	5,732	392	34,846
Clinical pregnancies	1,545	4,792	5,427	1,659	58	13,481
Live births	1,310	4,029	4,340	1,204	30	10,913
Live births per initiated cycle (%)	*35.3*	*35.4*	*30.7*	*20.5*	*7.4*	*30.7*
Live births per embryo transfer cycle (%)	*35.9*	*36.0*	*31.3*	*21.0*	*7.7*	*31.3*
Live births per clinical pregnancy (%)	*84.8*	*84.1*	*80.0*	*72.6*	*51.7*	*81.0*

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

Figure 5 shows age-specific live birth rates per initiated autologous thaw cycle by two-year age groups. The 95% confidence intervals represent the uncertainty surrounding the live birth rates for otherwise similar female patients of that age group.

The highest live birth rates were observed in females in their mid to late 20s to early 30s. The wider 95% confidence intervals for women in age groups under 30 years indicates greater uncertainty in the birth rates for these female patients.

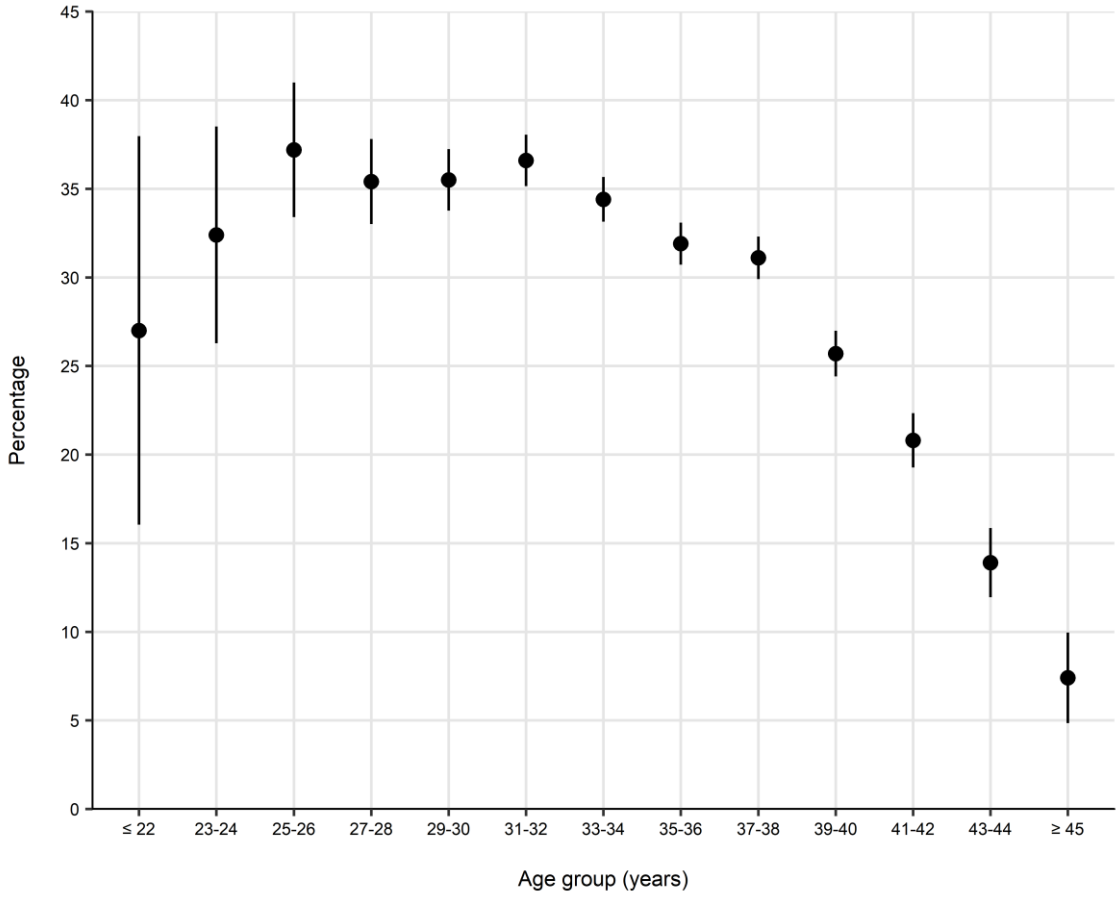


Figure 5: Live birth rate (with 95% confidence intervals) per initiated autologous thaw cycle by female patient's age at start of a treatment cycle, Australia and New Zealand, 2020

Clinical pregnancies and live births by cause of infertility

Causes of infertility may relate to either the female intending parent or her male partner, both, or may be unexplained. For ART cycles performed in 2020 (ANZARD 3.0), cause of infertility is reported for female-male intending parents undertaking ART to treat clinical infertility. The clinical diagnosis reported to ANZARD is made by the treating clinician. However, the diagnostic definitions may vary among ART Units and should be interpreted with considerable caution.

There were 1,180 autologous thaw cycles where ART was performed for reasons other than to treat clinical infertility. Examples include chromosomal testing, human leukocyte antigens (HLA) matching and fertility preservation. Of these 1,180 cycles, 34.1% resulted in a live birth.

There were 32,280 initiated autologous thaw cycles undertaken by female-male intending parents. Cycles reported with endometriosis as the only cause of infertility had the highest rate of live births per initiated autologous thaw cycle (34.6%) (Table 18).

Table 18: Outcomes of autologous thaw cycles by intending parent cause of infertility, Australia and New Zealand, 2020

Cause of infertility	Number of initiated cycles	Embryo transfer cycles per initiated cycle (%)	Clinical pregnancies per initiated cycle (%)	Live births per initiated cycle (%)
Tubal disease only	1,425	98.9	38.2	30.2
Endometriosis only	1,860	98.2	41.7	34.6
Other female factors only	6,406	97.8	36.5	29.5
Combined female factors only	1,567	98.3	35.7	28.3
Combined female-male factors	3,390	97.9	38.5	30.3
Male factor infertility only	6,669	98.5	40.2	33.1
Unexplained infertility	9,702	98.5	38.5	30.9
Not stated	81	98.8	35.8	24.7
Treatment not for infertility	1,180	96.9	40.2	34.1
All	**32,280**	**98.2**	**38.5**	**31.2**

Of the 32,280 initiated autologous thaw cycles undertaken by female-male intending parents, 10,059 (31.2%) had male factor infertility. The primary cause was reported as idiopathic (unexplained) in 78.4% of cycles with male factor infertility. Cycles where the primary cause was genetic due to other aneuploidies or single gene disorders had the highest live birth rate per initiated cycle (40.3%).

Table 19: Outcomes of autologous thaw cycles by male intending parent principal cause of infertility, Australia and New Zealand, 2020

Primary cause of male infertility	Number of initiated cycles	Embryo transfer cycles per initiated cycle (%)	Clinical pregnancies per initiated cycle (%)	Live births per initiated cycle (%)
Spermatogenic failure				
Idiopathic (unexplained)	*7,882*	*98.4*	*39.4*	*32.0*
Genetic – Klinefelter	*68*	*100.0*	*32.4*	*23.5*
Genetic – Y deletion	*19*	*94.7*	*31.6*	*26.3*
Genetic – other aneuploidies, single gene	*335*	*97.9*	*47.2*	*40.3*
Testis damage – cancer treatment	*231*	*98.7*	*37.7*	*29.4*
Testis damage – other (e.g. vascular, infective, trauma)	*284*	*96.8*	*40.1*	*31.3*
Gonadotrophin deficiency	*153*	*98.7*	*41.8*	*30.7*
Obstruction				
Vasectomy	*657*	*96.8*	*37.3*	*29.7*
Congenital absence of the vas deferens/cystic fibrosis	*113*	*98.2*	*42.5*	*37.2*
Obstructive disorder	*139*	*98.6*	*41.0*	*36.7*
Erectile and ejaculatory				
Erectile dysfunction (incl. psychosexual)	*89*	*98.9*	*40.4*	*33.7*
Ejaculatory disorders (incl. spinal injury, retrograde and anejaculation)	*89*	*100.0*	*48.3*	*38.2*
Total	**10,059**	**98.3**	**39.6**	**32.2**

Of the 34,846 autologous thaw embryo transfer cycles, 95% were SET cycles, 4.9% were DET cycles and 17 cycles transferred three or more embryos. Only female patients aged 35 or older had three or more frozen/thawed embryos transferred.

There were more blastocyst transfer cycles (95.7%) than cleavage-stage embryo transfer cycles (4.3%). The rates of clinical pregnancy and live birth were higher in blastocyst transfer cycles (39.4% and 31.8% respectively) than in cleavage-stage embryo transfer cycles (23.8% and 19.5% respectively) (Table 20). Caution should be taken when comparing clinical pregnancy and live birth rates following cleavage-stage embryo and blastocyst transfer. Patient characteristics and prognoses are different between these groups, and generally fewer embryos are available for transfer and cryopreservation when blastocyst culture is used.

The overall live birth rate per embryo transfer cycle was 31.4% for SET cycles and 29.7% for DET cycles (Table 20). Caution should be taken when comparing live birth rates following SET and DET cycles because patient characteristics and prognoses are different between these groups.

Table 20: Outcomes of autologous thaw embryo transfer cycles by stage of embryo development and number of embryos transferred, Australia and New Zealand, 2020

	Cleavage		Blastocyst[a]		Total	
Stage/outcome of treatment	**SET[b]**	**DET[c][d]**	**SET[b]**	**DET[c][d]**	**SET[b]**	**DET[c][d]**
Embryo transfer cycles	1,261	227	31,857	1,501	33,118	1,728
Clinical pregnancies	309	45	12,502	625	12,811	670
Live births	253	37	10,147	476	10,400	513
Clinical pregnancies per embryo transfer cycle (%)	*24.5*	*19.8*	*39.2*	*41.6*	*38.7*	*38.8*
Live births per embryo transfer cycle (%)	*20.1*	*16.3*	*31.9*	*31.7*	*31.4*	*29.7*

(a) Includes 1 cycle where both cleavage-stage embryos and blastocysts were transferred.

(b) SET: single embryo transfer.

(c) DET: double embryo transfer.

(d) Includes cycles where three or more embryos were transferred.

Clinical pregnancies and live births by embryo freezing methods

Of the autologous thaw cycles where a blastocyst was transferred, 96.5% used vitrified embryos compared with 81.1% of cleavage-stage embryo transfer cycles. Live birth rates were higher for vitrified embryos compared to slow-frozen embryos regardless of the stage of embryo development (Table 21).

Table 21: Outcomes of autologous thaw embryo transfer cycles by stage of embryo development and embryo freezing methods, Australia and New Zealand, 2020

	Stage of embryo development					
	Cleavage stage		Blastocyst[(a)]		All	
Stage/outcome of treatment	Slow freezing	Vitrification	Slow freezing	Vitrification	Slow freezing	Vitrification
Embryo transfer cycles	281	1,207	1,171	32,187	1,452	33,394
Clinical pregnancies	55	299	440	12,687	495	12,986
Live births	46	244	348	10,275	394	10,519
Clinical pregnancies per embryo transfer cycle (%)	*19.6*	*24.8*	*37.6*	*39.4*	*34.1*	*38.9*
Live births per embryo transfer cycle (%)	*16.4*	*20.2*	*29.7*	*31.9*	*27.1*	*31.5*

(a) Includes 1 cycle where both blastocyst and cleavage-stage embryos were transferred.

3.4 Donation and recipient cycles

A donation cycle is an ART treatment cycle in which a female patient intends to donate or donates her oocytes/embryos to another individual/couple (the intending parent/s). This includes same-sex female relationships where one female provides eggs or embryos for use by her female partner. A recipient cycle is defined as an ART treatment cycle in which a female patient receives oocytes or embryos created using another woman's oocytes to achieve a pregnancy. The use of donor sperm does not alter the donor status of the cycle.

In 2020, donation and recipient cycles accounted for 4% (3,807) of all treatment cycles in Australia and New Zealand. There were 1,061 initiated cycles where the intention was to donate oocytes or embryos to a recipient, consisting of 890 (83.9%) cycles in Australia and 171 (16.1%) in New Zealand.

This chapter does not include surrogacy arrangement cycles. Refer to Chapter 5.

