Advisory Committee on
Assisted Reproductive Technology

Assisted Reproductive Technology in New Zealand 2013

December 2017

This report has been prepared for the Advisory Committee on Assisted Reproductive Technology by the Perinatal and Reproductive Epidemiology Research Unit (PRERU) of the University of New South Wales. PRERU has provided the data and analysis.

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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 2013, the fifth New Zealand-specific report based on the Australian and New Zealand Assisted Reproduction Database (ANZARD).

The report provides a quantitative report of the numbers, types and outcomes of assisted reproductive technology in New Zealand. It gives a fuller picture of the uses and outcomes of assisted reproductive procedures in New Zealand.

One of ACART's functions is to monitor the application and health outcomes of assisted reproductive treatments. New Zealand has good data about some uses of assisted reproduction. 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. Until 2010 however, New Zealand lacked 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 assisted reproductive technology 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.

Once again, we hope that the report will be useful to consumers, fertility services providers and others with an interest in how New Zealanders are using assisted reproductive technology. With successive annual reports, we will begin to build a picture of use and trends over time.

The Ministry of Health has supported ACART in obtaining 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.

Alison Douglass
Outgoing Chair, Advisory Committee on Assisted Reproductive Technology
26 July 2016

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 UNSW Australia (University of New South Wales).

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
ART	assisted reproductive technology
DET	double embryo transfer
DI	donor sperm insemination
FSA	Fertility Society of Australia
FSH	follicle stimulating hormone
ICSI	intracytoplasmic sperm injection
IVF	in vitro fertilisation
NPESU	National Perinatal Epidemiology and Statistics Unit
OPU	oocyte pick-up
PGD	preimplantation genetic diagnosis
SET	single embryo transfer
UNSW	University of New South Wales

Symbols

–	not applicable

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Summary

Use of ART treatment cycles

There were 5,373 assisted reproductive technology (ART) treatment cycles reported from New Zealand in 2013. This represented 5.9 cycles per 1,000 women of reproductive age (15–44 years) in New Zealand. Women used their own oocytes/embryos in 93.9% of treatments (autologous), and one third (33.2%) of autologous cycles used frozen/thawed embryos.

Treatment outcomes and number of babies

Of all initiated ART treatment cycles performed in 2013, 29.0% (1,560) resulted in a clinical pregnancy and 22.8% (1,225) in a live delivery. There were 1,286 liveborn babies, 79.3% (1,020) 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 35.8 years. For women undergoing oocyte/embryo recipient cycles, the mean age was 40.6 years, five years older than for autologous cycles (35.6 years). Of all autologous and oocyte/embryo recipient cycles, one in five (21.8%) was undertaken by women aged 40 years or older. Of autologous cycles (fresh and thaw), 71.3% were undertaken by nulliparous women compared with 74.4% for oocyte/embryo recipient cycles.

Autologous fresh cycles

The overall live delivery rate per autologous fresh embryo transfer cycle was 28.6%. The highest live delivery rate per autologous fresh embryo transfer cycle was in women aged less than 30 years (44.9%) and declined with advancing women's age. Overall, 74.5% of autologous fresh embryo transfer cycles were single embryo transfer (SET) cycles, 24.8% were double embryo transfer (DET) cycles and 0.7% 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 25.3%. The highest live delivery rate per embryo transfer cycle was in women aged under 30 years (33.7%) and declined with advancing women's age. Of the 1,784 frozen/thawed embryo transfer cycles 88.8% were SET cycles, 5.9% were DET cycles and less than 0.1% transferred

three embryos. Overall, the rates of clinical pregnancy and live delivery were higher in blastocyst transfer cycles than in cleavage stage embryo transfer cycles regardless of a woman's age.

Deliveries by gestation and women's age

Of the 1,237 deliveries following ART treatment in 2014, 5.2% were multiple gestation deliveries. Women aged 40 years and over had the highest proportion of multiple gestation deliveries (8.9%).

