Advisory Committee on Assisted Reproductive Technology

Assisted Reproductive Technology in New Zealand 2015

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Foreword

On behalf of the Advisory Committee on Assisted Reproductive Technology (ACART), I am pleased to present this report, *Assisted Reproductive Technology in New Zealand 2015*, the seventh New Zealand-specific report based on the Australian and New Zealand Assisted Reproduction Database (ANZARD).

The report provides a quantitative summary of the numbers, types and outcomes of assisted reproductive technology (ART) in New Zealand. New Zealand has good data about some uses of assisted reproduction, but the report gives a fuller picture of the situation in this country.

One of ACART's functions is to monitor the application and health outcomes of ARTs. The Ethics Committee on Assisted Reproductive Technology provides an annual report that includes data about procedures that require ethical approval. District health boards hold information about publicly funded procedures. However, New Zealand lacks one collated source of comprehensive data looking at the full spectrum of procedures carried out, regardless of how they are funded or categorised in New Zealand's regulatory framework.

The well-established ANZARD report in most cases aggregates data from Australia and New Zealand. This means that the report, while valuable and comprehensive, lacks New Zealand-specific detail. There are significant variations in the regulatory frameworks and funding arrangements for ART in each country, and in patterns of usage. For these reasons, ACART decided in 2010 to commission New Zealand-specific reports from the ANZARD data.

We hope that the report will be useful to consumers, fertility services providers and others with an interest in how New Zealanders are using ART. With successive annual reports, we have begun to build a picture of use and trends over time.

I acknowledge the Ministry of Health for supporting ACART to obtain this report. I would also like to thank the National Perinatal Epidemiology and Statistics Unit at the University of New South Wales for collaborating with ACART to develop the report.

Dr Kathleen Logan
Acting Chair, Advisory Committee on Assisted Reproductive Technology
October 2018

Acknowledgements

The Australian and New Zealand Assisted Reproduction Database (ANZARD), funded by the Fertility Society of Australia (FSA), is a collaborative effort between the National Perinatal Epidemiology and Statistics Unit (NPESU) and fertility centres 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 (UNSW Sydney).

We would like to thank all staff in the fertility centres for their efforts in compiling the data and providing additional information when requested. A complete list of all contributing fertility clinics can be found in Appendix A.

Abbreviations

ANZARD	Australian and New Zealand Assisted Reproduction Database
ACART	Advisory Committee on Assisted Reproductive Technology
ART	assisted reproductive technology
DET	double embryo transfer
DI	donor insemination
FSA	Fertility Society of Australia
FSH	follicle stimulating hormone
GIFT	gamete intrafallopian transfer
ICMART	International Committee Monitoring Assisted Reproductive Technologies
ICSI	intracytoplasmic sperm injection
IVF	in-vitro fertilisation
NPESU	National Perinatal Epidemiology and Statistics Unit
OPU	oocyte pick-up
PGD	preimplantation genetic diagnosis
PGS	preimplantation genetic screening
PGT	preimplantation genetic testing
SET	single embryo transfer
UNSW Sydney	University of New South Wales

Symbols

–	not applicable

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Summary

Use of ART treatment cycles

There were 6,242 assisted reproductive technology (ART) treatment cycles reported from New Zealand in 2015. This represented 6.5 cycles per 1,000 women of reproductive age (15–44 years) in New Zealand. Women used their own oocytes/embryos in 92.3% of treatments (autologous), and 39.9% of autologous cycles used frozen/thawed embryos.

Treatment outcomes and number of babies

Of all the ART treatments in 2015, 28.3% (1,766) resulted in a clinical pregnancy, 22.6% (1,408) resulted in a delivery and 22.4% (1,401) in a live delivery. There were 1,438 live-born babies, 84.2% (1,211) were singletons at term (gestational age of 37– 41 weeks) with normal birthweight (≥2,500 grams).

Women's age and parity

The average age of women undertaking autologous and oocyte/embryo recipient cycles was 35.5 years. For women undergoing oocyte/embryo recipient cycles, the mean age was 40.0 years, five years older than for autologous cycles (35.2 years). Of all autologous and oocyte/embryo recipient cycles, one in five (21.3%) was undertaken by women aged 40 years or older. Of autologous cycles (fresh and thaw), 72.0% were undertaken by nulliparous women compared with 78.0% for oocyte/embryo recipient cycles.

Autologous fresh cycles

The overall live delivery rate per autologous fresh embryo transfer cycle was 29.8%. The highest live delivery rate per autologous fresh embryo transfer cycle was in women aged less than 30 years (41.4%). This delivery rate declined with advancing women's age. Overall, 89.6% of autologous fresh embryo transfer cycles were single embryo transfer (SET) cycles, 10.1% were double embryo transfer (DET) cycles, and 0.3% had three or more embryos transferred. The rates of clinical pregnancy and live delivery were higher in blastocyst transfer cycles than in cleavage stage embryo transfer cycles, regardless of a woman's age.

Autologous thaw cycles

The overall live delivery rate per autologous thaw embryo transfer cycle was 27.2%. The highest live delivery rate per embryo transfer cycle was in women aged less than 30 years (30.2%). The live delivery rate declined with advancing women's age. Of the 2,240 frozen/thawed embryo transfer cycles, 97.3% were SET cycles and 2.6% were DET cycles. The rates of clinical pregnancy and live delivery were higher in blastocyst transfer cycles than in cleavage stage embryo transfer cycles for women aged under 40 years.

Deliveries by gestation and women's age

Of the 1,397 deliveries following autologous and recipient cycles in 2015, 2.7% were multiple gestation deliveries. The proportion of multiple gestation deliveries was similar across age groups.

Cumulative live birth rates

ANZARD includes data items that make it possible to follow a woman from her first fresh ART treatment cycle through subsequent fresh and thaw cycles. There were 1,549 women identified as having their first fresh autologous cycle in 2013. These women were followed through their subsequent fresh and thaw cycles until 31 December 2015 or until they achieved a live delivery (up to and including 31 October 2016). For women identified in this cohort, the cumulative live delivery rate was 26.2% after the first cycle, increasing to 39.8% after two cycles, 46.5% after three cycles, 50.2% after four cycles and 51.5% after five cycles.

1 Introduction

It is estimated that around 15% of couples at any given time experience infertility, representing the source of much personal suffering to millions around the world (WHO 2010). The common medical definition of 'infertility' is the failure to achieve a clinical pregnancy after 12 or more months of regular unprotected sexual intercourse (Zegers-Hochschild et al 2009). Infertility is increasingly being overcome through advancements in fertility treatment, in particular assisted reproductive technologies (ARTs). ARTs have evolved over the last three decades into a suite of mainstream medical interventions that have resulted in the birth of more than 6 million children worldwide (ESHRE 2015).

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

The Fertility Society of Australia (FSA), in collaboration with the University of New South Wales (UNSW Sydney), is committed to providing informative annual statistics on ART treatments and is pleased to present the annual report on the use of ART in New Zealand in 2015.

1.1 Treatments covered in this report

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

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

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

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

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

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

1.2 Data used in this report

This report provides information on ART and DI treatments and the resulting pregnancy and birth outcomes. The data presented in this report were supplied by the four fertility organisations available in New Zealand (see Appendix A) and compiled into ANZARD.

As a joint initiative of the National Perinatal Epidemiology and Statistics Unit (NPESU) and FSA, the Australian and New Zealand Assisted Reproduction Database (ANZARD) was upgraded in 2009 to accommodate new ART treatment types and to transform ANZARD from a cycle-based data collection to a woman-based data collection (ANZARD 2.0). A more detailed description of ANZARD 2.0 can be found in Appendix B.