Oocyte/embryo donation cycles

Of the 1,061 initiated cycles where the intention was to donate oocytes or embryos to a recipient/intending parent(s), 37 (3.5%) cycles were cancelled before OPU, and a further 6 did not result in oocytes being donated. Following OPU, 87.3% of initiated donation cycles resulted in fresh oocytes or embryos being donated and 8.7% resulted in cryopreserved oocytes or embryos being donated.

The average age of females donating oocytes/embryos was 33 years, with 41.5% of cycles in females aged 35 or older (Table 22). There were 576 (54.3%) donation cycles where the recipients were female-male intending parents followed by 234 (22.1%) donation cycles where the recipients were female-female intending parents (Table 23). There were 45 donation cycles where the recipients were single male and male-male intending parents, for use with a surrogate gestational carrier and 91 cycles where oocytes were donated but no intending parents had been assigned to receive the oocytes at the time of the donation cycle.

Table 22: Number of oocyte/embryo donation cycles by donor age, Australia and New Zealand, 2020

Age group (years)[(a)]	Number of initiated cycles	Cycles with OPU performed (%)	Cycles with fresh oocyte(s)/embryo(s) donated[(b)] (%)	Cycles with cryopreserved oocyte(s)/embryo(s) donated (%)
< 30	269	95.5	88.1	7.4
30–34	352	97.4	86.6	10.8
35–39	375	96.8	87.2	8.3
≥ 40	65	93.8	87.7	4.6
Total	**1,061**	**96.5**	**87.3**	**8.7**

(a) Donor's age at the time of their OPU.
(b) Includes 17 cycles where oocytes/embryos were also cryopreserved.

Table 23: Number of oocyte/embryo donation cycles to intending parents, Australia and New Zealand, 2020

Intending parents	Number of initiated cycles	Cycles with OPU performed (%)	Cycles with fresh oocyte(s)/embryo(s) donated (%)[(a)]	Cycles with cryopreserved oocyte(s)/embryo(s) donated (%)
Female-male couple	576	95.8	93.4	2.3
Single female	115	92.2	75.7	13.9
Female-female couple	234	98.7	80.3	17.5
Single male	2	100.0	100.0	0.0
Male-male couple	43	100.0	100.0	0.0
Unknown intending parents	91	98.9	74.7	24.2
Total	**1,061**	**96.5**	**87.3**	**8.7**

(a) Includes 17 cycles where oocytes/embryos were also cryopreserved.

Oocyte/embryo recipient cycles

There were 2,746 oocyte/embryo recipient cycles in 2020, comprising 2,415 (88%) cycles in Australia and 331 (12.1%) cycles in New Zealand. Of these, 67% (1,839) were oocyte recipient cycles and 33% (907) were embryo recipient cycles (Table 24). The average age of women undertaking an oocyte/embryo recipient cycle was 40 years.

Progression of oocyte/embryo recipient cycles

Figure 6 shows the main stages of oocyte/embryo recipient cycles and the treatment outcomes. Of the 2,746 initiated oocyte/embryo recipient cycles undertaken in 2020, 92.1% resulted in an embryo transfer, 34.2% resulted in a clinical pregnancy and 27.5% in a live birth.

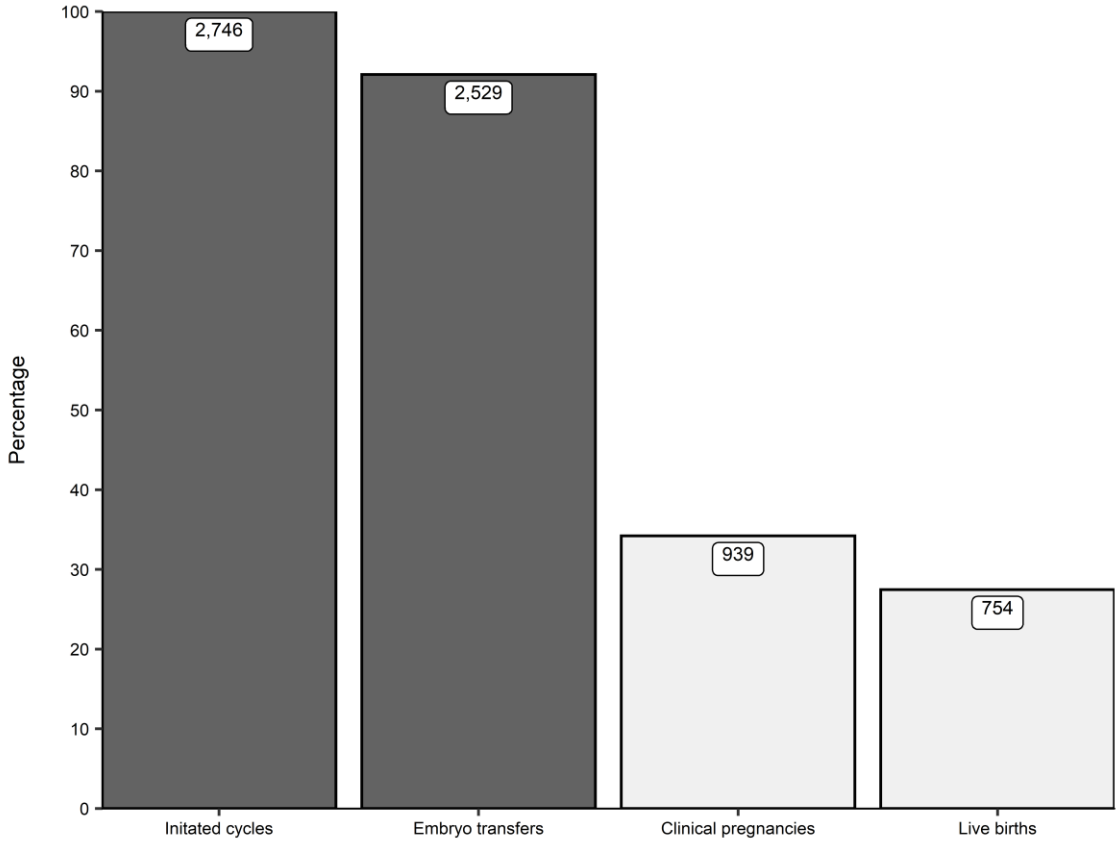


Figure 6: Progression of fresh and thaw oocyte/embryo recipient cycles, Australia and New Zealand, 2020

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

Of the 2,746 oocyte recipient cycles, 21.6% were fresh cycles and 78.4% were thaw cycles. The overall live birth rate per initiated cycle was 25.9% for oocyte recipient cycles and 30.5% for embryo recipient cycles (Table 24).

Table 24: Outcomes of oocyte/embryo recipient cycles by treatment type, Australia and New Zealand, 2020

	Oocyte recipient		Embryo recipient		
Stage/outcome of treatment	**Fresh**	**Thaw**	**Fresh**	**Thaw**	**All**
Initiated cycles	574	1,265	20	887	2,746
Embryo transfer cycles	391	1,249	20	869	2,529
Clinical pregnancies	164	433	8	334	939
Live births	129	348	6	271	754
Live births per initiated cycle (%)	*22.5*	*27.5*	*30.0*	*30.6*	*27.5*
Live births per embryo transfer cycle (%)	*33.0*	*27.9*	*30.0*	*31.2*	*29.8*
Live births per clinical pregnancy (%)	*78.7*	*80.4*	*75.0*	*81.1*	*80.3*

Clinical pregnancies and live births from oocyte/embryo recipient cycles by recipients' age

The clinical pregnancy and live birth rates of recipient cycles varied by recipients' age. The overall live birth rate per initiated recipient cycle was 27.5%, varying between 23.7% and 30.2% by recipients' age (Table 25).

Table 25: Outcomes of oocyte/embryo recipient cycles by recipient age, Australia and New Zealand, 2020

	Age group (years)[a]					
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
Initiated cycles	160	450	651	828	657	2,746
Embryo transfer cycles	147	415	586	766	615	2,529
Clinical pregnancies	51	164	224	296	204	939
Live births	44	136	182	236	156	754
Live births per initiated cycle (%)	*27.5*	*30.2*	*28.0*	*28.5*	*23.7*	*27.5*
Live births per embryo transfer cycle (%)	*29.9*	*32.8*	*31.1*	*30.8*	*25.4*	*29.8*
Live births per clinical pregnancy (%)	*86.3*	*82.9*	*81.3*	*79.7*	*76.5*	*80.3*

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

Clinical pregnancies and live births from oocyte/embryo recipient cycles by donors' age

The clinical pregnancy and live birth rates of recipient cycles varied by donors' age. The highest live birth rate per initiated recipient cycle was in donors aged between 30 and 34 (29.4%). The live birth rate per initiated recipient cycle in which the donor's age was 40 years or more was 15.6%. (Table 26).

Table 26: Outcomes of oocyte/embryo recipient cycles by donor age, Australia and New Zealand, 2020

	Age group (years)[a]				
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**≥ 40**	**All[b]**
Initiated cycles	801	929	860	154	2,746
Embryo transfers	735	868	782	142	2,529
Clinical pregnancies	281	342	278	36	939
Live births	230	273	225	24	754
Live births per initiated cycle (%)	*28.7*	*29.4*	*26.2*	*15.6*	*27.5*
Live births per embryo transfer cycle (%)	*31.3*	*31.5*	*28.8*	*16.9*	*29.8*
Live births per clinical pregnancy (%)	*81.9*	*79.8*	*80.9*	*66.7*	*80.3*

(a) Donor age at the time of their OPU.

(b) Includes 2 cycles where the donor's age was unknown.

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

Of the 2,529 oocyte/embryo recipient cycles where embryos were transferred, 93.9% were SET, 6.1% were DET and there were no cycles where three or more embryos were transferred.

Overall, the live birth rate per oocyte/embryo recipient cycle where embryos were transferred was 28.4% in DET cycles compared with 29.9% in SET cycles (Table 27).

Caution should be taken when comparing live birth rates following SET and DET cycles because patient characteristics and prognoses are different between these groups.

Table 27: Outcomes of oocyte/embryo recipient embryo transfer cycles by stage of embryo development and number of embryos transferred, Australia and New Zealand, 2020

	Cleavage		Blastocyst		All	
Stage/outcome of treatment	**SET**	**DET**	**SET**	**DET**	**SET**	**DET**
Embryo transfer cycles	236	40	2,138	115	2,374	155
Clinical pregnancies	57	12	822	48	879	60
Live births	41	9	669	35	710	44
Clinical pregnancies per embryo transfer cycle (%)	*24.2*	*30.0*	*38.4*	*41.7*	*37.0*	*38.7*
Live births per embryo transfer cycle (%)	*17.4*	*22.5*	*31.3*	*30.4*	*29.9*	*28.4*

(a) SET: single embryo transfer.
(b) DET: double embryo transfer.

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

The majority (95.1%) of oocyte/embryo recipient thaw cycles where a blastocyst was transferred used vitrified embryos, compared with 79.9% of cycles where a cleavage- stage embryo was transferred. Overall, the live birth rate per embryo transfer was higher for the transfer of vitrified embryos (29.8%) compared to slow-frozen embryos (21.5%) (Table 28).

Table 28: Outcomes of oocyte/embryo recipient thaw cycles by stage of embryo development and embryo freezing methods, Australia and New Zealand, 2020

	Stage of embryo development					
	Cleavage embryo		Blastocyst		All	
Stage/outcome of treatment	**Slow freezing**	**Vitrification**	**Slow freezing**	**Vitrification**	**Slow freezing**	**Vitrification**
Embryo transfer cycles	41	163	94	1,820	135	1,983
Clinical pregnancies	9	37	30	691	39	728
Live births	9	25	20	565	29	590
Clinical pregnancies per embryo transfer cycle (%)	*22.0*	*22.7*	*31.9*	*38.0*	*28.9*	*36.7*
Live births per embryo transfer cycle (%)	*22.0*	*15.3*	*21.3*	*31.0*	*21.5*	*29.8*

4 Pregnancy and birth outcomes following autologous and recipient embryo transfer cycles in 2020

4.1 Clinical pregnancies

Clinical pregnancies overview

There were 61,114 autologous and recipient embryo transfer cycles undertaken in Australian and New Zealand ART Units, of which 22,152 resulted in a clinical pregnancy. Of these clinical pregnancies, 19,712 (89%) were reported from ART Units in Australia and 2,440 (11%) from New Zealand Units. Clinical pregnancies that resulted from other ART treatment cycles are described in Chapters 5 and 6.