Cumulative live birth rates

ANZARD includes data items which make it possible to follow a woman from her first fresh ART treatment cycle through subsequent fresh and thaw cycles. There were 1,520 women identified as having their first fresh autologous cycle in 2011. These women were followed through their subsequent fresh and thaw cycles until 31st December 2013 or until they achieved a live delivery. For women identified in this cohort, the cumulative live delivery rate was 26.2% after the first cycle, increasing to 39.9% after two cycles, 45.3% after three cycles, 48.0% after four cycles and 49.3% after five cycles.

1 Introduction

It is estimated that around 9% of couples at any given time experience infertility, representing the source of much personal suffering to millions around the world (Boivin et al. 2007). The common medical definition of 'infertility' is the failure to achieve a clinical pregnancy after 12 or more months of regular unprotected sexual intercourse (Zegers-Hochschild et al. 2009). Infertility is increasingly being overcome through advancements in fertility treatment, in particular assisted reproductive technologies (ARTs). ARTs have evolved over the last three decades into a suite of mainstream medical interventions that have resulted in the birth of more than 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), 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 2013.

Treatments covered in this report

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

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

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

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

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

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

Data used in this report

This report provides information on ART and DI treatments and the resulting pregnancy and birth outcomes. The data presented in this report were supplied by all seven fertility clinics and compiled into the Australian and New Zealand Assisted Reproduction Database (ANZARD).

As a joint initiative of the NPESU and FSA, ANZARD was upgraded in 2009 to accommodate new ART treatment types and to transform ANZARD from a cycle-based data collection to a woman-based data collection (ANZARD2.0). A more detailed description of ANZARD2.0 can be found in Appendix B.

Structure of this report

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

Chapter 2—'Overview of ART treatment in 2013', provides an outline of the numbers and outcomes of all ART treatments undertaken in New Zealand.

Chapter 3—'Autologous and donation/recipient cycles in 2013', presents data on women undergoing treatment, cycle types, and the outcomes of treatment.

Chapter 4—'Pregnancy and birth outcomes following embryo transfer cycles in 2013', presents data on the outcomes of clinical pregnancies and deliveries following autologous and recipient cycles including a description of perinatal outcomes.

Chapter 5—'Preimplantation genetic diagnosis', includes information on the numbers of embryos that had cells removed and analysed for chromosomal disorders or genetic diseases before transfer.

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

Chapter 7—'Trends in ART treatment and outcomes 2009-2013', presents trends in ART treatment over the last five years of data collection in New Zealand.

Chapter 8—'Cumulative success rates for women undertaking autologous treatment 2011-2013', presents information on all women who started their first autologous fresh ART treatment cycle between 1st January 2011 and 31st December 2011.

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

2 Overview of ART treatment in 2013

There were 5,373 assisted reproductive technology (ART) treatment cycles reported from New Zealand clinics in 2013. This represented 5.9 cycles per 1,000 women of reproductive age (15-44 years) in New Zealand (Statistics New Zealand 2014). Of these 93.9% of cycles were autologous cycles (where a woman intended to use, or used her own oocytes or embryos). Of these 5,043 autologous cycles, 3,259 (64.6%) were fresh cycles and 1,784 (35.4%) were thaw cycles. Other treatment cycles accounted for a small proportion of cycles comprising 3.4% oocyte recipient cycles, 0.3% embryo recipient cycles, 1.9% oocyte donation cycles and 0.5% surrogacy cycles. Of all the ART treatments in 2013, 29% (1,560) resulted in a clinical pregnancy, 23.0% (1,237) resulted in a delivery and 22.8% (1,225) in a live delivery. There were 1,286 liveborn babies, 79.3% (1,020) 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, 2013