1.3 Structure of this report

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

- Chapter 2: Overview of ART treatment in 2015 outlines the numbers and outcomes of all ART treatments undertaken in New Zealand.
- Chapter 3: Autologous and donation/recipient cycles in 2015 presents data on women undergoing treatment, cycle types and the outcomes of treatment.
- Chapter 4: Pregnancy and birth outcomes following autologous and recipient cycles in 2015 presents data on the outcomes of clinical pregnancies and deliveries following autologous and recipient cycles, including a description of perinatal outcomes.
- Chapter 5: Preimplantation genetic diagnosis in 2015 includes information on the number of embryos that had cells removed and analysed for chromosomal disorders or genetic diseases before transfer.
- Chapter 6: Donor sperm insemination cycles in 2015 presents data on DI cycles and their outcomes, including a description of pregnancy and perinatal outcomes.
- Chapter 7: Trends in ART treatment and outcomes 2011–2015, presents trends in ART treatment over the last five years of data collection in New Zealand.
- Chapter 8: Cumulative success rates for women undertaking autologous treatment 2013–2015 presents information on all women who started their first autologous fresh ART treatment cycle between 1 January and 31 December 2013.

There are also two appendices: Appendix A lists the contributing fertility clinics involved in this research; while Appendix B provides an overview of the ANZARD 2.0 data collection that was used to prepare this report.

2 Overview of ART treatment in 2015

There were 6,242 assisted reproductive technology (ART) treatment cycles reported from New Zealand clinics in 2015. This represented 6.5 cycles per 1,000 women of reproductive age (15–44 years) in New Zealand (Stats NZ 2015). Of these treatment cycles, 5,759 (92.3%) were autologous cycles (where a woman intended to or did use her own oocytes or embryos). Of these autologous cycles, 3,461 (55.5%) were fresh cycles, and 2,298 (36.8%) were thaw cycles.

The remaining treatment comprised: 4.1% oocyte recipient cycles, 0.3% embryo recipient cycles, 2.7% oocyte donation cycles and 0.7% surrogacy cycles.

Of all the ART treatments taking place in 2015, 28.3% (1,766) resulted in a clinical pregnancy, 22.6% (1,408) resulted in a delivery and 22.4% (1,401) in a live delivery. There were 1,438 live-born babies, and 84.2% (1,211) were singletons at term (gestational age of 37–41 weeks) with normal birthweight (≥2,500 grams).

Table 1: Number of initiated ART treatment cycles by treatment type, New Zealand, 2015

Treatment type	Number of initiated ART cycles	Percent of treatment types	Number of clinical pregnancies	Number of live deliveries	Number of live-born babies	Number of live-born singletons at term with normal birthweight
Autologous	5,759	92.3	1,643	1,293	1,326	1,122
Fresh	*3,461*	*55.5*	*859*	*684*	*702*	*592*
Thaw	*2,298*	*36.8*	*784*	*609*	*624*	*530*
Oocyte recipient	256	4.1	103	90	92	75
Embryo recipient	17	0.3	7	7	8	6
Oocyte donation	167	2.7	0	0	0	0
Surrogacy arrangement cycles	43	0.7	13	11	12	8
Commissioning cycles	*15*	*0.2*	*0*	*0*	*0*	*0*
Gestational carrier cycles	*28*	*0.5*	*13*	*11*	*12*	*8*
Total	**6,242**	**100.0**	**1,766**	**1,401**	**1,438**	**1,211**

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

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

Note: Percentages may not total to 100 due to rounding.

3 Autologous and donation/recipient cycles in 2015

This chapter presents data on initiated autologous cycles, oocyte donation cycles and oocyte/embryo recipient cycles.

An 'autologous cycle' is defined as an ART treatment cycle in which a woman intends to or does use her own oocytes.

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

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

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

3.1 Overview of autologous and recipient cycles

Age of women and their partners

The average age of women undertaking autologous and oocyte/embryo recipient cycles was 35.5 years in 2015. For women undergoing oocyte/embryo recipient cycles, the mean age was 40.0 years – five years older than for autologous cycles (35.2 years). Of all autologous and oocyte/embryo recipient cycles, one in five (21.3%) was undertaken by women aged 40 years or older (Table 2). The average age of partners was 38.2 years, with over one-third (36.0%) aged 40 years or older (Table 3).

Table 2: Number of autologous and recipient cycles by women's age group and treatment type, New Zealand, 2015

Age group (years)[(a)]	Autologous							
	Fresh		Thaw		Oocyte/embryo recipient		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
< 30	370	10.7	248	10.8	7	2.6	625	10.4
30–34	1,054	30.5	749	32.6	34	12.5	1,837	30.5
35–39	1,331	38.5	902	39.3	55	20.1	2,288	37.9
40–44	681	19.7	389	16.9	134	49.1	1,204	20.0
≥ 45	25	0.7	10	0.4	43	15.8	78	1.3
Total	**3,461**	**100.0**	**2,298**	**100.0**	**273**	**100.0**	**6,032**	**100.0**

(a) Age at start of treatment cycle.

Notes: Data are collected for each treatment cycle. Therefore, some individuals may be counted more than once.
Percentages may not total to 100 due to rounding.

Table 3: Number of autologous and recipient cycles by partners' age group and treatment type, New Zealand, 2015

Age group (years)[(a)]	Autologous							
	Fresh		Thaw		Oocyte/embryo recipient		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
< 30	220	6.4	132	5.7	4	1.5	356	5.9
30–34	807	23.3	536	23.3	35	12.8	1,378	22.8
35–39	997	28.8	751	32.7	73	26.7	1,821	30.2
40–44	771	22.3	524	22.8	89	32.6	1,384	22.9
≥ 45	470	13.6	258	11.2	58	21.2	786	13.0
Not stated	196	5.7	97	4.2	14	5.1	307	5.1
Total	**3,461**	**100.0**	**2,298**	**100.0**	**273**	**100.0**	**6,032**	**100.0**

(a) Age at start of treatment cycle.

Notes: Data are collected for each treatment cycle. Therefore, some individuals may be counted more than once.
Percentages may not total to 100 due to rounding.

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 autologous cycles (fresh and thaw), 72.0% were undertaken by nulliparous women compared with 78.0% for oocyte/embryo recipient cycles (Table 4).

Table 4: Number of autologous and recipient cycles by parity and treatment type, New Zealand, 2015

Parity	Autologous							
	Fresh		Thaw		Oocyte/embryo recipient		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Nulliparous	2,687	77.6	1,458	63.4	213	78.0	4,358	72.2
Parous	773	22.3	837	36.4	60	22.0	1,670	27.7
Not stated	1	0.0	3	0.1	0	0.0	4	0.1
Total	**3,461**	**100.0**	**2,298**	**100.0**	**273**	**100.0**	**6,032**	**100.0**

Notes: Data are collected for each treatment cycle. Therefore, some individuals may be counted more than once.
Percentages may not total to 100 due to rounding.

Intracytoplasmic sperm injection procedures

Of the 3,114 autologous fresh cycles where fertilisation was attempted, 1,947 (62.6%) used ICSI procedures and 1,165 (37.4%) used IVF procedures.

Table 5: Number of autologous and recipient cycles with fertilisation attempted by treatment type and procedure, New Zealand, 2015

	Autologous				Oocyte/embryo recipient			
	Fresh[a]		Thaw[b]		Fresh[a]		Thaw[b]	
Procedure	Number	Percent	Number	Percent	Number	Percent	Number	Percent
IVF	1,165	37.4	29	49.2	24	40.7	0	0.0
ICSI[c]	1,949	62.6	30	50.8	35	59.3	2	100.0
Not stated	0	0.0	0	0.0	0	0.0	0	0.0
Total	**3,114**	**100.0**	**59**	**100.0**	**59**	**100.0**	**2**	**100.0**

(a) Fresh cycles where fertilisation was attempted.