Of the 22,152 clinical pregnancies, 80.6% resulted in a birth and 19% resulted in early pregnancy loss (less than 20 weeks gestation or less than 400 grams birthweight). The outcomes of 75 (0.3%) clinical pregnancies were not known because women could not be followed up or contacted by ART Units.

Early pregnancy loss

There were 4,217 early pregnancy losses (less than 20 weeks gestation or less than 400 grams birthweight) following embryo transfers, representing 19% of clinical pregnancies.

Table 29: Early pregnancy loss by pregnancy outcome and maternal age and number of embryos transferred, Australia and New Zealand, 2020

	Age group (years)[a]							
	< 35		35–39		≥ 40		All	
Pregnancy outcome	**One embryo**	**Two embryos[b]**	**One embryo**	**Two embryos[b]**	**One embryo**	**Two embryos[b]**	**One embryo**	**Two embryos[b]**
					n			
Early pregnancy loss	1,404	61	1,636	110	825	181	3,865	352
Miscarriage	*1,245*	*53*	*1,465*	*101*	*749*	*171*	*3,459*	*325*
Reduction or termination	*60*	*1*	*90*	*2*	*48*	*8*	*198*	*11*
Ectopic or heterotopic pregnancy	*99*	*7*	*81*	*7*	*28*	*2*	*208*	*16*
Birth	8,456	342	6,499	365	1,961	237	16,916	944
Not stated	27	1	33	1	12	1	72	3
Total pregnancies	**9,887**	**404**	**8,168**	**476**	**2,798**	**419**	**20,853**	**1,299**
					%			
Early pregnancy loss	14.2	15.1	20.0	23.1	29.5	43.2	18.5	27.1
Miscarriage	*12.6*	*13.1*	*17.9*	*21.2*	*26.8*	*40.8*	*16.6*	*25.0*
Reduction or termination	*0.6*	*0.2*	*1.1*	*0.4*	*1.7*	*1.9*	*0.9*	*0.8*
Ectopic or heterotopic pregnancy	*1.0*	*1.7*	*1.0*	*1.5*	*1.0*	*0.5*	*1.0*	*1.2*
Birth	85.5	84.7	79.6	76.7	70.1	56.6	81.1	72.7
Not stated	0.3	0.2	0.4	0.2	0.4	0.2	0.3	0.2
Total pregnancies	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Age at start of treatment cycle.

(b) Includes three or more embryos.

4.2 Births

There were 17,860 female patients 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, 98.9% (17,669) gave birth to at least one liveborn baby (live birth). The proportion of term live births (≥ 37 weeks) among all births was higher for autologous cycles than for oocyte/embryo recipient cycles (Table 30).

Table 30: Births by birth outcome and treatment type, Australia and New Zealand, 2020

	Autologous				Oocyte /embryo recipient		All	
	Fresh		Thaw					
Birth outcome	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Live birth	6,002	98.9	10,913	98.9	754	99.2	17,669	98.9
< 37 weeks	*692*	*11.4*	*1,185*	*10.7*	*120*	*15.8*	*1,997*	*11.2*
≥ 37 weeks	*5,310*	*87.5*	*9,728*	*88.2*	*634*	*83.4*	*15,672*	*87.7*
Gestational age unknown	*0*	*0.0*	*0*	*0.0*	*0*	*0.0*	*0*	*0.0*
Stillbirth[(a)]	49	0.8	67	0.6	3	0.4	119	0.7
Not stated	20	0.3	49	0.4	3	0.4	72	0.4
Total	**6,071**	**100.0**	**11,029**	**100.0**	**760**	**100.0**	**17,860**	**100.0**

(a) Stillbirth is reported by patients to ART Unit staff. These data are not official vital statistics.

Births by gestation and maternal age and number of embryos transferred

Of the 17,860 births, 2.8% were multiple births (Table 31), a slightly lower proportion than in 2019 (2.9%) (Newman et al. 2021). By comparison, the proportion of multiple births in Australia from all conceptions in 2020 was 1.4% (AIHW 2022).

Twin births accounted for 2.8% of births following embryo transfer cycles in 2020. Of twin births, 41.9% resulted from the transfer of two or more embryos. Of births following DET, the proportion of multiple births was higher for women aged under 35 (31.3%) compared with females aged 35–39 (22.3%) and females aged 40 or older (13.4%) (Table 31).

The average age of female patients at the time of birth who conceived using ART was 36 years. This is five years older than the average age (30.9 years) of all women who gave birth in Australia in 2020 (AIHW 2022).

Table 31: Births by gestation and maternal age and number of embryos transferred, Australia and New Zealand, 2020

	Age group (years)[a]								
	< 35		35–39		≥ 40		All		
Gestation	One embryo	Two embryos[b]	One embryo	Two embryos[b]	One embryo	Two embryos[b]	One embryo	Two embryos[b]	Total
					n				
Singleton	7,193	204	6,822	271	2,611	258	16,626	733	17,359
Multiple	143	93	99	78	48	40	290	211	501
Twin	*141*	*91*	*97*	*76*	*48*	*39*	*286*	*206*	*492*
Higher order multiple	*2*	*2*	*2*	*2*	*0*	*1*	*4*	*5*	*9*
Total	**7,336**	**297**	**6,921**	**349**	**2,659**	**298**	**16,916**	**944**	**17,860**
					%				
Singleton	98.1	68.7	98.6	77.7	98.2	86.6	98.3	77.6	97.2
Multiple	1.9	31.3	1.4	22.3	1.8	13.4	1.7	22.4	2.8
Twin	*1.9*	*30.6*	*1.4*	*21.8*	*1.8*	*13.1*	*1.7*	*21.8*	*2.8*
Higher order multiple	*0.0*	*0.7*	*0.0*	*0.6*	*0.0*	*0.3*	*0.0*	*0.5*	*0.1*
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Age at time of birth.

(b) Includes three or more embryos.

Caesarean section

More than half (54.3%) of births following embryo transfer cycles were by caesarean section (Table 32). The high rate of caesarean section following ART treatment may be related to the fact that on average, female patients receiving ART treatment were five years older than women who gave birth in Australia in 2020 and that there were more multiple births following ART treatment.

The caesarean section rate increased with advancing female age at birth: 41.7% of females aged less than 30 had a caesarean section compared with 84.2% of females aged 45 or older (Table 32).

The caesarean section rate varied by plurality, with 53.4% for singleton births and 83.1% for multiple births (twins and triplets). The caesarean section rate for women having a baby in Australia in 2020 was 37% (AIHW 2022).

Table 32: Births by method of birth and maternal age, Australia and New Zealand, 2020

	Age group (years)[(a)]					
Method of birth	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**Total**
			n			
Caesarean section	695	2,911	4,073	1,791	224	9,694
Not stated	20	90	106	45	2	263
Other	952	2,965	3,091	855	40	7,903
Total	**1,667**	**5,966**	**7,270**	**2,691**	**266**	**17,860**
			%			
Caesarean section	41.7	48.8	56.0	66.6	84.2	54.3
Not stated	1.2	1.5	1.5	1.7	0.8	1.5
Other	57.1	49.7	42.5	31.8	15.0	44.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Age at time of birth.

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 ART cycles are described in Chapter 5.

There were 18,370 babies born to females who had autologous and recipient embryo transfer cycles. Of these, 89.1% (16,365) were reported from ART Units in Australia and 10.9% (2,005) from ART Units in New Zealand. Of the 18,370 babies, 94.5% were singletons, 5.4% were twins and < 1% were triplets. There were 18,165 liveborn babies (98.9%). The birth status was not reported for 74 (0.4%) babies.

Sex distribution in liveborn babies

There were 9,216 (50.7%) liveborn male babies, 8,871 (48.8%) liveborn female babies and 78 (0.4%) liveborn babies where sex was not stated. For the 18,087 liveborn babies where the baby's sex was stated, the sex ratio was 104 male babies for every 100 female babies. The sex ratio for all Australian liveborn babies born in 2020 was 105.4 male liveborn babies per 100 female liveborn babies (AIHW 2022).

Liveborn babies following cleavage-stage embryo transfers had a sex ratio of 103 male babies for every 100 female babies. Liveborn babies following blastocyst transfers had a sex ratio of 104 male babies for every 100 female babies.

Gestational age of babies

The overall proportions of preterm singletons (10%) and twins (75.4%) born to women who had embryo transfer cycles in 2020 were higher than the overall proportions of preterm singletons and twins born in Australia in 2020 (6.7% and 65% respectively) (AIHW 2022).

The median gestational age of babies born following autologous and recipient embryo transfer cycles was 38 weeks (Table 33). This is lower than the median gestational age of 39 weeks for all babies born in Australia in 2020 (AIHW 2022).

There were 13.6% of babies born preterm (less than 37 weeks gestation), which is higher than the proportion of preterm babies born in Australia in 2020 (8.3%) (AIHW 2022).

Table 33: Babies by gestational age and plurality, Australia and New Zealand, 2020

Gestational age (weeks)	Singletons		Twins		Higher order multiples		Total	
Median	*38*		*35*		*31*		*38*	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
≤ 27	*222*	*1.3*	*48*	*4.9*	*6*	*22.2*	*276*	*1.5*
28–31	*154*	*0.9*	*74*	*7.5*	*9*	*33.3*	*237*	*1.3*
32–36	*1,354*	*7.8*	*620*	*63.0*	*9*	*33.3*	*1,983*	*10.8*
≤ 36	1,730	10.0	742	75.4	24	88.9	2,496	13.6
≥ 37	15,629	90.0	242	24.6	3	11.1	15,874	86.4
Not stated	0	0.0	0	0.0	0	0.0	0	0.0
Total	**17,359**	**100.0**	**984**	**100.0**	**27**	**100.0**	**18,370**	**100.0**

Birthweight of liveborn babies

The average birthweight for liveborn babies to women who had autologous and recipient embryo transfer cycles was 3,227 grams. This is slightly lower than the average birthweight of all liveborn babies (3,332 grams) in Australia in 2020 (AIHW 2022). Approximately one in ten (10.2%) of the 18,165 liveborn babies were low birthweight (less than 2,500 grams) (Table 34).

The average birthweight was 3,283 grams and 2,257 grams for liveborn ART singletons and twins respectively. Low birthweight was reported for 9.1% of liveborn singletons following fresh cycles and 6.5% of liveborn singletons following thaw cycles. For ART twins, 58% were reported as low birthweight in comparison with 56.1% of twin births in Australia in 2020 (AIHW 2022).

Table 34: Liveborn babies by birthweight group and plurality, Australia and New Zealand, 2020

	Fresh			Thaw		
Birthweight (grams)	**Singletons**	**Twins**	**Higher order multiples**	**Singletons**	**Twins**	**Higher order multiples**
			n			
< 1,500	82	40	9	130	63	7
1,500–2,499	459	166	3	595	289	4
2,500–3,499	3,514	103	0	5,943	266	1
3,500–4,500	1,822	2	0	4,194	9	0
> 4,500	36	0	0	167	0	0
Not stated	59	10	0	175	14	3
Total	**5,972**	**321**	**12**	**11,204**	**641**	**15**
			%			
< 1,500	1.4	12.5	75.0	1.2	9.8	46.7
1,500–2,499	7.7	51.7	25.0	5.3	45.1	26.7
2,500–3,499	58.8	32.1	0.0	53.0	41.5	6.7
3,500–4,500	30.5	0.6	0.0	37.4	1.4	0.0
> 4,500	0.6	0.0	0.0	1.5	0.0	0.0
Not stated	1.0	3.1	0.0	1.6	2.2	20.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Perinatal mortality

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

There were 181 reported perinatal deaths, including 131 stillbirths and 50 neonatal deaths. The perinatal mortality rate in 2020 was 9.9 deaths per 1,000 births (Table 35), which was comparable to the rate of 9.9 per 1,000 births for all births in Australia in 2020 (AIHW 2022). Singletons had a markedly lower perinatal mortality rate (8.6 deaths per 1,000 births) compared with multiples (30.7 deaths per 1,000 births) (Table 35).