Treatment type	Number of initiated ART cycles	Percent of treatment types	Number of clinical pregnancies	Number of live deliveries	Number of liveborn babies	Number of liveborn singletons at term with normal birthweight
Autologous	5,043	93.9	1,474	1,154	1,214	961
Fresh	3,259	60.7	877	703	746	579
Thaw	1,784	33.2	597	451	468	382
Oocyte recipient	181	3.4	74	63	64	52
Embryo recipient	14	0.3	4	1	1	0
Oocyte donation	103	1.9	0	0	0	0
Surrogacy arrangement cycles	32	0.5	8	7	7	7
Commissioning cycles[(a)]	8	0.1	0	0	0	0
Gestational carrier cycles[(b)]	24	0.4	8	7	7	7
Total	**5,373**	**100.0**	**1,560**	**1,225**	**1,286**	**1,020**

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

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

3 Autologous and donation/recipient cycles in 2013

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

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

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

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

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

3.1 Overview of autologous and recipient cycles

Age of women and their partners

The average age of women undertaking autologous and oocyte/embryo recipient cycles was 35.8 years. For women undergoing oocyte/embryo recipient cycles, the mean age was 40.6 years, five years older than for autologous cycles (35.6 years). Of all autologous and oocyte/embryo recipient cycles, one in five (21.8%) was undertaken by women aged 40 years or older (Table 2). The average age of partners was 38.6 years, with more than one-third (37.0%) 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, 2013

Age group (years)[(a)]	Autologous							
	Fresh		Thaw		Oocyte/Embryo Recipient		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
< 30	318	9.8	172	9.6	1	0.5	491	9.4
30–34	883	27.1	563	31.6	18	9.2	1,464	27.9
35–39	1,349	41.4	741	41.5	53	27.2	2,143	40.9
40–44	686	21.0	294	16.5	88	45.1	1,068	20.4
≥ 45	23	0.7	14	0.8	35	17.9	72	1.4
Total	**3,259**	**100.0**	**1,784**	**100.0**	**195**	**100.0**	**5,238**	**100.0**

(a) Age at start of treatment cycle.

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

Table 3: Number of autologous and recipient cycles by partners' age group and treatment type, New Zealand, 2013

Age group (years)[(a)]	Autologous				Oocyte/Embryo Recipient		All	
	Fresh		Thaw					
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
< 30	195	6	81	4.5	4	2.1	280	5.3
30–34	664	20.4	380	21.3	15	7.7	1,059	20.2
35–39	970	29.8	526	29.5	52	26.7	1,548	29.6
40–44	739	22.7	363	20.3	75	38.5	1,177	22.5
≥ 45	506	15.5	222	12.4	34	17.4	762	14.5
Not stated	185	5.7	212	11.9	15	7.7	412	7.9
Total	**3,259**	**100.0**	**1,784**	**100.0**	**195**	**100.0**	**5,238**	**100.0**

(a) Age at start of 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 autologous cycles (fresh and thaw), 71.3% were undertaken by nulliparous women compared with 74.4% for oocyte/embryo recipient cycles (Table 4).

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

Age group (years)	Autologous				Oocyte/Embryo Recipient		All	
	Fresh		Thaw					
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Nulliparous	2,512	77.1	1,086	60.9	145	74.4	3,743	71.5
Parous	747	22.9	698	39.1	50	25.6	1,495	28.5
Not stated	0	0	0	0	0	0	0	0
Total	**3,259**	**100.0**	**1,784**	**100.0**	**195**	**100.0**	**5,238**	**100.0**

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

Intracytoplasmic sperm injection procedures

Of the 2,975 autologous fresh cycles where fertilisation was attempted, 1,696 (57.0%) used ICSI procedures and 1,279 (43.0%) used IVF procedures.