(b) Thaw cycles where embryos were transferred.

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

Number of embryos transferred

Of the 4,797 fresh and thawed autologous embryo transfer cycles, more than nine out of ten (93.6%) were single embryo transfer (SET) cycles and 6.2% were double embryo transfer (DET) cycles. In women under 35 years of age, 98.7% were SET cycles and 1.3% were DET cycles. In women aged 35 years or older, 90.5% of cycles were SET cycles and 9.3% were DET cycles (Table 6).

Table 6: Number of embryo transfer cycles by number of embryos transferred per cycle and women's age group, New Zealand, 2015

Age group (years)[a]	Number of embryos transferred							
	One		Two		Three or more		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<30	446	98.7	6	1.3	0	0.0	452	100.0
30–34	1,452	98.2	27	1.8	0	0.0	1.479	100.0
35–39	1,712	93.9	110	6.0	2	0.1	1,824	100.0
40–44	825	84.3	151	15.4	3	0.3	979	100.0
≥ 45	56	88.9	5	7.9	2	3.2	63	100.0
Total	**4,491**	**93.6**	**299**	**6.2**	**7**	**0.1**	**4,797**	**100.0**

(a) Age at start of a treatment cycle.

Stage of embryo development

Of the 4,797 embryo transfer cycles, 74.3% involved the transfer of day five to six embryos (blastocysts) with the remainder day two to three embryos (cleavage stage embryos). Of

autologous cycles, blastocyst transfers made up 94.0% of thaw cycles compared with 53.8% of fresh cycles (Table 7).

Table 7: Number of embryo transfer cycles by treatment type and stage of embryo development, New Zealand, 2015

Type and procedure	Autologous				Oocyte/embryo recipient			
	Fresh		Thaw		Fresh		Thaw	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Cleavage stage	1,062	46.2	134	6.0	17	34.0	21	10.1
Blastocyst	1,237	53.8	2,106	94.0	33	66.0	187	89.9
Total	**2,299**	**100.0**	**2,240**	**100.0**	**50**	**100.0**	**208**	**100.0**

Transfer of cryopreserved embryos

Embryos created in a fresh cycle can be cryopreserved by either slow freezing or ultra-rapid cryopreservation (vitrification) methods. Slow-frozen and vitrified embryos can be thawed/warmed and then transferred in subsequent cycles. Of the 2,448 frozen/thawed embryo transfer cycles conducted in 2015, over half (52.5%) involved the transfer of slow frozen embryos.

Table 8: Number of embryo transfer cycles by freezing method and stage of embryo development, New Zealand, 2015

Type and procedure	Autologous				Oocyte/embryo recipient			
	Cleavage embryo		Blastocyst		Cleavage embryo		Blastocyst	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Slow frozen embryo	126	94.0	1,058	50.2	18	85.7	83	44.4
Vitrified embryo[(a)]	8	6.0	1,048	49.8	3	14.3	104	55.6
Total	**134**	**100.0**	**2,106**	**100.0**	**21**	**100.0**	**187**	**100.0**

(a) Ultra-rapid cryopreservation.

3.2 Autologous fresh cycles

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

In 2015, the overall live delivery rate per autologous fresh embryo transfer cycle was 29.8%. The highest live delivery rate per embryo transfer cycle was in women aged less than 30 years (41.4%). The rate declined steadily with advancing women's age (Table 9).

Table 9: Outcomes of autologous fresh cycles by women's age group, New Zealand, 2015

Stage/outcome of treatment	Age group (years)[a]					
	< 30	30–34	35–39	40–44	≥ 45	All
Initiated cycles	370	1,054	1,331	681	25	3,461
Freeze-all cycles	100	198	193	50	1	542
Cycles with OPU	336	1,007	1,238	623	22	3,226
Embryo transfers	203	713	892	477	14	2,299
Clinical pregnancies	94	308	344	111	2	859
Live deliveries	84	260	278	62	0.0	684
Live deliveries per initiated cycle (%)	*22.7*	*24.7*	*20.9*	*9.1*	*0.0*	*19.8*
Live deliveries per initiated non-freeze-all cycle (%)	*31.1*	*30.4*	*24.4*	*9.8*	*0.0*	*23.4*
Live deliveries per embryo transfer cycle (%)	*41.4*	*36.5*	*31.2*	*13.0*	*0.0*	*29.8*
Live deliveries per clinical pregnancy (%)	*89.4*	*84.4*	*80.8*	*55.9*	*0.0*	*79.6*

(a) Age at start of a treatment cycle.

Clinical pregnancies and live deliveries by number of embryos transferred from autologous fresh cycles

Overall, 89.6% of autologous fresh embryo transfer cycles were SET cycles, 10.1% were DET cycles and 0.3% had three or more embryos transferred. Three or more embryos were transferred in seven cycles. Overall, the live delivery rate per embryo transfer cycle was 30.8% for SET cycles and 21.1% for DET cycles (Table 10).

Table 10: Outcomes of autologous fresh embryo transfer cycles by women's age and number of embryos transferred, New Zealand, 2015

Stage/outcome of treatment	Age group (years)[a]							
	<35		35–39		≥ 40		All	
	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]
Embryo transfer cycles	894	22	812	78	354	132	2,060	232
Clinical pregnancies	393	9	312	32	80	32	785	73
Live deliveries	335	9	252	26	47	14	634	49
Clinical pregnancies per embryo transfer cycle (%)	*44.0*	*40.9*	*38.4*	*41.0*	*22.6*	*24.2*	*38.1*	*31.5*
Live deliveries per embryo transfer cycle (%)	*37.5*	*40.9*	*31.0*	*33.3*	*13.3*	*10.6*	*30.8*	*21.1*

(a) Age at start of a treatment cycle.

(b) SET: single embryo transfer.

(c) DET: double embryo transfer.

Note: Of embryo transfer cycles in women aged 40 years and over, five cycles involved the transfer of three or more embryos resulting in one clinical pregnancy and one live delivery.

Clinical pregnancies and live deliveries by stage of embryo development from autologous fresh cycles

The rates of clinical pregnancy and live delivery were higher in blastocyst transfer cycles than in cleavage stage embryo transfer cycles regardless of a woman's age (Table 11). Overall the live delivery rate for blastocyst transfer cycles (36.8%) was 15 percentage points higher than for cleavage stage embryo transfer cycles (21.6%).

Table 11: Outcomes of autologous fresh embryo transfer cycles by women's age and stage of embryo development, New Zealand, 2015

Stage/outcome of treatment	Age group (years)[a]							
	<35		35–39		≥ 40		All	
	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]
Embryo transfer cycles	352	564	427	465	283	208	1,062	1,237
Clinical pregnancies	122	280	127	217	47	66	296	563
Live deliveries	107	237	98	180	24	38	229	455
Clinical pregnancies per embryo transfer cycle (%)	*34.7*	*49.6*	*29.7*	*46.7*	*16.6*	*31.7*	*27.9*	*45.5*
Live deliveries per embryo transfer cycle (%)	*30.4*	*42.0*	*23.0*	*38.7*	*8.5*	*18.3*	*21.6*	*36.8*

(a) Age at start of a treatment cycle.

(b) CL: cleavage stage embryo.

(c) BL: blastocyst.