These data should be interpreted with caution because of the small numbers and potential variability in case reporting, which is compounded by the self-reported nature of ART birth outcome data. In 2020, information relating to birth outcomes was not stated for 74 births.

Table 35: Perinatal mortality of babies by type of death and plurality, Australia and New Zealand, 2020

			Stillbirths[a]		Neonatal deaths[b]		Perinatal deaths[a][b]	
Plurality	**All births**	**Live births**	**n**	**Rate[c][e]**	**n**	**Rate[d][f]**	**n**	**Rate[c][g]**
Singletons	17,359	17,176	113	6.5	37	2.2	150	8.6
Multiples	1,011	989	18	17.8	13	13.1	31	30.7
Total	**18,370**	**18,165**	**131**	**7.1**	**50**	**2.8**	**181**	**9.9**

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

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

(c) Stillbirth and perinatal mortality rates were calculated using all births (live births and stillbirths) as the denominator.

(d) Neonatal death rate was calculated using live births as the denominator.

(e) Stillbirths per 1,000 births.

(f) Neonatal deaths per 1,000 live births.

(g) Perinatal deaths per 1,000 births.

Note: The birth status was not adequately reported for 74 births.

5 Other cycle types, procedures and treatment complications in 2020

5.1 Surrogacy arrangements

A surrogacy arrangement is an arrangement between the intending parent(s) and a female patient, known as the 'gestational carrier' or 'surrogate'. The surrogate gestational carrier agrees to carry a child for another person or couple, known as the 'intending parent(s)', with the intention that the child will be raised by the intending parent(s). The oocytes and/or sperm used to create the embryo(s) can be either from the intending parents or from a donor(s).

There were 345 surrogacy arrangement cycles in 2020, including 238 surrogate gestational carrier cycles and 107 commissioning cycles. Commissioning cycles include a variety of cycle types involved in the provision of oocytes or embryos by either the intending parents or donors. Among the 238 surrogate gestational carrier cycles, 233 (97.9%) resulted in an embryo transfer, all of which were single embryo transfers. Of the embryo transfer cycles, 103 (44.2%) resulted in a clinical pregnancy and 91 (39.1%) resulted in a live birth (Table 36).

Table 36: Outcomes of surrogate gestational carrier cycles by number of embryos transferred, Australia and New Zealand, 2020

Outcome	SET	DET	Total
Embryo transfer cycles	233	0	233
Clinical pregnancies	103	0	103
Live births	91	0	91
Singletons	91	0	91
Multiples	0	0	0
Clinical pregnancies per embryo transfer cycle (%)	*44.2*	*..*	*44.2*
Live births per embryo transfer cycle (%)	*39.1*	*..*	*39.1*
Live births per clinical pregnancy (%)	*88.3*	*..*	*88.3*

5.2 Preimplantation genetic testing

Preimplantation genetic testing (PGT) is a procedure where DNA from oocytes or embryos is tested for chromosomal disorders or genetic diseases before embryo transfer. This term includes PGT for aneuploidies (PGT-A), PGT for monogenic/single gene defects (PGT-M) and PGT for chromosomal structural rearrangements (PGT-SR).

There were 7,714 autologous, recipient, surrogacy and lab-only cycles where PGT was performed in 2020 (Table 37), representing 8.2% of these cycles (Table 1). Of the 6,856 fresh cycles where PGT was performed in 2020, 76.3% (5,231) were freeze-all cycles, 22.8% (1,562) were fresh embryo transfer cycles where the embryo transferred did not undergo PGT (not all embryos were tested), 0.4% (30) were fresh embryo transfer cycles where the embryo transferred underwent PGT in the same cycle and 0.5% (33) of the cycles did not proceed beyond fertilisation.

Table 37: Number of autologous, recipient, surrogacy and lab-only cycles with PGT performed in that cycle, by reason for PGT, Australia and New Zealand, 2020

Indication	Fresh embryo/s	Thaw embryo/s	Lab-only cycles	Total
Aneuploidy	5,781	235	482	6,484
Single gene variation	714	41	50	802
Chromosomal structural arrangements	328	23	20	371
Other	33	1	6	40
Total	**6,856**	**300**	**558**	**7,714**

Almost half of PGT cycles were performed in women aged 35–39 years (44.1%) (Table 38). It is important to note that embryos thawed in a thaw or lab-only cycle were created in an earlier initiated fresh cycle; therefore, a woman's age at the start of a thaw or lab-only cycle is older than her age when the embryo was created.

Table 38: Number of autologous, recipient, surrogacy and lab-only cycles with PGT performed in that cycle, by female intending parent age, Australia and New Zealand, 2020

Female age group (years)[(a)]	Fresh embryo/s	Thaw embryo/s	Lab-only cycles	Total
< 30	376	20	31	427
30–34	1,562	75	131	1,768
35–39	3,038	149	204	3,391
40–44	1,820	56	142	2,018
≥ 45	60	0	33	93
Total	**6,856**	**300**	**541**	**7,697**

(a) Female age at start of cycle. Table 38 excludes cycles where there was no female intending parent.

There were 6,099 autologous, recipient and gestational carrier cycles initiated in 2020 where PGT embryos were transferred. Of these, 48.3% resulted in a clinical pregnancy and 41% resulted in a live birth (Table 39). The PGT procedure could have occurred in 2020 or previous years for thaw cycles.

Table 39: Stage/outcome of autologous, recipient and surrogacy cycles with PGT performed, by treatment type, Australia and New Zealand, 2020

Stage/Outcome of PGT-tested embryos	Fresh	Thaw	Total
Embryo transfers	30	6,069	6,099
Clinical pregnancies	10	2,934	2,944
Live births	7	2,495	2,502
Clinical pregnancies per embryo transfer cycle (%)	*33.3*	*48.3*	*48.3*
Live births per embryo transfer cycle (%)	*23.3*	*41.1*	*41.0*

Almost half (46.6%) of the embryo transfer cycles where PGT embryos were transferred were undertaken in women aged 35–39 years. The highest live birth rate per embryo transfer cycle was in women aged under 30 years (47.2%) followed by women aged 35–39 years (41.6%) (Table 40). It is important to note that embryos thawed in 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 when the embryo was created.

Table 40: Stage/outcome of autologous, recipient and surrogacy cycles with PGT performed, by female patient age, Australia and New Zealand, 2020

	Age group (in years)[(a)]					
Stage/Outcome of PGT-tested embryos	< 30	30–34	35–39	40–44	≥ 45	Total
Embryo transfers	305	1,585	2,843	1,268	98	6,099
Clinical pregnancies	156	761	1,395	600	32	2,944
Live births	144	646	1,183	507	22	2,502
Clinical pregnancies per embryo transfer cycle (%)	*51.1*	*48.0*	*49.1*	*47.3*	*32.7*	*48.3*
Live births per embryo transfer cycle (%)	*47.2*	*40.8*	*41.6*	*40.0*	*22.4*	*41.0*

(a) Age at start of treatment cycle.

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 6,061 assisted hatching cycles reported in 2020 that did not occur in an autologous or recipient cycle where PGT was performed in 2020. Of these, 5,161 (85.2%) had embryos transferred, resulting in 1,983 (32.7%) clinical pregnancies and 1,592 (26.3%) live births. There were 1,628 babies born following assisted hatching cycles, including 1,557 singletons and 68 twin babies and 3 triplet babies.

6 Donor sperm insemination cycles in 2020

Donor sperm insemination (DI) covers a range of techniques of placing sperm into the female genital tract using donated sperm from a male who is not an intending parent. The information presented in this section only describes DI cycles undertaken in ART Units in Australia and New Zealand and does not include DI undertaken outside of this setting.

Information on ART cycles using donated sperm are presented in Supplementary Tables which accompany this report.

Number and outcomes of DI cycles

In 2020, there were 3,299 DI cycles reported, which included 12.3% (405) undertaken with controlled ovarian hyperstimulation and 87.7% (2,894) undertaken in unstimulated cycles. Of all DI cycles, 15.7% resulted in a clinical pregnancy and 13% resulted in a live birth (Table 41). The multiple birth rate from births following DI cycles was 5.1%.

The average age of women who had a DI cycle was 35 years. The clinical pregnancy and live birth rates decreased with age (Table 41).

Table 41: Outcomes of DI cycles by female patient age, Australia and New Zealand, 2020

	Age group (years)[(a)]				
Stage/outcome of treatment	**< 30**	**30–34**	**35–39**	**≥ 40**	**Total**
DI cycles	532	1,035	1,258	474	3,299
Clinical pregnancies	96	198	193	30	517
Live births	86	169	157	17	429
Clinical pregnancies per DI cycle (%)	*18.0*	*19.1*	*15.3*	*6.3*	*15.7*
Live births per DI cycle (%)	*16.2*	*16.3*	*12.5*	*3.6*	*13.0*
Live births per clinical pregnancy (%)	*89.6*	*85.4*	*81.3*	*56.7*	*83.0*

(a) Age at start of a treatment cycle.

Clinical pregnancies following DI cycles

Of the 517 clinical pregnancies following DI cycles, 83% resulted in a birth and 16.1% ended in early pregnancy loss (including 14.3% miscarriages, 1.4% ectopic/heterotopic pregnancies and 0.4% reductions/termination). Of the 429 births, 407 (94.9%) were singleton births, 21 (4.9%) were twin births and 1 was a triplet birth (0.2%).

Perinatal outcomes of babies following DI cycles

There were 454 babies born to females who had DI treatment. Of these, 449 were liveborn, 3 were neonatal deaths, 1 was stillborn and there was 1 where the outcome was not known. Of the liveborn babies, 67 (14.9%) were born preterm (less than 37 weeks gestation). The mean birthweight of liveborn babies following DI treatment was 3,282 grams. This was higher than the mean birthweight of liveborn babies following autologous and recipient embryo transfer cycles (3,231 grams). Forty-six liveborn babies (10.2%) were born with low birthweight (less than 2,500 grams).

7 Trends in ART treatment and outcomes: 2016–2020

This section includes autologous cycles, donation/recipient cycles, surrogacy cycles and GIFT cycles undertaken in Australia and New Zealand from 2016 to 2020. It does not include DI cycles or lab-only cycles.

ART treatment and outcomes

In 2020, there were 95,030 initiated ART cycles in Australia and New Zealand, a 6.9% increase on 2019 (Table 42).

The proportion of initiated fresh cycles reaching embryo transfer decreased from 51% in 2016 to 42.6% in 2020 partly due to changes in clinical practice, including an increase in the proportion of freeze-all cycles. Since 2016, there has been an average 12.4% yearly increase in the number of freeze-all cycles (Table 42).

Between 2016 and 2020, the live birth rate per initiated fresh non-freeze-all cycle ranged between 15.6% and 16.1% (Table 42). The live birth rate per embryo transfer cycle marginally increased from 23.9% in 2016 to 25.5% in 2019 and 25.4% in 2020.

Table 42: Number of fresh cycles by stage/outcome of treatment, Australia and New Zealand, 2016–2020

Stage/outcome of treatment	2016	2017	2018	2019	2020
Initiated cycles[a]	49,826	50,096	50,559	53,736	56,691
Cycles with OPU[b]	43,752	43,814	45,656	47,410	50,694
Freeze-all cycles[c]	11,285	12,110	13,520	15,079	17,939
Embryo transfers	25,405	24,588	24,254	24,206	24,154
Clinical pregnancies	7,708	7,694	7,612	7,934	7,906
Live births	6,075	5,929	5,961	6,177	6,138
Clinical pregnancy per embryo transfer (%)	*30.3*	*31.3*	*31.4*	*32.8*	*32.7*
Clinical pregnancies per initiated cycle (%)	*15.5*	*15.4*	*15.1*	*14.8*	*13.9*
Live births per embryo transfer (%)	*23.9*	*24.1*	*24.6*	*25.5*	*25.4*
Live births per initiated cycle (%)	*12.2*	*11.8*	*11.8*	*11.5*	*10.8*
Live births per initiated non-freeze-all cycle (%)[d]	*15.8*	*15.6*	*16.1*	*16.0*	*15.8*

(a) Included autologous cycles, oocyte donation cycles, oocyte/embryo recipient cycles, GIFT cycles and surrogacy cycles.
(b) Cycles with OPU include cycles where no oocytes were collected during the procedure.
(c) Freeze-all cycles are fresh ART treatment cycles where all oocytes or embryos are cryopreserved for potential future use.
(d) Live births per initiated non-freeze-all *cycle* is calculated using live births as the numerator and initiated cycles minus freeze-all cycles as the denominator.