Table 5: Number of autologous and recipient cycles with fertilisation attempted by treatment type and procedure, New Zealand, 2013

	Autologous				Oocyte/Embryo Recipient			
	Fresh[a]		Thaw[b]		Fresh[a]		Thaw[b]	
Procedure	Number	Percent	Number	Percent	Number	Percent	Number	Percent
IVF	1,279	43.0	862	50.9	49	55.1	71	68.3
ICSI[c]	1,696	57.0	831	49.1	40	44.9	33	31.7
Total	**2,975**	**100.0**	**1,693**	**100.0**	**89**	**100.0**	**104**	**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 4,345 fresh and thawed autologous embryo transfer cycles, more than four out of five (82.9%) were single embryo transfer (SET) cycles and 16.7% were double embryo transfer (DET) cycles. In women under 35, 94.8% were SET cycles and 5.2% were DET cycles. In women aged 35 or older, three-quarters (76%) of cycles were SET cycles and (23.3%) 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, 2013

Age group (years)[a]	Number of embryos transferred							
	One		Two		Three or more		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<30	362	96.8	12	3.2	0	0.0	374	100.0
30–34	1,136	94.1	71	5.9	0	0.0	1,207	100.0
35–39	1,505	82.7	313	17.2	2	0.1	1,820	100.0
40–44	544	61.8	320	36.4	16	1.8	880	100.0
≥ 45	53	82.8	10	15.6	1	1.6	64	100.0
Total	**3,600**	**82.9**	**726**	**16.7**	**19**	**0.4**	**4,345**	**100.0**

(a) Age at start of a treatment cycle.

Stage of embryo development

Of the 4,345 embryo transfer cycles, 61.9% involved the transfer of day 5–6 embryos (blastocysts) with the remainder day 2-3 embryos (cleavage stage embryos). Of autologous cycles, blastocyst transfers made up 90.4% of thaw cycles compared with 41.3% of fresh cycles (Table 7).

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

Stage of embryo development	Autologous				Oocyte/embryo recipient			
	Fresh		Thaw		Fresh		Thaw	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Cleavage stage	1,444	58.7	163	9.6	34	38.6	15	14.4
Blastocyst	1,016	41.3	1,530	90.4	54	61.4	89	85.6
Total	**2,460**	**100.0**	**1,693**	**100.0**	**88**	**100.0**	**104**	**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 1,797 frozen/thawed embryo transfer cycles, over half (59.7%) involved the transfer of slow frozen embryos.

Table 8: Number of embryo transfer cycles by freezing method and stage of embryo development, New Zealand, 2013

Type and procedure	Autologous				Oocyte/embryo recipient			
	Cleavage stage		Blastocyst		Cleavage stage		Blastocyst	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Slow frozen embryo	134	82.2	874	57.1	10	66.7	54	60.7
Vitrified embryo[(a)]	29	17.8	656	42.9	5	33.3	35	39.3
Total	**163**	**100.0**	**1530**	**100.0**	**15**	**100.0**	**89**	**100.0**

(a) Ultra-rapid cryopreservation.

3.2 Autologous fresh cycles

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

The overall live delivery rate per autologous fresh embryo transfer cycle was 28.6%. The highest live delivery rate per embryo transfer cycle was in women aged less than 30 years (44.9%). 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, 2013

Stage/outcome of treatment	Age group (years)[a]					
	< 30	30–34	35–39	40–44	≥ 45	All
Initiated cycles	318	883	1,349	686	23	3,259
Cycles with OPU	294	837	1,285	620	19	3,055
Embryo transfers	207	650	1,067	520	16	2,460
Clinical pregnancies	101	279	384	111	2	877
Live deliveries	93	234	304	71	1	703
Live deliveries per initiated cycle (%)	*29.2*	*26.5*	*22.5*	*10.3*	*4.3*	*21.6*
Live deliveries per embryo transfer cycle (%)	*44.9*	*36.0*	*28.5*	*13.7*	*6.2*	*28.6*
Live deliveries per clinical pregnancy (%)	*92.1*	*83.9*	*79.2*	*64.0*	*50.0*	*80.2*

(a) Age at start of a treatment cycle.