3.3 Autologous thaw cycles

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

The overall live delivery rate per autologous thaw embryo transfer cycle was 27.2%. The highest live delivery rate per embryo transfer cycle was in women aged less than 30 years (30.2%) and declined significantly after 40 years (Table 12). It is important to note that embryos thawed during a thaw cycle were created during an earlier initiated fresh cycle, therefore a women's age at the start of a thaw cycle is older than her age at the start of the initiated fresh cycle.

Table 12: Outcomes of autologous thaw cycles by women's age group, New Zealand, 2015

Stage/outcome of treatment	Age group (years)[a]					
	< 30	30–34	35–39	40–44	≥ 45	All
Initiated cycles	248	749	902	389	10	2,298
Embryo transfers	242	732	881	375	10	2,240
Clinical pregnancies	88	275	323	96	2	784
Live deliveries	73	212	264	59	1	609
Live deliveries per initiated cycle (%)	*29.4*	*28.3*	*29.3*	*15.2*	*10.0*	*26.5*
Live deliveries per embryo transfer cycle (%)	*30.2*	*29.0*	*30.0*	*15.7*	*10.0*	*27.2*
Live deliveries per clinical pregnancy (%)	*83.0*	*77.1*	*81.7*	*61.5*	*50.0*	*77.7*

(a) Age at start of a treatment cycle.

Clinical pregnancies and live deliveries by number of embryos transferred from autologous thaw cycles

Overall, of the 2,240 frozen/thawed embryo transfer cycles in 2015, 97.3% were SET cycles and 2.6% were DET cycles (Table 13).

Table 13: Outcomes of autologous thaw embryo transfer cycles by women's age and number of embryos transferred, New Zealand, 2015

Stage/outcome of treatment	Age group (years)[a]							
	<35		35–39		≥ 40		All	
	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]
Embryo transfer cycles	964	10	850	31	367	18	2,181	59
Clinical pregnancies	358	5	310	13	92	6	760	24
Live deliveries	281	4	251	13	56	4	588	21
Clinical pregnancies per embryo transfer cycle (%)	*37.1*	*50.0*	*36.5*	*41.9*	*25.1*	*33.3*	*34.8*	*40.7*
Live deliveries per embryo transfer cycle (%)	*29.1*	*40.0*	*29.5*	*41.9*	*15.3*	*22.2*	*27.0*	*35.6*

(a) Age at start of a treatment cycle.

(b) SET: single embryo transfer.

(c) DET: double embryo transfer.

Clinical pregnancies and live deliveries by stage of embryo development from autologous thaw cycles

The rates of clinical pregnancy and live delivery were higher for blastocyst transfer cycles than for cleavage stage embryo transfer cycles, for women aged under 40 years. The rate of live delivery for blastocyst transfer cycles (27.7%) was 9 percentage points higher than that for cleavage stage embryo transfer cycles (18.7% – see Table 14).

Table 14: Outcomes of autologous thaw embryo transfer cycles by women's age and stage of embryo development, New Zealand, 2015

Stage/outcome of treatment	Age group (years)[a]							
	<35		35–39		≥ 40		All	
	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]
Embryo transfer cycles	69	905	46	835	19	366	134	2,106
Clinical pregnancies	14	349	13	310	6	92	33	751
Live deliveries	10	275	11	253	4	56	25	584
Clinical pregnancies per embryo transfer cycle (%)	*20.3*	*38.6*	*28.3*	*37.1*	*31.6*	*25.1*	*24.6*	*35.7*
Live deliveries per embryo transfer cycle (%)	*14.5*	*30.4*	*23.9*	*30.3*	*21.1*	*15.3*	*18.7*	*27.7*

(a) Age at start of a treatment cycle.

(b) CL: cleavage stage embryo.

(c) BL: blastocyst.

3.4 Donation and recipient cycles

Oocyte donation cycles

Of the 167 cycles where the intention was to donate oocytes to a recipient, all but four cycles proceeded to OPU, however 33 (19.8%) did not result in oocytes being donated. The average age of women donating oocytes was 31.9 years; with 34.7% of cycles in women aged 35 years or older (Table 15).

Table 15: Number of oocyte donation cycles by donor's age group, New Zealand, 2015

Age group (years)[(a)]	Initiated cycles (number)	Cycles with OPU performed (number)	Cycles with OPU performed (percent)	Cycles with oocyte donated (number)	Cycles with oocyte donated (percent)
< 30	49	48	98.0	39	79.6
30–34	60	58	96.7	48	80.0
35–39	54	53	98.1	38	70.4
≥ 40	4	4	100.0	0	0.0
Total	167	163	97.6	125	74.9

(a) Age at start of a treatment cycle.

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

There were 273 oocyte/embryo recipient cycles in 2015. The majority of these, 93.8% (256) were oocyte recipient cycles and 6.2% (17) were embryo recipient cycles. Of the 273 oocyte/embryo recipient cycles, 78.4% were thaw cycles (Table 16). Of the 59 fresh oocyte recipient cycles, 32.2% resulted in a live delivery, lower than the live delivery rate for thaw oocyte recipient cycles (36.0%). The live delivery rate for embryo recipient cycles was 41.2%.

Table 16: Outcomes of oocyte/embryo recipient cycles by treatment type, New Zealand, 2015

Stage/outcome of treatment	Oocyte recipient		Embryo recipient	All
	Fresh	Thaw		
Initiated cycles	59	197	17	273
Embryo transfers	50	193	15	258
Clinical pregnancies	23	80	7	110
Live deliveries	19	71	7	97
Live deliveries per initiated cycle (%)	*32.2*	*36.0*	*41.2*	*35.5*
Live deliveries per embryo transfer cycle (%)	*38.0*	*36.8*	*46.7*	*37.6*
Live deliveries per clinical pregnancy (%)	*82.6*	*88.8*	*100.0*	*88.2*

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

The clinical pregnancy and live delivery rates of recipient cycles varied by recipient's age group. The overall live delivery rate per initiated cycle was 35.5%. Within age categories, live delivery rates per initiated cycle ranged between 20.9% and 40.3% (Table 17). In recipients aged 45 years and over, the live delivery rate per oocyte/embryo recipient cycle was 20.9%. This compares with live delivery rates from autologous fresh and thaw cycles for women in the same age group of 0.0% and 10.0% respectively (Tables 9 and Table 12).

Table 17: Outcomes of oocyte/embryo recipient cycles by recipient's age group, New Zealand, 2015

Stage/outcome of treatment	Age group (years)[a]					
	< 30	30–34	35–39	40–44	≥ 45	All
Initiated cycles	7	34	55	134	43	273
Embryo transfers	7	34	51	127	39	258
Clinical pregnancies	2	14	23	58	13	110
Live deliveries	2	13	19	54	9	97
Live deliveries per initiated cycle (%)	*28.6*	*38.2*	*34.5*	*40.3*	*20.9*	*35.5*
Live deliveries per embryo transfer cycle (%)	*28.6*	*38.2*	*37.3*	*42.5*	*23.1*	*37.6*
Live deliveries per clinical pregnancy (%)	*100.0*	*92.9*	*82.6*	*93.1*	*69.2*	*88.2*

(a) Age at start of a treatment cycle.

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

The overall live delivery rate per embryo transfer cycle was 35.5%. Within age categories, live delivery rates per initiated cycle ranged between 30.1% and 41.2%. (Table 18).