There were 37,649 initiated thaw cycles undertaken in 2020, an increase of 7% on 2019 (Table 43). The live birth rate per initiated thaw cycle increased from 27% in 2016 to 30.6% in 2020 (Table 43).

Table 43: Number of thaw cycles by stage/outcome of treatment, Australia and New Zealand, 2016–2020

Stage/outcome of treatment	2016	2017	2018	2019	2020
Initiated cycles[(a)]	31,236	32,119	33,505	35,193	37,649
Embryo transfers	29,974	31,006	32,422	34,116	36,964
Clinical pregnancies	10,561	11,166	11,902	12,734	14,248
Live births	8,440	8,953	9,514	10,133	11,532
Clinical pregnancy per embryo transfer (%)	*35.2*	*36.0*	*36.7*	*37.3*	*38.5*
Clinical pregnancies per initiated cycle (%)	*33.8*	*34.8*	*35.5*	*36.2*	*37.8*
Live births per embryo transfer (%)	*28.2*	*28.9*	*29.3*	*29.7*	*31.2*
Live births per initiated cycle (%)	*27.0*	*27.9*	*28.4*	*28.8*	*30.6*

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

The clinical pregnancy and live birth rates per OPU provide an estimate of the chances of success following a single OPU cycle. For this measure, all OPUs and fresh and thaw embryo transfers were performed in 2020 and embryo transfers were not linked to the OPU from which they originated. The calculation is the sum of clinical pregnancies or live births from fresh and thaw cycles as the numerator and the number of OPUs as denominator.

Between 2016 and 2020, the live birth rate from fresh and thaw cycles per OPU cycle increased from 33.2% to 34.9% (Table 44).

Table 44: Outcomes of fresh and thaw cycles following OPU, Australia and New Zealand, 2016–2020

Outcome of treatment	2016	2017	2018	2019	2020
Cycles with OPU[(a)]	43,752	43,814	45,656	47,410	50,694
Clinical pregnancies	18,269	18,860	19,514	20,668	22,154
Live births	14,515	14,882	15,475	16,310	17,670
Clinical pregnancies from fresh and thaw cycles per OPU cycles[(b)]	*41.8*	*43.0*	*42.7*	*43.6*	*43.7*
Live births from fresh and thaw cycles per OPU cycle[(c)]	*33.2*	*34.0*	*33.9*	*34.4*	*34.9*

(a) Cycles with OPU include cycles where no oocytes were collected during the procedure.
(b) Clinical pregnancies from fresh and thaw cycles per OPU cycle is calculated using clinical pregnancies from fresh and thaw cycles as the numerator and cycles with OPU as the denominator.
(c) Live births from fresh and thaw cycles per OPU cycle is calculated using live births from fresh and thaw cycles as the numerator and cycles with OPU as the denominator.

Multiple gestation births

The proportion of multiple births decreased from 3.8% in 2016 to 2.8% in 2020 (Table 45). The decline is primarily the result of the increasing uptake of SET (Table 48).

Table 45: Number of births following ART treatment by gestation, Australia and New Zealand, 2016–2020

Gestation	2016		2017		2018		2019		2020	
	n	%	n	%	n	%	n	%	n	%
Singleton	14,098	96.2	14,528	96.4	15,129	96.8	15,962	97.1	17,375	97.2
Multiple	554	3.8	539	3.6	505	3.2	480	2.9	502	2.8
Twin	*543*	*3.7*	*532*	*3.5*	*497*	*3.2*	*475*	*2.9*	*493*	*2.8*
Higher order multiple	*11*	*0.1*	*7*	*0.0*	*8*	*0.1*	*5*	*0.0*	*9*	*0.1*
Total[(a)]	**14,652**	**100.0**	**15,067**	**100.0**	**15,634**	**100.0**	**16,442**	**100.0**	**17,877**	**100.0**

(a) Includes cycles in which gestation was unknown.

Women's age for autologous cycles

Women aged 35 to 39 were the largest age group undertaking autologous cycles between 2016 and 2020. The average age of women having autologous cycles remained stable over the period, at 36 years. The proportion of autologous cycles in women aged 40 and older ranged between 23% and 24.5% between 2016 and 2020 (Table 46).

Table 46: Number of fresh and thaw autologous cycles by women's age group, Australia and New Zealand, 2016–2020

Age group (years)[(a)]	2016		2017		2018		2019		2020	
Mean	*36*		*36*		*36*		*36*		*36*	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
< 30	7,832	10.3	8,219	10.6	7,764	9.8	8,334	9.9	8,899	9.8
30–34	22,118	29.0	22,482	29.1	23,093	29.2	23,961	28.5	25,820	28.5
35–39	27,608	36.2	28,547	36.9	29,422	37.2	32,038	38.1	34,971	38.6
40–44	17,279	22.7	16,544	21.4	17,284	21.9	18,173	21.6	19,238	21.3
≥ 45	1,418	1.9	1,561	2.0	1,509	1.9	1,575	1.9	1,601	1.8
Total	**76,255**	**100.0**	**77,353**	**100.0**	**79,072**	**100.0**	**84,081**	**100.0**	**90,529**	**100.0**

(a) Age at start of treatment cycle.

Types of ART treatment and stage of embryo development

The proportion of embryo transfer cycles that used embryos fertilised using ICSI has decreased from 62.9% in 2016 to 56.1% in 2020. The proportion of blastocyst transfer cycles increased from 78.4% in 2016 to 89.4% in 2020 (Table 47).

Table 47: Number of embryo transfer cycles by treatment type, Australia and New Zealand, 2016–2020

Treatment type[(a)] and procedure	2016		2017		2018		2019		2020	
	n	%	n	%	n	%	n	%	n	%
Fertilisation procedure										
IVF	19,507	35.2	20,325	36.6	22,473	39.7	24,405	41.8	26,815	43.9
ICSI[(b)]	34,830	62.9	34,597	62.2	34,201	60.3	33,917	58.2	34,299	56.1
Not stated/GIFT	1,040	1.9	672	1.2	0	0.0	0	0.0	4	0.0
Total	**55,377**	**100.0**	**55,594**	**100.0**	**56,674**	**100.0**	**58,322**	**100.0**	**61,118**	**100.0**
Stage of embryo development										
Cleavage stage	11,939	21.6	10,018	18.0	7,566	13.4	6,833	11.7	6,495	10.6
Blastocyst[(c)]	43,438	78.4	45,576	82.0	49,108	86.6	51,489	88.3	54,619	89.4
Not stated/GIFT	**0**	**0.0**	**0**	**0.0**	**0**	**0.0**	**0**	**0.0**	**4**	**0.0**
Total	**55,377**	**100.0**	**55,594**	**100.0**	**56,674**	**100.0**	**58,322**	**100.0**	**61,118**	**100.0**

(a) Includes autologous cycles, oocyte/embryo recipient cycles, and surrogacy cycles.
(b) Includes cycles where both ICSI and IVF fertilised embryos were transferred.
(c) Includes cycles where both cleavage-stage embryos and blastocysts were transferred.

Types of cryopreservation and stage of embryo development

The proportion of thaw embryo transfer cycles that used vitrified embryos increased for cleavage-stage embryos and blastocysts between 2016 and 2020 (Table 48). In 2020, 96.4% of blastocyst transfers and 81% of cleavage-stage transfers used vitrified embryos.

Table 48: Number of thaw embryo transfer cycles by cryopreservation method and stage of embryo development, Australia and New Zealand, 2016–2020

Treatment type and procedure	2016		2017		2018		2019		2020	
	n	%	n	%	n	%	n	%	n	%
Cleavage stage										
Slow frozen	1,631	50.7	1,033	42.4	710	37.4	486	30.7	322	19.0
Vitrification[(a)]	1,583	49.7	1,405	57.6	1,186	62.6	1,095	69.3	1,370	81.0
Not stated	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	**3,214**	**100.0**	**2,438**	**100.0**	**1,896**	**100.0**	**1,581**	**100.0**	**1,692**	**100.0**
Blastocyst										
Slow frozen	3,266	12.2	2,440	8.5	1,801	5.9	1,478	4.5	1,265	3.6
Vitrification[(a)]	23,494	87.8	26,128	91.5	28,725	94.1	31,055	95.5	34,007	96.4
Not stated	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	**26,760**	**100.0**	**28,568**	**100.0**	**30,526**	**100.0**	**32,533**	**100.0**	**35,272**	**100.0**

(a) Includes cycles were both vitrified and slow-frozen embryos were transferred.

Number of embryos transferred per embryo transfer cycle

The proportion of SET cycles has increased from 87.7% of embryo transfer cycles in 2016 to 93% of embryo transfer cycles in 2020 (Table 49).

Table 49: Percentage of embryo transfer cycles by number of embryos transferred, Australia and New Zealand, 2016–2020

Number of embryos transferred	2016	2017	2018	2019	2020
One embryo	87.7	89.4	90.6	91.9	93.0
Two embryos	12.1	10.5	9.3	8.0	6.9
Three or more embryos	0.2	0.1	0.1	0.1	0.1

8 Women undertaking autologous treatment in 2020

This section presents the number of women who underwent autologous ART treatment in 2020. 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 46,846 women who undertook 90,529 autologous fresh and/or thaw cycles in Australia and New Zealand in 2020. Of these women, 42,349 had treatment in Australia, 4,506 in New Zealand, including 9 having treatment in both Australia and New Zealand.

On average, 1.9 fresh and/or thaw cycles per woman were undertaken in 2020, with more cycles per woman in Australia (2.0 cycles per woman) than in New Zealand (1.7 cycles per woman). In Australia, more than half (52.8%) of the women had two or more autologous treatment cycles compared with 47.8% of women in New Zealand. In line with this, 10.9% of women in Australia had four or more cycles in 2020 compared with 5.8% of women in New Zealand (Table 50).

Table 50: Women undertaking autologous fresh and/or thaw cycles by number of cycles, Australia and New Zealand, 2020

Number of cycles	Australia		New Zealand		All	
	n	%	n	%	n	%
One	19,980	47.2	2,351	52.2	22,321	47.6
Two	11,923	28.2	1,357	30.1	13,279	28.3
Three	5,842	13.8	537	11.9	6,380	13.6
Four or more	4,604	10.9	261	5.8	4,866	10.4
Total	**42,349**	**100.0**	**4,506**	**100.0**	**46,846**	**100.0**

Note: Only women who undertook cycles in 2020 are included. Nine women had treatment in both Australia and New Zealand.

Women who undertook autologous fresh cycles

There were 55,032 fresh cycles undertaken by 37,006 women in Australia and New Zealand in 2020, an average of 1.5 fresh cycles per woman. Younger women had fewer fresh cycles, with around one in four (22.9%) women aged under 30 having two or more autologous fresh cycles compared to nearly one in three (32.3%) overall. 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. One percent of women aged under 30 had four or more cycles. This proportion increased to 1.7% for women aged 30 to 34 years, 3.6% for women aged 35 to 39 years and 7.7% for women aged 40 to 44 years (Table 51).

Table 51: Women undertaking autologous fresh cycles by number of cycles, Australia and New Zealand, 2020

	Age group (years)[(a)]					
Number of cycles	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
			n			
One	3,153	8,125	9,450	3,961	353	25,042
Two	725	2,067	3,117	1,862	162	7,933
Three	161	538	1,046	898	56	2,699
Four or more	48	184	504	557	39	1,332
Total	**4,087**	**10,914**	**14,117**	**7,278**	**610**	**37,006**
			%			
One	77.1	74.4	66.9	54.4	57.9	67.7
Two	17.7	18.9	22.1	25.6	26.6	21.4
Three	3.9	4.9	7.4	12.3	9.2	7.3
Four or more	1.2	1.7	3.6	7.7	6.4	3.6
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Age at start of first autologous fresh cycle in 2020.