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

Overall, 74.5% of autologous fresh embryo transfer cycles were SET cycles, 24.8% were DET cycles and 0.7% had three or more embryos transferred. Three or more embryos were transferred in 17 cycles. Overall, the live delivery rate per embryo transfer cycles was 30.4% for SET cycles and 23.3% 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, 2013

Stage/outcome of treatment	Age group (years)[a]							
	<35		35–39		≥ 40		All	
	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]
Embryo transfer cycles	798	59	798	267	237	284	1833	610
Clinical pregnancies	350	30	284	100	41	68	675	198
Live deliveries	301	26	227	77	30	39	558	142
Clinical pregnancies per embryo transfer cycle (%)	*43.9*	*50.8*	*35.6*	*37.5*	*17.3*	*23.9*	*36.8*	*32.5*
Live deliveries per embryo transfer cycle (%)	*37.7*	*44.1*	*28.4*	*28.8*	*12.7*	*13.7*	*30.4*	*23.3*

(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 35 and over, 17 cycles involved the transfer of three or more embryos resulting in 4 clinical pregnancies and 3 live deliveries.

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 14 percentage points higher than for cleavage stage embryo transfer cycles (22.8%).

Table 11: Outcomes of autologous fresh embryo transfer cycles by women's age and stage of embryo development, New Zealand, 2013

Stage/outcome of treatment	Age group (years)[a]							
	<35		35–39		≥ 40		All	
	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]
Embryo transfer cycles	442	415	623	444	379	157	1,444	1016
Clinical pregnancies	164	216	182	202	64	49	410	467
Live deliveries	143	184	149	155	37	35	329	374
Clinical pregnancies per embryo transfer cycle (%)	*37.1*	*52.0*	*29.2*	*45.5*	*16.9*	*31.2*	*28.4*	*46.0*
Live deliveries per embryo transfer cycle (%)	*32.4*	*44.3*	*23.9*	*34.9*	*9.8*	*22.3*	*22.8*	*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 26.6%. The highest live delivery rate per embryo transfer cycle was in women aged under 30 years (34.9%) and declined steadily with advancing women's age (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, 2013

Stage/outcome of treatment	Age group (years)[a]					
	< 30	30–34	35–39	40–44	≥ 45	All
Initiated cycles	172	563	741	294	14	1,784
Embryo transfers	166	539	703	272	13	1,693
Clinical pregnancies	77	202	244	72	2	597
Live deliveries	58	155	184	53	1	451
Live deliveries per initiated cycle (%)	*33.7*	*27.5*	*24.8*	*18.0*	*7.1*	*25.3*
Live deliveries per embryo transfer cycle (%)	*34.9*	*28.8*	*26.2*	*19.5*	*7.7*	*26.6*
Live deliveries per clinical pregnancy (%)	*75.3*	*76.7*	*75.4*	*73.6*	*50.0*	*75.5*

(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 1,784 frozen/thawed embryo transfer cycles, 88.8% were SET cycles, 5.9% were DET cycles and less than 0.1% transferred three embryos. The overall live delivery rate was higher for SET (26.8%) than for DET (24.5%) (Table 13).

Table 13: Outcomes of autologous thaw embryo transfer cycles by women's age and number of embryos transferred, New Zealand, 2013

Stage/outcome of treatment	Age group (years)[a]							
	<35		35–39		≥ 40		All	
	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]	SET[b]	DET[c]
Embryo transfer cycles	683	22	658	45	244	39	1,585	106
Clinical pregnancies	272	7	229	15	57	16	558	38
Live deliveries	209	4	172	12	44	10	425	26
Clinical pregnancies per embryo transfer cycle (%)	*39.8*	*31.8*	*34.8*	*33.3*	*23.4*	*41.0*	*35.2*	*35.8*
Live deliveries per embryo transfer cycle (%)	*30.6*	*18.2*	*26.1*	*26.7*	*18.0*	*25.6*	*26.8*	*24.5*

(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, regardless of a woman's age. The rate of live delivery for blastocyst transfer cycles was 7.8 percentage points higher than for cleavage stage embryo transfer cycles (Table 14).