Table 18: Outcomes of oocyte/embryo recipient cycles by donor's age group, New Zealand, 2015

Stage/outcome of treatment	Age group (years)[a]				
	< 30	30–34	35–39	≥ 40	All[b]
Initiated cycles	74	102	93	3	273
Embryo transfers	72	95	87	3	258
Clinical pregnancies	29	48	31	1	110
Live deliveries	25	42	28	1	97
Live deliveries per initiated cycle (%)	*33.8*	*41.2*	*30.1*	*33.3*	*35.5*
Live deliveries per embryo transfer cycle (%)	*34.7*	*44.2*	*32.2*	*33.3*	*37.6*
Live deliveries per clinical pregnancy (%)	*86.2*	*87.5*	*90.3*	*100.0*	*88.2*

(a) Age at start of treatment cycle.

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

4 Pregnancy and birth outcomes following autologous and recipient cycles in 2015

There were 1,753 clinical pregnancies following autologous and recipient oocyte/embryo transfer cycles in 2015. Four out of five clinical pregnancies (79.7%) resulted in a delivery and 18.6% resulted in early pregnancy loss (less than 20 weeks gestation and less than 400 grams birthweight). The outcomes of 30 (1.7%) clinical pregnancies were not known because the fertility centres were unable to follow up with the women.

Early pregnancy loss

Of the 326 early pregnancy losses, 90.5% were miscarriages, 7.6% were due to termination of pregnancy, and 5.5% were ectopic/heterotopic pregnancies. Pregnancies following SET resulted in a lower rate of early pregnancy loss (18.9%) than pregnancies following DET (24.2%; Table 19).

Table 19: Early pregnancy losses by pregnancy outcome and treatment type, New Zealand, 2015

	Autologous				Oocyte/embryo recipient		All	
	Fresh		Thaw					
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Early pregnancy loss	159	18.6	157	20.0	10	9.1	326	17.5
Miscarriage	*144*	*16.8*	*141*	*18.0*	*10*	*9.1*	*295*	*16.8*
Termination	*11*	*1.3*	*7*	*0.9*	*0*	*0.0*	*18*	*1.0*
Ectopic or heterotopic pregnancy	*4*	*0.5*	*9*	*1.1*	*0*	*0.0*	*13*	*0.7*
Delivery	688	80.1	611	77.9	98	89.1	1,397	79.7
Not stated	12	1.4	16	2.0	2	1.8	30	1.7
Total	**859**	**100.0**	**784**	**100.0**	**110**	**100.0**	**1,753**	**100.0**

Note: Percentages may not total to 100 due to rounding.

Deliveries by delivery outcomes and treatment type

There were 1,397 women who gave birth to at least one baby of 20 weeks or more gestation or at least 400 grams birthweight following embryo transfer cycles. Of these, 99.6% (1,390) gave birth to at least one live-born baby (live delivery) (Table 20).

Table 20: Deliveries by delivery outcome and treatment type, New Zealand, 2015

	Autologous				Oocyte/embryo recipient		All	
	Fresh		Thaw					
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Live delivery	684	99.4	609	99.6	97	99	1,390	99.5
< 37 weeks	*64*	*9.3*	*46*	*7.5*	*14*	*14.3*	*124*	*8.9*
≥ 37 weeks	*620*	*90.1*	*563*	*92.1*	*83*	*84.7*	*1,266*	*90.6*
Fetal death (stillbirth)[(a)]	4	0.6	2	0.3	1	1.0	7	0.5
Total	**688**	**100.0**	**611**	**100.0**	**98**	**100.0**	**1,397**	**100.0**

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

Note: Percentages may not total to 100 due to rounding.

Deliveries by maternal age

The average age of women at the time of delivery was 35.6 years. Of the 1,397 autologous and recipient deliveries, 2.7% were multiple gestation deliveries (Table 21).

Table 21: Deliveries by gestation and maternal age group, New Zealand, 2015

	Age group (years)[(a)]								
	< 35			35–39			≥ 40		
	One embryo	Two embryos	All	One embryo	Two embryos	All[(b)]	One embryo	Two embryos	All[(b)]
					Number				
Singleton	542	7	549	550	23	573	210	26	236
Multiple	10	3	13	8	9	17	4	4	8
Twin	*10*	*3*	*13*	*8*	*9*	*17*	*4*	*4*	*8*
Higher order multiple	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Total	**552**	**10**	**562**	**558**	**32**	**590**	**214**	**30**	**244**
					Percent				
Singleton	98.2	70	97.7	98.6	71.9	97.1	98.1	86.7	96.7
Multiple	1.8	30	2.3	1.4	28.1	2.9	1.9	13.3	3.3
Twin	*1.8*	*30*	*2.3*	*1.4*	*28.1*	*2.9*	*1.9*	*13.3*	*3.3*
Higher order multiple	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Age at time of delivery.

(b) Includes three or more embryos.

Gestational age of babies

The average gestational age of babies born following autologous and recipient embryo transfer cycles was 38.6 weeks (Table 22). One in six babies (11.0%) were pre-term (less than 37 weeks gestation); the average gestational age of ART singletons was 38.8 weeks, while the average gestational age for ART twins was 34.6 weeks.

Table 22: Babies by gestational age and plurality, New Zealand, 2015

Gestational age (weeks)	Singletons		Twins		Higher order multiples		Total	
Mean	38.8		34.6		–		38.6	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
≤ 27	8	0.6	6	7.9	0	0.0	14	1
28–31	4	0.3	4	5.3	0	0.0	8	0.6
32–36	90	6.6	46	60.5	0	0.0	136	9.5
≥ 37	1,257	92.5	20	26.3	0	0.0	1,277	89
Total	**1,359**	**100.0**	**76**	**100.0**	**0**	**–**	**1,435**	**100.0**

Note: Percentages may not total to 100 due to rounding.

Birth outcomes

The average birthweight for live-born babies to women who had autologous and recipient embryo transfer cycles was 3,350 grams. Of all live-born babies, 8.3% were low birthweight (less than 2,500 grams) (Table 23). The average birthweight for live-born ART singletons and twins was 3,402 grams and 2,368 grams respectively. Low birthweight was reported for 5.9% of live-born singletons following SET – lower than the 7.1% of live-born singletons following DET.

Table 23: Live-born babies by birthweight group and plurality, New Zealand, 2015

Birthweight (grams)	Singletons		Twins	Higher order multiples	Total[c]
	SET[a]	DET[b]			
			Number		
< 1,000	*4*	*0*	*2*	*0*	*6*
1,000–1,499	*4*	*0*	*4*	*0*	*8*
1,500–1,999	*10*	*0*	*12*	*0*	*22*
2,000–2,499	*58*	*4*	*20*	*0*	*82*
< 2,500	76	4	38	0	118
2,500–2,999	191	9	22	0	222
3,000–3,499	428	18	8	0	454
3,500–3,999	424	24	2	0	450
≥ 4,000	171	1	0	0	173
Not stated	6	0	3	0	9
Total	**1,296**	**56**	**73**	**0**	**1,426**
			Percent		
< 1,000	*0.3*	*0.0*	*2.7*	*0.0*	*0.4*
1,000–1,499	*0.3*	*0.0*	*5.5*	*0.0*	*0.6*
1,500–1,999	*0.8*	*0.0*	*16.4*	*0.0*	*1.5*
2,000–2,499	*4.5*	*7.1*	*27.4*	*0.0*	*5.8*
< 2,500	5.9	7.1	52	0.0	8.3
2,500–2,999	14.7	16.1	30.1	0.0	15.6
3,000–3,499	33	32.1	11	0.0	31.8
3,500–3,999	32.7	42.9	2.7	0.0	31.6
≥ 4,000	13.2	1.8	0.0	0.0	12.1
Not stated	0.5	0.0	4.1	0.0	0.6
Total	**100.0**	**100.0**	**100.0**	**–**	**100.0**

(a) SET: single embryo transfer.