Women who undertook autologous thaw cycles

There were 35,497 thaw cycles undertaken by 24,220 women in Australia and New Zealand in 2020, an average of 1.5 thaw cycles per woman. Thirty-four percent of women aged under 30 had two or more thaw cycles compared with 23.7% of women aged 45 or older (Table 52).

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 (Table 51 and Table 52).

Table 52: Women undertaking autologous thaw cycles by number of cycles, Australia and New Zealand, 2020

	Age group (years)[(a)]					
Number of cycles	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
			n			
One	1,685	5,094	6,417	2,935	225	16,356
Two	570	1,774	2,136	815	54	5,349
Three	197	637	723	246	12	1,815
Four or more	101	222	283	90	4	700
Total	**2,553**	**7,727**	**9,559**	**4,086**	**295**	**24,220**
			%			
One	66.0	65.9	67.1	71.8	76.3	67.5
Two	22.3	23.0	22.3	19.9	18.3	22.1
Three	7.7	8.2	7.6	6.0	4.1	7.5
Four or more	4.0	2.9	3.0	2.2	1.4	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 2020.

9 Cycle-specific rates for women who started their first ART treatment cycle in 2018

This chapter presents information for the cohort of women who started their first ART treatment cycle between 1 January 2018 and 31 December 2018. Women in this cohort were followed from the start of their first autologous (non-freeze-all) fresh cycle through subsequent fresh and thaw cycles, excluding freeze-all cycles, until 31 December 2020 or until they achieved a live birth (a birth of at least one liveborn baby) up to and including 31 October 2021.

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 2020 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 in 2018, the cycle-specific live birth rates may change over time as more women return for treatment at a later date.

ART treatment cycles presented in Tables 51 to 56 include all initiated autologous fresh and thaw cycles, excluding freeze-all cycles. Donor sperm insemination cycles, oocyte/embryo recipient cycles, oocyte/embryo donation cycles, surrogacy arrangement cycles and GIFT cycles were also excluded. A pregnancy that ended before 20 weeks or in a stillbirth is not counted as a live birth.

In 2018, 19,591 women were identified as having their first ever fresh autologous cycle in that year. Information on whether a fresh cycle was a first or subsequent cycle was not available for 1,219 women representing 3.7% of all women having autologous fresh cycles in 2018. Of the 19,591 women identified as having their first fresh autologous cycle in 2018, 1,834 had only freeze-all cycles without subsequent embryo transfers and are therefore excluded from the cycle-specific live birth rates.

Table 51 presents the number of cycles undertaken by 17,757 women who undertook their first autologous (non-freeze-all) fresh cycle in 2018. Tables 52 to 56 present cycle-specific live birth rates and non-progression rates for these women. The rates are presented for all women (Table 52) and by women's age group at the time of their first cycle in 2018: < 30, 30–34, 35–39 and 40–44 (Tables 53 to 56). Only the first 10 cycles are presented in Tables 52 to 56 due to the small number of women (114 women and 15 live births) undertaking 11 or more treatment cycles between 1 January 2018 and 31 December 2020.

The *cycle-specific live birth* rate is calculated as the number of live births in that cycle divided by the number of women who commenced ART treatment in that cycle. 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 2020, divided by the number of women who did not have a live birth in that cycle.

Number of cycles by women's age group

Table 53 presents the number of cycles by women's age group. Seventy-seven percent of these women had between 1 and 3 cycles, and the remainder had 4 or more cycles.

Table 53: Number of cycles by women's age group for all women who started their first autologous fresh cycle (excluding freeze-all cycles[(a)]) between 1 January 2018 and 31 December 2018, Australia and New Zealand

	Age group (years)[(b)]					
Cycle number	**< 30**	**30–34**	**35–39**	**40–44**	**≥ 45**	**All**
			n			
One	1,135	2,408	2,193	953	118	6,807
Two	619	1,373	1,416	707	49	4,164
Three	337	857	952	438	36	2,620
Four	178	501	589	290	17	1,575
Five	95	329	368	183	8	983
Six	72	179	262	121	5	639
Seven	34	122	139	80	1	376
Eight	21	81	102	45	5	254
Nine	8	33	71	38	3	153
Ten or more	14	46	76	50	0	186
Total	**2,513**	**5,929**	**6,168**	**2,905**	**242**	**17,757**
			%			
One	45.2	40.6	35.6	32.8	48.8	38.3
Two	24.6	23.2	23.0	24.3	20.2	23.4
Three	13.4	14.5	15.4	15.1	14.9	14.8
Four	7.1	8.4	9.5	10.0	7.0	8.9
Five	3.8	5.5	6.0	6.3	3.3	5.5
Six	2.9	3.0	4.2	4.2	2.1	3.6
Seven	1.4	2.1	2.3	2.8	0.4	2.1
Eight	0.8	1.4	1.7	1.5	2.1	1.4
Nine	0.3	0.6	1.2	1.3	1.2	0.9
Ten or more	0.6	0.8	1.2	1.7	0.0	1.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Freeze-all cycles are fresh ART treatment cycles where all oocytes or embryos are frozen and an embryo transfer does not take place.

(b) Age at start of first autologous fresh ART treatment cycle (excluding freeze-all cycles) undertaken in 2018.

Note: Women who started their first autologous fresh non-freeze-all ART treatment cycle between 1 January 2018 and 31 December 2018 and were followed through subsequent fresh and thaw cycles, excluding freeze-all cycles, until 31 December 2020 or birth of a liveborn baby up to 31 October 2021.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 birth rates

How to interpret Tables 54 to 58

- The following tables report on women who started their first ART treatment cycle in 2018. They present the proportion of live births achieved in the first and subsequent ART cycles.
- The first cycle is always a fresh ART treatment cycle, where an OPU was performed but cycles two to ten can be either an initiated fresh or frozen/thaw cycle. Cycles where all embryos were frozen (freeze-all cycles) are not counted.
- Only cycles undertaken in 2018–2020 are counted.
- Only the first live birth by a woman is counted.
- The *cycle-specific rate* is the percentage of women who had a live birth in a specific cycle after previous failed treatment attempts. For example,17.0% of women who undertook a fifth cycle achieved a live birth in that cycle (Table 54).
- The *non-progression rate* is the percentage of women who did not return for further ART treatment cycles before 31 December 2020. For example, 25.2% of women who did not achieve a live birth by their fifth cycle did not return for a sixth cycle (Table 54).

Table 54: Cycle-specific live birth rates for all women who started their first autologous fresh cycle (excluding freeze-all cycles) between 1 January 2018 and 31 December 2018, Australia and New Zealand

Cycle number[a]	Number of women starting cycle	Number of women who had a live birth[b]	Cycle-specific live birth rate (%)[c]	Number of women who did not progress to next treatment	Non-progression rate (%)[d]
One	17,757	4,503	25.4	2,305	17.4
Two	10,950	2,403	21.9	1,760	20.6
Three	6,786	1,336	19.7	1,284	23.6
Four	4,166	720	17.3	855	24.8
Five	2,591	440	17.0	543	25.2
Six	1,608	263	16.4	376	28.0
Seven	969	137	14.1	239	28.7
Eight	593	94	15.9	160	32.1
Nine	339	40	11.8	113	37.8
Ten	186	22	11.8	50	30.5

(a) Cycle one represents a woman's first autologous (non-freeze-all) fresh ART treatment cycle between 1 January 2018 and 31 December 2018. Cycles two to ten could be either a fresh or thaw cycle (excluding freeze-all cycles) undertaken by a woman until 31 December 2020 or birth of a liveborn baby up to 31 October 2021. For freeze-all cycles, subsequent transfers are included in cycles two to ten.

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

(c) The cycle-specific live birth rate for a specific cycle is calculated as the number of live births in that specific cycle 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 2020 divided by the number of women who did not have a live birth in that cycle. Reasons that a woman did not progress to the next treatment, such as poor prognosis, spontaneous pregnancy, migration, financial, psychological and other unrelated reasons, are not collected in ANZARD.

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

Table 55: Cycle-specific live birth rates for women aged less than 30 who started their first autologous fresh cycle (excluding freeze-all cycles) between 1 January 2018 and 31 December 2018, Australia and New Zealand

Cycle number[a]	Number of women starting cycle	Number of women who had a live birth[b]	Cycle-specific live birth rate (%)[c]	Number of women who did not progress to next treatment	Non-progression rate (%)[d]
One	2,513	904	36.0	232	14.4
Two	1,378	439	31.9	179	19.1
Three	759	221	29.1	116	21.6
Four	422	103	24.4	75	23.5
Five	244	53	21.7	42	22.0
Six	149	34	22.8	38	33.0
Seven	77	18	23.4	16	27.1
Eight	43	11	25.6	10	31.3
Nine	22	3	13.6	5	26.3
Ten	14	3	21.4	1	9.1

(a) Cycle one represents a woman's first autologous (non-freeze-all) fresh ART treatment cycle between 1 January 2018 and 31 December 2018. Cycles two to ten could be either a fresh or thaw cycle (excluding freeze-all cycles) undertaken by a woman until 31 December 2020 or birth of a liveborn baby up to 31 October 2021. For freeze-all cycles, subsequent transfers are included in cycles two to ten.

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

(c) The cycle-specific live birth rate for a specific cycle is calculated as the number of live births in that specific cycle 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 2020 divided by the number of women who did not have a live birth in that cycle. Reasons that a woman did not progress to the next treatment, such as poor prognosis, spontaneous pregnancy, migration, financial, psychological and other unrelated reasons, are not collected in ANZARD.

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

Table 56: Cycle-specific live birth rates for women aged 30–34 who started their first autologous fresh cycle (excluding freeze-all cycles) between 1 January 2018 and 31 December 2018, Australia and New Zealand

Cycle number[a]	Number of women starting cycle	Number of women who had a live birth[b]	Cycle-specific live birth rate (%)[c]	Number of women who did not progress to next treatment	Non-progression rate (%)[d]
One	5,929	1,922	32.4	486	12.1
Two	3,521	978	27.8	395	15.5
Three	2,148	548	25.5	309	19.3
Four	1,291	282	21.8	219	21.7
Five	790	198	25.1	131	22.1
Six	461	90	19.5	89	24.0
Seven	282	61	21.6	61	27.6
Eight	160	40	25.0	41	34.2
Nine	79	14	17.7	19	29.2
Ten	46	6	13.0	15	37.5

(a) Cycle one represents a woman's first autologous (non-freeze-all) fresh ART treatment cycle between 1 January 2018 and 31 December 2018. Cycles two to ten could be either a fresh or thaw cycle (excluding freeze-all cycles) undertaken by a woman until 31 December 2020 or birth of a liveborn baby up to 31 October 2021. For freeze-all cycles, subsequent transfers are included in cycles two to ten.

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

(c) The cycle-specific live birth rate for a specific cycle is calculated as the number of live births in that specific cycle 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 2020 divided by the number of women who did not have a live birth in that cycle. Reasons that a woman did not progress to the next treatment, such as poor prognosis, spontaneous pregnancy, migration, financial, psychological and other unrelated reasons, are not collected in ANZARD.

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

Table 57: Cycle-specific live birth rates for women aged 35–39 who started their first autologous fresh cycle (excluding freeze-all cycles) between 1 January 2018 and 31 December 2018, Australia and New Zealand

Cycle number[(a)]	Number of women starting cycle	Number of women who had a live birth[(b)]	Cycle-specific live birth rate (%)[(c)]	Number of women who did not progress to next treatment	Non-progression rate (%)[(d)]
One	6,168	1,421	23.0	772	16.3
Two	3,975	817	20.6	599	19.0
Three	2,559	474	18.5	478	22.9
Four	1,607	278	17.3	311	23.4
Five	1,018	156	15.3	212	24.6
Six	650	115	17.7	147	27.5
Seven	388	48	12.4	91	26.8
Eight	249	36	14.5	66	31.0
Nine	147	20	13.6	51	40.2
Ten	76	12	15.8	18	28.1

(a) Cycle one represents a woman's first autologous (non-freeze-all) fresh ART treatment cycle between 1 January 2018 and 31 December 2018. Cycles two to ten could be either a fresh or thaw cycle (excluding freeze-all cycles) undertaken by a woman until 31 December 2020 or birth of a liveborn baby up to 31 October 2021. For freeze-all cycles, subsequent transfers are included in cycles two to ten.