(b) DET: double embryo transfer.

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

Note: Percentages may not total to 100 due to rounding.

5 Preimplantation genetic testing in 2015

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 preimplantation genetic diagnosis (PGD) and preimplantation genetic screening (PGS). The indication for PGT is not recorded in ANZARD.

In 2015, PGT was performed in 136 cycles, representing 2.4% of cycles in which embryos were created or thawed. Among the 136 PGT cycles, 54 (39.7%) were part of a 'freeze-all' cycle (Table 24). Of the 136 PGT cycles, 59 (43.4%) had embryos transferred, resulting in 25 (18.4%) clinical pregnancies and 17 (12.5%) live deliveries.

Table 24: Number of cycles with PGT by type of embryo, New Zealand, 2015

Type of embryo	Stage of treatment	
	Number of cycles with embryos fertilised/thawed	Number of cycles with PGT
Fresh	3,061	78
Freeze-all cycles	*536*	*54*
Thaw	2,503	58
Total	**5,564**	**136**

6 Donor insemination cycles in 2015

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

In 2015, there were 392 DI cycles reported, which included 47 (12.0%) undertaken with controlled ovarian hyperstimulation and 88.0% (345) undertaken in unstimulated cycles. Of all DI cycles, 19.1% resulted in a clinical pregnancy and 14.5% resulted in a live delivery (Table 25). The multiple birth rate following DI cycles was 5.3%. The average age of women who had a DI cycle was 35.5 years. The clinical pregnancy rate and live delivery rate was highest in women aged under 30 years and decreased with advancing woman's age. Of the DI cycles in women aged under 35 years, 20.4% resulted in a live delivery, compared with 5.6% of DI cycles in women aged 40 years or older (Table 25).

Table 25: Outcomes of DI cycles by women's age group, New Zealand, 2015

	Age group (years)[(a)]				
	< 30	**30–34**	**35–39**	**≥ 40**	**Overall**
DI cycles	32	135	135	90	392
Clinical pregnancies	9	31	24	11	75
Live deliveries	8	26	18	5	57
Clinical pregnancies per DI cycle (%)	*28.1*	*23.0*	*17.8*	*12.2*	*19.1*
Live deliveries per DI cycle (%)	*25.0*	*19.3*	*13.3*	*5.6*	*14.5*
Live deliveries per clinical pregnancy (%)	*88.9*	*83.8*	*75.0*	*45.5*	*76.0*

(a) Age at start of treatment cycle.

Clinical pregnancies following DI cycles

Of the 75 clinical pregnancies following DI cycles, 22.7% ended in early pregnancy loss. Of the 57 live deliveries, 54 (94.7%) were singleton deliveries and 3 (5.3%) were twin deliveries.

Perinatal outcomes of babies

There were 60 babies born to women who had DI treatment, all of which were live born. Of these, 10 were born pre-term (less than 37 weeks gestation). The mean birthweight of live-born babies was 3,260 grams. There were seven live-born babies (11.7%) born with low birthweight (less than 2,500 grams).

7 Trends in ART treatment and outcomes 2011–2015

This section includes autologous cycles, donation/recipient cycles, surrogacy cycles and GIFT cycles undertaken in New Zealand from 2011 to 2015. It does not include DI cycles.

In 2015, a total of 6,242 initiated fresh or thaw ART treatment cycles were undertaken in New Zealand. This was an increase of 6.0% on 2014 and an increase of 20.3% on 2011 (Table 26). From 2011 to 2015, the live delivery rates per initiated cycle ranged from 22.1% to 23.6% respectively. The live delivery rate per initiated non-freeze-all cycle has been relatively stable at around 24.1% since 2011, with a slight increase to 24.6% in 2015 (Table 26).

Table 26: Number of fresh and thaw cycles by stage/outcome of treatment, New Zealand, 2011–2015

Stage/outcome of treatment	2011	2012	2013	2014	2015
Initiated cycles[(a)]	5,189	5,177	5,373	5,891	6,242
Cycles with OPU[(b)]	3,113	3,021	3,167	3,230	3,397
Freeze-all	115	191	319	480	542
Embryo transfers	4,300	4,291	4,365	4,597	4,821
Clinical pregnancies	1,529	1,564	1,560	1,655	1,766
Live deliveries	1,225	1,209	1,225	1,302	1,401
Clinical pregnancies per initiated cycle (%)	*29.5*	*30.2*	*29.0*	*28.1*	*28.3*
Clinical pregnancies per embryo transfer (%)	*35.6*	*36.4*	*35.7*	*36.0*	*36.7*
Live deliveries per initiated cycle (%)	*23.6*	*23.4*	*22.8*	*22.1*	*22.4*
Live deliveries per initiated non-freeze-all cycle (%)	*24.1*	*24.2*	*24.2*	*24.1*	*24.6*
Live deliveries per embryo transfer (%)	*28.5*	*28.2*	*28.1*	*28.3*	*29.1*

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

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

8 Cumulative success rates for women undertaking autologous treatment 2013–2015

This section presents information on all women who started their first autologous fresh ART treatment cycle between 1 January and 31 December 2013. Women were followed from the start of their first autologous fresh cycle through subsequent fresh and thaw cycles, excluding freeze-all cycles, until 31 December 2015 or until they achieved a live delivery (a delivery of at least one live-born baby) up to and including 31 October 2016. This longitudinal perspective provides a measure of the outcomes of successive ART treatment cycles undertaken by the same woman up to her first birth following ART treatment. These women might have had additional treatment cycles after 2015, and this treatment information and resulting outcomes will be captured in subsequent annual reports. Therefore, in this dynamic cohort of women undergoing their first autologous fresh ART treatment between 1 January and 31 December 2013, the cumulative success rates may increase over time as more women return for treatment at a later date.

ART treatment cycles presented in Tables 27 to 32 include all initiated autologous fresh and thaw cycles, excluding freeze-all cycles. Cycles that were cancelled at any stage and did not proceed to oocyte collection or embryo transfer are included. DI cycles, oocyte/embryo recipient cycles, oocyte/embryo donation cycles, surrogacy arrangement cycles and GIFT cycles are not included. A pregnancy that ends before 20 weeks gestation or a stillbirth (fetal death) are not counted as a live delivery.

Table 27 presents the number of cycles by women's age group. Tables 28 to 32 present cycle-specific live delivery rates, non-progression rates and cumulative live delivery rates respectively for: women in all age groups and aged < 30, 30–34, 35–39 and ≥ 40 years. Only the first five cycles are presented in each case due to the small number of women who undertook six or more treatment cycles between 1 January 2013 and 31 December 2015.

Definition

- Cycle-specific live delivery rate for a specific cycle number is calculated as the number of live deliveries resulting from a specific cycle number divided by the number of women who undertook that cycle number. For example, the cycle-specific rate of 22.9% for cycle number three measures the proportion of women who undertook a third cycle and achieved a live delivery in that cycle (Table 28).
- 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 2015 divided by the number of women who did not have a live delivery in that cycle. For example, the non-progression rate of 34.4% for cycle number three measures the proportion of women who did not achieve a live delivery in cycle number three and did not progress to a fourth cycle (Table 28). ANZARD does not collect the reasons why a woman/couple does not

progress for further treatment (for example, poor prognosis, natural pregnancy, migration, financial, psychological and other unrelated reasons).

- Cumulative live delivery rate for a specific cycle is calculated as the total number of live deliveries following this cycle and all previous cycles divided by the total number of women who started their first autologous fresh ART treatment cycle between 1 January and 31 December 2013. For example, the cumulative live delivery rate of 46.5% for cycle number three measures the proportion of women who started ART treatment in 2013 and achieved a live delivery following their first three cycles (Table 28).

Note: Only the first birth following ART is counted in cumulative live birth rates.

Table 27: 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 and 31 December 2013, New Zealand, 2013–2015

Cycle number	Age group years[b]				
	< 30	30–34	35–39	≥ 40	All
			Number		
One	96	197	248	147	688
Two	55	128	165	64	412
Three	27	67	93	35	222
Four	19	37	50	11	117
Five or more	10	38	55	7	110
Total	**207**	**467**	**611**	**264**	**1,549**
			Percent		
One	46.4	42.2	40.6	55.7	44.4
Two	26.6	27.4	27.0	24.2	26.6
Three	13.0	14.3	15.2	13.3	14.3
Four	9.2	7.9	8.2	4.2	7.6
Five or more	4.8	8.1	9.0	2.7	7.1
Total	**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 undertaken in 2013.

Notes:

Women who started their first autologous fresh ART treatment cycle between 1 January and 31 December 2013 and were followed through subsequent fresh and thaw cycles (excluding freeze-all cycles) until 31 December 2015 or delivery of a live-born baby up to and including 31 October 2016.

Data should be interpreted with caution due to small numbers in certain cells.

Percentages may not total to 100 due to rounding.

Table 28: Cycle-specific and cumulative live delivery rates for all women who started their first autologous fresh cycle (excluding freeze-all cycles) between 1 January and 31 December 2013, New Zealand, 2013–2015

Cycle number[a]	Number of women starting cycle	Number of women who had a live delivery[b]	Cycle-specific live delivery rate (%)[c]	Number of women who did not progress to next treatment	Non-progression rate (%)[d]	Cumulative live delivery rate (%)[e]
One	1,549	406	26.2	282	24.7	26.2
Two	861	211	24.5	201	30.9	39.8
Three	449	103	22.9	119	34.4	46.5
Four	227	58	25.6	59	34.9	50.2
Five	110	20	18.2	36	40.0	51.5

(a) Cycle one represents a woman's first autologous (non-freeze-all) fresh ART treatment cycle between 1 January and 31 December 2013. Cycles two to five could be either a fresh or thaw cycle (excluding freeze-all cycles) undertaken by a woman until 31 December 2015 or delivery of a live-born baby up to and including 31 October 2016.

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

(c) The cycle-specific live delivery rate is calculated as the number of live deliveries resulting from a specific 'cycle number' divided by the number of women who undertook that same 'cycle number'.

(d) The non-progression rate for a specific 'cycle number' is calculated as the number of women who did not return for further ART treatment cycles before 31 December 2015 divided by the number of women who did not have a live delivery in that 'cycle number'.

(e) The cumulative live delivery rate for a specific 'cycle number' is calculated as the total number of live deliveries following this 'cycle number' and all previous cycles divided by the total number of women who started their first autologous fresh ART treatment cycle between 1 January and 31 December 2013.

Note: Further treatment cycles after the fifth cycle and resulting live deliveries are not presented in this table due to small numbers. Data should be interpreted with caution due to small numbers in certain cells, and measures of statistical variance are not supplied.

Table 29: Cycle-specific and cumulative live delivery rates for women aged less than 30 years who started their first autologous fresh cycle (excluding freeze-all cycles) between 1 January and 31 December 2013, New Zealand, 2013–2015

Cycle number	Number of women starting cycle[a]	Number of women who had a live delivery[b]	Cycle-specific live delivery rate (%)[c]	Number of women who did not progress to next treatment	Non-progression rate (%)[d]	Cumulative live delivery rate (%)[e]
One	207	74	35.7	22	16.5	35.7
Two	111	36	32.4	19	25.3	53.1
Three	56	15	26.8	12	29.3	60.4
Four	29	6	20.7	13	56.5	63.3
Five	10	2	20.0	2	25.0	64.3

(a) Cycle one represents a woman's first autologous (non-freeze-all) fresh ART treatment cycle between 1 January and 31 December 2013. Cycles two to five could be either a fresh or thaw cycle (excluding freeze-all cycles) undertaken by a woman until 31 December 2015 or delivery of a live-born baby up to and including 31 October 2016.

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

(c) The cycle-specific live delivery rate is calculated as the number of live deliveries resulting from a specific 'cycle number' divided by the number of women who undertook that same 'cycle number'.

(d) The non-progression rate for a specific 'cycle number' is calculated as the number of women who did not return for further ART treatment cycles before 31 December 2015 divided by the number of women who did not have a live delivery in that 'cycle number'.

(e) The cumulative live delivery rate for a specific 'cycle number' is calculated as the total number of live deliveries following this 'cycle number' and all previous cycles divided by the total number of women who started their first autologous fresh ART treatment cycle between 1 January and 31 December 2013.

Note: Further treatment cycles after the fifth cycle and resulting live deliveries are not presented in this table due to small numbers. Data should be interpreted with caution due to small numbers in certain cells, and measures of statistical variance are not supplied.

Table 30: Cycle-specific and cumulative live delivery rates for women aged 30–34 years who started their first autologous fresh cycle (excluding freeze-all cycles) between 1 January and 31 December 2013, New Zealand, 2013–2015

Cycle number[a]	Number of women starting cycle	Number of women who had a live delivery[b]	Cycle specific-live delivery rate (%)[c]	Number of women who did not progress to next treatment	Non-progression rate (%)[d]	Cumulative live delivery rate (%)[e]
One	467	139	29.8	58	17.7	29.8
Two	270	79	29.3	49	25.7	46.7
Three	142	39	27.5	28	27.2	55.0
Four	75	26	34.7	11	22.4	60.6
Five	38	8	21.1	14	46.7	62.3

(a) Cycle one represents a woman's first autologous (non-freeze-all) fresh ART treatment cycle between 1 January and 31 December 2013. Cycles two to five could be either a fresh or thaw cycle (excluding freeze-all cycles) undertaken by a woman until 31 December 2015 or delivery of a live-born baby up to and including 31 October 2016.

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

(c) The cycle-specific live delivery rate is calculated as the number of live deliveries resulting from a specific 'cycle number' divided by the number of women who undertook that same 'cycle number'.

(d) The non-progression rate for a specific 'cycle number' is calculated as the number of women who did not return for further ART treatment cycles before 31 December 2015 divided by the number of women who did not have a live delivery in that 'cycle number'.

(e) The cumulative live delivery rate for a specific 'cycle number' is calculated as the total number of live deliveries following this 'cycle number' and all previous cycles divided by the total number of women who started their first autologous fresh ART treatment cycle between 1 January and 31 December 2013.

Note: Further treatment cycles after the fifth cycle and resulting live deliveries are not presented in this table due to small numbers. Data should be interpreted with caution due to small numbers in certain cells, and measures of statistical variance are not supplied.

Table 31: Cycle-specific and cumulative live delivery rates for women aged 35–39 years who started their first autologous fresh cycle (excluding freeze-all cycles) between 1 January and 31 December 2013, New Zealand, 2013–2015

Cycle number[a]	Number of women starting cycle	Number of women who had a live delivery[b]	Cycle-specific live delivery rate (%)[c]	Number of women who did not progress to next treatment	Non-progression rate (%)[d]	Cumulative live delivery rate (%)[e]
One	611	163	26.7	85	19.0	26.7
Two	363	88	24.2	77	28.0	41.1
Three	198	43	21.7	50	32.3	48.1
Four	105	22	21.0	28	33.7	51.7
Five	55	9	16.4	19	41.3	53.2

(a) Cycle one represents a woman's first autologous (non-freeze-all) fresh ART treatment cycle between 1 January and 31 December 2013. Cycles two to five could be either a fresh or thaw cycle (excluding freeze-all cycles) undertaken by a woman until 31 December 2015 or delivery of a live-born baby up to and including 31 October 2016.