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

(c) The cycle-specific live birth rate for a specific cycle is calculated as the number of live births in that specific cycle 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 2020 divided by the number of women who did not have a live birth in that cycle. Reasons that a woman did not progress to the next treatment, such as poor prognosis, spontaneous pregnancy, migration, financial, psychological and other unrelated reasons, are not collected in ANZARD.

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

Table 58: Cycle-specific live birth rates for women aged 40–44 who started their first autologous fresh cycle (excluding freeze-all cycles) between 1 January 2018 and 31 December 2018, Australia and New Zealand

Cycle number[(a)]	Number of women starting cycle	Number of women who had a live birth[(b)]	Cycle-specific live birth rate (%)[(c)]	Number of women who did not progress to next treatment	Non-progression rate (%)[(d)]
One	2,905	255	8.8	698	26.3
Two	1,952	168	8.6	539	30.2
Three	1,245	91	7.3	347	30.1
Four	807	55	6.8	235	31.3
Five	517	33	6.4	150	31.0
Six	334	24	7.2	97	31.3
Seven	213	10	4.7	70	34.5
Eight	133	7	5.3	38	30.2
Nine	88	3	3.4	35	41.2
Ten	50	1	2.0	16	32.7

(a) Cycle one represents a woman's first autologous (non-freeze-all) fresh ART treatment cycle between 1 January 2018 and 31 December 2018. Cycles two to ten could be either a fresh or thaw cycle (excluding freeze-all cycles) undertaken by a woman until 31 December 2020 or birth of a liveborn baby up to 31 October 2021. For freeze-all cycles, subsequent transfers are included in cycles two to ten.

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

(c) The cycle-specific live birth rate for a specific cycle is calculated as the number of live births in that specific cycle 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 2020 divided by the number of women who did not have a live birth in that cycle. Reasons that a woman did not progress to the next treatment, such as poor prognosis, spontaneous pregnancy, migration, financial, psychological and other unrelated reasons, are not collected in ANZARD.

Note: Further treatment cycles after the tenth cycle and resulting live births 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 ART Units

Australian Capital Territory

IVF Australia Canberra, Deakin (A/Prof Peter Illingworth)

COMPASS Fertility, Barton (Dr Nicole Sides)

Genea Canberra, Deakin (A/Prof Mark Bowman)

New South Wales

Adora Fertility, Sydney, Surry Hills (Dr Paul Atkinson)

City Fertility Centre – Sydney, Liverpool (Dr Devora Lieberman)

City Fertility Centre – Sydney City (Dr Devora Lieberman)

Demeter Fertility, Liverpool (Dr David Knight)

Fertility First, Hurstville (Dr Anne Clark)

Genea – Illawarra, Wollongong (A/Prof Mark Bowman)

Genea – Liverpool, Liverpool (A/Prof Mark Bowman)

Genea – Newcastle, Merewether (A/Prof Mark Bowman)

Genea – Northwest, Bella Vista (A/Prof Mark Bowman)

Genea – Orange, Orange (A/Prof Mark Bowman)

Genea – RPAH, Camperdown (A/Prof Mark Bowman)

Genea – Sydney (A/Prof Mark Bowman)

Hunter IVF (IVF Australia), New Lambton Heights (A/Prof Peter Illingworth)

IVF Australia – Eastern Sydney, Alexandria (A/Prof Peter Illingworth)

IVF Australia – North Shore, Greenwich (A/Prof Peter Illingworth)

IVF Australia – Western Sydney, Westmead (A/Prof Peter Illingworth)

Monash IVF – Bondi Junction, Bondi Junction (Dr Kim Matthews)

Monash IVF – Parramatta, Parramatta (Dr Kim Matthews)

Monash IVF – Penrith, Kingswood (Dr Kim Matthews)

Monash IVF – Sydney City (Dr Kim Matthews)

Reproductive Medicine Albury, Albury (Dr Kim Matthews)

Royal Hospital for Women – Fertility & Research Centre, Randwick (Prof William Ledger)

The Fertility Centre – Liverpool, Liverpool (A/Prof Peter Illingworth)

The Fertility Centre – Wollongong, Wollongong (A/Prof Peter Illingworth)

Westmead Fertility Centre, Westmead (Dr Howard Smith)

Northern Territory

Repromed Darwin, Tiwi (Prof Kelton Tremellen)

Queensland

Adora Fertility, Brisbane (Dr Paul Atkinson)

CARE Fertility, Greenslopes (Dr Clare Boothroyd)

CARE Fertility, Toowoomba (Dr Clare Boothroyd) – now closed

Cairns Fertility Centre, Cairns (Dr John Yovich)

City Fertility Centre – Brisbane (Dr Simone Campbell)

City Fertility Centre – Southside, Sunnybank (Dr Neil Astill)

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

Coastal IVF, Maroochydore (Dr Paul Stokes)

Fertility Solutions Sunshine Coast, Buderim (Dr James Orford)

Fertility Solutions Bundaberg, Bundaberg (Dr James Orford)

QFG Sunshine Coast (Dr David Molloy)

Life Fertility Clinic, Spring Hill (Dr Glenn Sterling)

Monash IVF Gold Coast, Southport (Dr Irving Korman)

Monash IVF Rockhampton, Rockhampton (Dr Irving Korman)

Monash IVF Townsville (Dr Irving Korman)

Monash IVF Auchenflower, Auchenflower (Dr Irving Korman)

MyIVF, North Lakes (Dr John Chenoweth) – now closed

QFG Cairns, Cairns (A/Prof Anusch Yazdani)

QFG Gold Coast, Benowa (A/Prof Anusch Yazdani)

QFG Mackay, North Mackay (A/Prof Anusch Yazdani)

QFG Toowoomba, Toowoomba (A/Prof Anusch Yazdani)

QFG Townsville, Hyde Park (A/Prof Anusch Yazdani)

QFG, Spring Hill (A/Prof Anusch Yazdani)

The Fertility Centre, Springwood (A/Prof Anusch Yazdani)

South Australia

Family Fertility Centre – Ashford (Dr Marcin Stankiewicz)

Fertility SA, Adelaide (Dr Bruno Radesic)

Flinders Fertility, Glenelg (Dr Enzo Lombardi)

Repromed, Dulwich (Prof Kelton Tremellen)

Tasmania

Fertility Tasmania, Hobart (Dr Irena Nikakis)

TasIVF Hobart, Hobart (Dr Lyndon Hale)

Victoria

Adora Fertility, Greensborough (Dr Paul Atkinson)

Ballarat IVF, Wendouree (Dr Russell Dalton)

City Fertility Centre Bundoora, Bundoora (Dr Alex Eskander)

City Fertility Centre Melbourne, Melbourne (Dr Anne Poliness)

Genea Melbourne, Melbourne (A/Prof Mark Bowman)

Melbourne IVF Mt Waverley, Mt Waverley (Dr Lyndon Hale)

Melbourne IVF, East Melbourne (Dr Lyndon Hale)

Monash IVF Bendigo, Bendigo (Prof Luk Rombauts)

Monash IVF Geelong, Geelong (Prof Luk Rombauts)

Monash IVF Mildura (Prof Luk Rombauts)

Monash IVF Sale, Sale (Prof Luk Rombauts)

Monash IVF Sunshine, St Albans (Prof Luk Rombauts)

Monash IVF Hawthorn, Hawthorn (Prof Luk Rombauts)

Monash IVF Monash Surgical Private Hospital, Clayton (Prof Luk Rombauts)

Newlife IVF, Boxhill (Dr Nicole Hope)

Number 1 Fertility, Geelong (Dr Lynn Burmeister) – now closed

Number 1 Fertility, East Melbourne (Dr Lynn Burmeister)

Reproductive Services, Parkville (Dr Lyndon Hale)

Western Australia

Adora Fertility, Perth, Craigie (Dr Paul Atkinson)

Concept Fertility Centre, Subiaco (Dr Lucy Williams)

Fertility Great Southern, Denmark (Dr Jay Natalwala) – now closed

Fertility North, Joondalup (Dr Vince Chapple)

Fertility Specialists South, Applecross (Prof Roger Hart)

Fertility Specialists WA, Claremont (Prof Roger Hart)

Genea Hollywood Fertility Centre, Hollywood (Dr Simon Turner)

PIVET Medical Centre, Leederville (Dr John Yovich)

New Zealand

Fertility Associates Auckland, Auckland (Dr Simon Kelly)

Fertility Associates Christchurch, Christchurch (Dr Sarah Wakeman)

Fertility Associates Hamilton, Hamilton (Dr VP Singh)

Fertility Associates Dunedin, Dunedin (A/Prof Wayne Gillet)

Fertility Associates Wellington, Wellington (Dr Andrew Murray)

Fertility Plus, Auckland (Professor Cindy Farquhar)

Genea Oxford Women's Health, Christchurch (Dr Robert Woolcott) – now closed

Repromed Auckland, Auckland (Dr Guy Gudex)

Appendix B: Data used in this report

The data presented in this report are supplied by 93 ART Units in Australia and New Zealand and are compiled into ANZARD 3.0. ANZARD 3.0 includes autologous treatment cycles, treatment involving donated oocytes or embryos, and treatment involving surrogacy arrangements. ANZARD 3.0 collects data on the use of ART techniques such as ICSI, oocyte/embryo freezing methods, PGT and cleavage/blastocyst transfers. In addition to ART procedures, ANZARD 3.0 also collects data on artificial insemination cycles using donated sperm (DI) from ART Units. The outcomes of pregnancies, births and babies born following ART and DI treatments are also maintained in ANZARD 3.0. This includes the method of birth, birth status, birthweight, gestational age, plurality, perinatal mortality and selected information on maternal morbidity.

Data validation

Most ART Units have computerised data information management systems and can provide NPESU with high-quality data. All data processed by NPESU undergoes a validation process, with data queries being followed up with ART Unit staff.

The Reproductive Technology Accreditation Committee (RTAC) of the Fertility Society of Australia and New Zealand (FSANZ) also plays a role in ensuring the quality of ANZARD 3.0 data. ANZARD submissions from ART Units are audited by certifying bodies according to the RTAC Code of Practice. This includes selected records against ART Unit files in their annual inspections. All ART cycles and DI undertaken in Australia and New Zealand must be reported to ANZARD as part of their accreditation by the RTAC of the FSANZ.

Data presentation

Chapters 2 to 7 of this report present information on ART and DI treatment cycles that took place in ART Units in Australia and New Zealand in 2020, and the resulting pregnancies and births. The babies included in this report were conceived following treatment cycles undertaken in 2020 and were born in either 2020 or 2021. 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 birth 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 2020.

Chapter 9 presents longitudinal information on the cohort of women who were identified as starting their first autologous (non-freeze-all) fresh ART cycle in 2018.

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 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 ART Unit 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. ART Unit staff invest great effort in validating such information by obtaining medical records from clinicians or hospitals.

Note that some contributing ART Units may have closed or changed their name since 2020. The medical director listed is based on information provided by the FSANZ at the time this report was prepared.

Appendix C: ANZARD 3.0 data items

Variable	Data domain
PATIENT AND INTENDING PARENT (S) DETAILS	
ANZARD Unit identifier	3-digit code for ART Units provided by NPESU. May consist of more than one ART Unit
ART unit identifier	3-digit code for ART Units provided by RTAC. A facility with a laboratory collecting or preparing human gametes and/or embryos for therapeutic service, possibly across a range of sites of clinical activity.
Sex (at birth) of the intending parents	1=a female-male couple 2=a single female 3=a female-female couple 4=a single male 5= a male-male couple
Unit patient ID/medical record number	ART Unit-issued unique patient identifier.
Female patient first two letters of first name	First two letters of female patient first name.
Female patient first two letters of surname	First two letters of female patient surname.
Female patient date of birth	DD/MM/YYYY.
Female patient height	Female patient height (in centimetres) at the time of treatment
Female patient weight	Female patient weight (in kilograms) at the time of treatment
Male intending parent first two letters of first name	First two letter of male intending parent's first name
Male intending parent first two letters of surname	First two letters of male intending parent's surname
Male intending parent date of birth	DD/MM/YYYY.
Non-patient female intending parent date of birth	DD/MM/YYYY.
Second male intending parent date of birth	DD/MM/YYYY.
Postcode	Postcode of patient residential area.
CYCLE DETAILS	
Cycle ID	Unique cycle identifier, allocated by the ART Unit.
Cycle date	DD/MM/YYYY Cycle date is coded by: 1. The first date where FSH/stimulation drug was administered 2. The date of last menstrual period (LMP) for unstimulated cycles (including natural fresh cycles, thaw cycles and donor insemination) 3. The date of oocyte/embryo thawing for lab-only cycles
Cycle type	1=Autologous: female-male couple, single female, female-female couple 2=Non-autologous: female-female couple 3=Non-autologous: oocyte/embryo donation 4=Non-autologous: oocyte recipient 5=Non-autologous: embryo recipient 6=Surrogacy – intending parent(s): Oocyte/embryo provision 7=Surrogacy – gestational carrier: Transfer (or thawing with the intention of transfer) of embryos to a gestational carrier 8=Lab-only cycle
Surrogacy arrangement	No – if cycle is not part of a surrogacy arrangement. Yes – if cycle is part of a surrogacy arrangement.

Variable	Data domain
Fertility preservation	1=No – cycle is not being undertaken for fertility preservation purposes 2=Yes – cycle is being undertaken for fertility preservation purposes
Reason for fertility preservation	1=Medical reason – cancer diagnosis 2=Medical reason – other 3=Non-medical reason
Period of infertility	DD/MM/YYYY The month and year that the female intending parent started trying to conceive (applies to female-male couples only)
Any pregnancies ≥ 20 weeks	No – if the female patient has had no previous pregnancy of 20 complete weeks or more Yes – if the female patient has had a pregnancy of 20 complete weeks or more by ART or by a different partner.
ART treatment being undertaken for reasons other than to treat clinical infertility	No – ART treatment being undertaken to treat clinical infertility Yes – ART treatment being undertaken for reasons other than to treat clinical infertility
Cause of infertility: tubal disease	No – in the opinion of the treating clinician or ART Unit the, cause of infertility is not due to tubal disease. Yes – in the opinion of the treating clinician or ART Unit the, cause of infertility is due to tubal disease.
Cause of infertility: endometriosis	No – in the opinion of the treating clinician or ART Unit the, cause of infertility is not due to endometriosis. Yes – in the opinion of the treating clinician or ART Unit the, cause of infertility is due to endometriosis.
Cause of infertility: other female factors	No – in the opinion of the treating clinician or ART Unit the, cause of infertility is not due to other female factors. Yes – in the opinion of the treating clinician or ART Unit the, cause of infertility is due to other female factors.
Polycystic ovarian syndrome	1=No – the treating clinician or ART Unit does not consider that the female intending parent has PCOS 2=Yes – the treating clinician or ART Unit considers that the female intending parent has PCOS, regardless of whether it is contributing to infertility 3=Unknown – the treating clinician or ART Unit has not assessed the female intending parent for PCOS
Cause of infertility: male factor	No – in the opinion of the treating clinician or ART Unit the, cause of infertility is not due to male factors. Yes – in the opinion of the treating clinician or ART Unit the, cause of infertility is due to male factors.
Primary cause of male factor infertility diagnosis	1=Idiopathic 2=Genetic – Klinefelter 3=Genetic – Y deletion 4=Genetic – other aneuploidies, single gene 5=Testis damage – cancer treatment 6=Testis damage – other 7=Gonadotrophin deficiency 8=Vasectomy 9=Congenital absence of the vas deferens/cystic fibrosis 10=Obstructive disorder (other) 11=Erectile dysfunction 12=Ejaculatory disorders
Cause of infertility: unexplained	No – in the opinion of the treating clinician or ART Unit, the cause of infertility is not unexplained in the intending parents Yes – in the opinion of the treating clinician or ART Unit, the cause of infertility is unexplained in the intending parents.
Ovarian stimulation via follicle stimulating hormone (FSH)	No – FSH was not administered Yes – FSH administered. Does not include clomiphene or hCG alone unless FSH was also given.

Variable	Data domain
First ever FSH stimulated cycle for OPU	No – not the patient's first ever FSH stimulated cycle Yes – the current cycle is the patient's first ever FSH stimulated cycle with the intention of OPU.
Date of cancellation for cancelled OPU	Date of the last day FSH is administered in a cancelled cycle. DD/MM/YYYY.
OPU date	Date of oocyte pickup. DD/MM/YYYY.
Number of eggs retrieved	Number of eggs retrieved at OPU.
In-vitro maturation (IVM)	Whether IVM took place during the treatment cycle 1=No 2=Yes
Source of sperm	1=a male intending parent 2=a sperm donor outside of the intending parents
Site of sperm used	Site of sperm extraction: ejaculated, epididymal (whether by open biopsy or by PESA), testicular or other.
Sperm quality	The concentration of sperm
DONATION AND RECIPIENT DETAILS	
Age of oocyte/embryo donor	Completed age at time of OPU.
Number of fresh eggs donated	Number of fresh eggs donated to someone else.
Number of fresh eggs received	Number of fresh eggs received from someone else.
Number of fresh embryos donated	Records the number of fresh embryos donated to another patient/couple
Number of fresh embryos received	Records the number of fresh embryos that a patient/couple received from another patient/couple.
OOCYTE CRYOPRESERVATION DETAILS	
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.
Initial cryopreservation date of thawed/warmed oocytes	DD/MM/YYYY.
FERTILISATION DETAILS	
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.
Number of eggs fertilised normally	Number of eggs fertilised normally.
Intrauterine insemination date	Date of intrauterine insemination procedure (using donated sperm only) DD/MM/YYYY.
Assisted hatching	No – assisted hatching not performed. Yes – where assisted hatching in any form has been performed on any of the embryos (transferred or not).
PRE-IMPLANTATION GENETIC TESTING	
Number of embryos biopsied for invasive PGT	Number of embryos biopsied for invasive PGT
Number of embryos biopsied for non-invasive PGT	Number of embryos biopsied for non-invasive PGT
Number of invasive PGT embryos transferred	Number of invasive PGT embryos transferred
Number of non-invasive PGT embryos transferred	Number of non-invasive PGT embryos transferred

Variable	Data domain
Number of embryos thawed that had invasive PGT performed in a previous cycle	Number of embryos thawed that had invasive PGT performed in a previous cycle
Number of embryos thawed that had non-invasive PGT performed in a previous cycle	Number of embryos thawed that had non-invasive PGT performed in a previous cycle
Primary reason for PGT	1=Aneuploidy screening 2=Single gene variation 3=Chromosomal structural rearrangements (e.g. translocations) 4=Other
EMBRYO CRYOPRESERVATION DETAILS	
Number of cleavage-stage embryos slow frozen	Number of cleavage-stage embryos frozen by slow freezing method in this cycle.
Number of cleavage-stage embryos vitrified	Number of cleavage-stage 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 slow frozen cleavage embryos thawed	Number of slow frozen cleavage embryos thawed for use in the cycle
Number of vitrified cleavage embryos warmed	Number of vitrified cleavage embryos warmed for use in the cycle
Number of slow frozen blastocysts thawed	Number of slow frozen blastocysts thawed for use in the cycle
Number of vitrified blastocysts warmed	Number of vitrified blastocyst embryos for use in the cycle
Freezing date of thawed/warmed embryos	Initial cryopreservation date of thawed/warmed embryos.
EMBRYO TRANSFER DETAILS	
Embryo transfer date	DD//MM/YYYY Data embryo transfer occurred.
Number of cleavage-stage embryos transferred	Number of cleavage-stage embryos transferred.
Number of blastocysts transferred	Number of blastocyst stage embryos transferred.
Transferred embryos fertilised via ICSI	No – no transferred embryos were fertilised by ICSI. Yes – any embryos transferred were fertilised by ICSI.
PREGNANCY DETAILS	
Clinical pregnancy	A pregnancy that fulfils at least 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 birth, 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–Neither ectopic nor heterotopic e–Ectopic h–Heterotopic
Elective termination of pregnancy	No–pregnancy not terminated. Yes–pregnancy is terminated.
Selective reduction performed	No–If no selective reduction has been performed.

Variable	Data domain
	Yes–If selective reduction has been performed due to fetal abnormality/other reasons.
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.
BIRTH DETAILS	
Number of babies born	Include all liveborn and stillborn babies after 20 weeks gestation or at least 400 grams birthweight.
Caesarean birth	No–other. Yes–birth by planned or emergency caesarean section.
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.
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.
TREATMENT COMPLICATIONS	
Admitted with ART morbidity	No – patient was not admitted to hospital with any 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.
Ovarian hyperstimulation syndrome (OHSS)	No – OHSS did not occur Yes – OHSS occurred
Morbidity information and detail	Describes any information related to the female patient's hospital admission or cause of morbidity
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.

ART Unit: a facility with a laboratory collecting or preparing human gametes and/or embryos for therapeutic service, possibly across a range of sites of clinical activity. Where the collection of gametes/embryos takes place at a different site to the preparation, the two sites are considered to be a single ART Unit.

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.

Birth: a birth event in which one or more babies of 20 weeks or more gestation or of 400 grams or more birthweight is born, either liveborn or stillborn.

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

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

Cleavage-stage embryo: an embryo comprising about eight cells usually developed two to four 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 reveals 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.

Cycle: when a medical procedure is attempted or takes place, or when certain laboratory procedures are undertaken. This is further broken down to specific terms, 'treatment cycles' and 'lab-only cycles.' Please refer to the glossary for definitions of these specific terms.

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.

Freeze-all (freeze-only) cycle: a fresh cycle where all oocytes or embryos that are potentially suitable for transfer are cryopreserved for potential future use.

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.

Lab-only cycle: involves a laboratory procedure with no planned patient involvement and includes the following scenarios:

- receipt of donor oocytes with the intention of fertilisation and freezing of all resulting embryos
- attempted/actual oocyte thaw with intention of fertilisation and freezing of all resulting embryos
- PGT cycles where embryos are thawed and refrozen with no intention of embryo transfer in the reported cycle.

Live birth: according to the World Health Organization (WHO) definition, a live birth is defined as "the complete expulsion or extraction from the mother of a baby, irrespective of the duration of the pregnancy, which, 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" (AIHW 2022). 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 births are counted as birth

events, e.g. the birth of one or more liveborn infants. For example, where a multiple birth (twins, triplets) results in a liveborn and a stillborn baby, this is still considered one live birth.

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

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

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.

PGT (preimplantation genetic testing): a procedure where DNA from oocytes or embryos is tested for chromosomal disorders or genetic diseases before embryo transfer. This term includes PGT for aneuploidies (PGT-A); PGT for monogenic/single gene defects (PGT-M); and PGT for chromosomal structural rearrangements (PGT-SR).

Perinatal death: a 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.

Singleton: refers to the birth of only one child during a single birth event.

Stillbirth: the birth of an infant after 20 or more weeks gestation or 400 grams or more birthweight that shows no signs of life.

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

Treatment cycle: involves an attempted/actual medical procedure being carried out on a female patient and includes the following scenarios:

- ovarian stimulation with the intention of oocyte collection in autologous or donation cycle
- attempted/actual oocyte collection, whether in a stimulated or unstimulated, autologous or donation cycle
- attempted/actual oocyte thaw with the intention of fertilisation and embryo transfer
- attempted/actual embryo thaw with the intention of embryo transfer
- insemination of donated sperm as part of an intrauterine insemination (IUI) cycle.

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 Infertility and Fertility Care glossary for the terms used in ART data collections (Zegers-Hochschild et al. 2017). However, the terminology used in this report may differ from that in the ICMART glossary.

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List of Figures

List of Tables

There were **95,699** ART treatment cycles reported from Australian and New Zealand fertility clinics in 2020, resulting in **18,257** liveborn babies.