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

(c) The cycle-specific live delivery rate is calculated as the number of live deliveries resulting from a specific 'cycle number' divided by the number of women who undertook that same 'cycle number'.

(d) The non-progression rate for a specific 'cycle number' is calculated as the number of women who did not return for further ART treatment cycles before 31 December 2015 divided by the number of women who did not have a live delivery in that 'cycle number'.

(e) The cumulative live delivery rate for a specific 'cycle number' is calculated as the total number of live deliveries following this 'cycle number' and all previous cycles divided by the total number of women who started their first autologous fresh ART treatment cycle between 1 January and 31 December 2013.

Note: Further treatment cycles after the fifth cycle and resulting live deliveries are not presented in this table due to small numbers. Data should be interpreted with caution due to small numbers in certain cells, and measures of statistical variance are not supplied.

Table 32: Cycle-specific and cumulative live delivery rates for women aged 40 years and over who started their first autologous fresh cycle (excluding freeze-all cycles) between 1 January and 31 December 2013, New Zealand, 2013–2015

Cycle number[a]	Number of women starting cycle	Number of women who had a live delivery[b]	Cycle-specific live delivery rate (%)[c]	Number of women who did not progress to next treatment	Non-progression rate (%)[d]	Cumulative live delivery rate (%)[e]
One	264	30	11.4	117	50.0	11.4
Two	117	8	6.8	56	51.4	14.4
Three	53	6	11.3	29	61.7	16.7
Four	18	4	22.2	7	50.0	18.2
Five	7	1	14.3	1	16.7	18.6

(a) Cycle one represents a woman's first autologous (non-freeze-all) fresh ART treatment cycle between 1 January and 31 December 2013. Cycles two to five could be either a fresh or thaw cycle (excluding freeze-all cycles) undertaken by a woman until 31 December 2015 or delivery of a live-born baby up to and including 31 October 2016.

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

(c) The cycle-specific live delivery rate is calculated as the number of live deliveries resulting from a specific 'cycle number' divided by the number of women who undertook that same 'cycle number'.

(d) The non-progression rate for a specific 'cycle number' is calculated as the number of women who did not return for further ART treatment cycles before 31 December 2015 divided by the number of women who did not have a live delivery in that 'cycle number'.

(e) The cumulative live delivery rate for a specific 'cycle number' is calculated as the total number of live deliveries following this 'cycle number' and all previous cycles divided by the total number of women who started their first autologous fresh ART treatment cycle between 1 January and 31 December 2013.

Note: Further treatment cycles after the fifth cycle and resulting live deliveries are not presented in this table due to small numbers. Data should be interpreted with caution due to small numbers in certain cells, and measures of statistical variance are not supplied.

Appendix A: Contributing fertility clinics

Fertility Associates, Auckland (Dr Simon Kelly)
Fertility Associates Hamilton (Dr VP Singh)
Fertility Associates Wellington, Wellington (Dr Andrew Murray)
Fertility Associates Christchurch (Dr Sarah Wakeman)
Fertility Associates Otago, Dunedin (Associate Professor Wayne Gillett)
Fertility PLUS, Auckland (Dr Neil Johnson)
Genea Oxford Fertility, Christchurch (Dr Robert Woolcott)
Repromed Auckland (Dr Guy Gudex)

Appendix B: Data used in this report

The data presented in this report are supplied by eight fertility clinics from around New Zealand and are compiled into ANZARD 2.0. ANZARD 2.0 includes autologous treatment cycles, treatment involving donated oocytes or embryos and treatment involving surrogacy arrangements. ANZARD 2.0 collects data on the use of ART techniques such as ICSI, oocyte/embryo freezing methods, PGD and cleavage stage / blastocyst transfers. In addition to ART procedures, ANZARD 2.0 also collects data from fertility centres about artificial insemination cycles using donated sperm (DI). The outcomes of pregnancies, deliveries and babies born following ART and DI treatments are also maintained in ANZARD 2.0. This includes the method of birth, birth status, birthweight, gestational age, plurality, perinatal mortality and selected information on maternal morbidity.

This report presents information on treatment cycles undertaken in New Zealand in 2015 and the resulting pregnancies and births in either 2015 or 2016.

Data validation

Most fertility centres have computerised data information management systems and are able to provide the National Perinatal Epidemiology and Statistics Unit (NPESU) with high-quality data. All data processed by NPESU undergo a validation process, with data queries being followed up with fertility centre staff. In 2015, information relating to pregnancy and birth outcomes was provided for all New Zealand-based cycles.

The Reproductive Technology Accreditation Committee (RTAC) of the Fertility Society of Australia (FSA) also plays a role in ensuring the quality of ANZARD 2.0 data by validating selected records against clinic files in their annual inspections.

Data presentation

Data presented in chapters 2 to 6 are for treatment cycles and not patients. It is possible for an individual woman to undergo more than one treatment cycle in a year or experience more than one pregnancy. Thus information about patient characteristics, such as age, parity and cause of infertility, is based on calculations that may include an individual more than once.

The rates of clinical pregnancy and live delivery in chapters 2 to 6 were measured per initiated cycle. Where the number of initiated cycles was not available, the rates were measured per embryo transfer cycle.

Where applicable, percentages in tables have been calculated including the 'Not stated' category. Throughout the report, percentages may not total to 100 and subtotal percentages, may not add up to the sum of the percentages for the categories 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 fertility centre and includes direct 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 that had successful follow-up, data are limited by the self-reported nature of the information. Fertility centre staff invest significant effort in validating such information by obtaining medical records from clinicians or hospitals. Data about previous ART treatment and history of pregnancies are, in some cases, reported by patients.

Glossary

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

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.

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

Assisted hatching: when the outer layer of the embryo, the zona pellucida, is either thinned or perforated in the laboratory to aid the embryo's 'hatching', 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 or does use her own oocytes or embryos. GIFT cycles are classified separately from autologous cycles.

Blastocyst: an embryo comprising about 100 cells, usually developed within five or six days after fertilisation.

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

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

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

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

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

Cryopreservation: freezing embryos for potential future ART treatment.

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

DI (donor sperm 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 or does donate her oocytes to others. A donation cycle may result in the donation of either oocytes or embryos to a recipient woman. The use of donor sperm does not alter the donor status of the cycle.

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

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

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

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

Freeze-all cycle: a fresh cycle where all oocytes or embryos are preserved for potential future use.

Fresh cycle: an ART treatment cycle that intends to or does use 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.

ICMART (International Committee Monitoring Assisted Reproductive Technologies): an independent international non-profit organisation that leads the development, collection and dissemination of worldwide data on ART.

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 (outside the body) fertilisation.

Live birth: according to the World Health Organization (WHO) definition, the complete expulsion or extraction from its mother of a product of conception irrespective of the duration of the pregnancy. Where that product, 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 live born. In this report, live births are included if they meet the WHO definition and are of 20 weeks or more gestation or 400 grams or more birthweight.

Live delivery: the delivery of one or more live-born infants, with the birth of twins, triplets or more counted as one live delivery.

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

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

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 she has experienced reached 20 weeks or more gestation.

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

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

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

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 live-born babies per 100 female live-born babies.

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

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

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

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

Note: ICMART has published a glossary for the terms used in ART data collections (Zegers-Hochschild et al. 2009). However, the terminology used in this report may differ from that in the ICMART glossary.

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