Table 14: Outcomes of autologous thaw embryo transfer cycles by women's age and stage of embryo development, New Zealand, 2013

Stage/outcome of treatment	Age group (years)[a]							
	<35		35–39		≥ 40		All	
	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]	CL[b]	BL[c]
Embryo transfer cycles	67	638	61	642	35	250	163	1,530
Clinical pregnancies	19	260	16	228	7	67	42	555
Live deliveries	18	195	10	174	4	50	32	419
Clinical pregnancies per embryo transfer cycle (%)	*28.4*	*40.8*	*26.2*	*35.5*	*20.0*	*26.8*	*25.8*	*36.3*
Live deliveries per embryo transfer cycle (%)	*26.9*	*30.6*	*16.4*	*27.1*	*11.4*	*20.0*	*19.6*	*27.4*

(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 103 cycles where the intention was to donate oocytes to a recipient, all cycles proceeded to OPU, however 11 (10.7%) did not result in oocytes being donated. The average age of women donating oocytes was 32.2 years; with 40.8% of cycles in women aged 35 or older (Table 15).

Table 15: Number of oocyte donation cycles by donor's age group, New Zealand, 2013

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	22	22	100.0	18	81.8
30–34	39	39	100.0	38	97.4
35–39	41	41	100.0	35	85.4
≥ 40	1	1	100.0	1	100.0
Total	**103**	**103**	**100.0**	**92**	**89.3**

(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 195 oocyte/embryo recipient cycles in 2013. The majority of these, 92.8% (181) were oocyte recipient cycles and 7.2% (14) were embryo recipient cycles. Of the 195 cycles where the embryos were derived from donated oocyte/embryos, 47.2% were thaw cycles (Table 16). Of the 89 fresh oocyte recipient cycles, 40.4% resulted in a live delivery, higher than the live delivery rate for thaw oocyte recipient cycles (29.3%). The live delivery rate for embryo recipient cycles was 7.1%.

Table 16: Outcomes of oocyte/embryo recipient cycles by treatment type, New Zealand, 2013

Stage/outcome of treatment	Oocyte recipient		Embryo recipient	All
	Fresh	Thaw		
Initiated cycles	89	92	14	195
Embryo transfers	88	90	14	192
Clinical pregnancies	42	32	4	78
Live deliveries	36	27	1	64
Live deliveries per initiated cycle (%)	*40.4*	*29.3*	*7.1*	*32.8*
Live deliveries per embryo transfer cycle (%)	*40.9*	*30.0*	*7.1*	*33.3*
Live deliveries per clinical pregnancy (%)	*85.7*	*84.4*	*25.0*	*82.1*

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 32.8%. Within age categories live delivery rate per initiated cycle ranged between 21.1% and 37.1% (Table 17). In recipients aged 45 and over the live delivery rate per oocyte/embryo recipient cycle was 37.1%. This compares to live delivery rates from autologous fresh and thaw cycles for women of the same age group of 4.3% and 7.1% respectively (Tables 9 and 12).

Table 17: Outcomes of oocyte/embryo recipient cycles by recipient's age group, New Zealand, 2013

Stage/outcome of treatment	Age group (years)[a]				
	< 30	35–39	40–44	≥ 45	All
Initiated cycles	19	53	88	35	195
Embryo transfers	19	50	88	35	192
Clinical pregnancies	6	22	37	13	78
Live deliveries	4	19	28	13	64
Live deliveries per initiated cycle (%)	*21.1*	*35.8*	*31.8*	*37.1*	*32.8*
Live deliveries per embryo transfer cycle (%)	*21.1*	*38.0*	*31.8*	*37.1*	*33.3*
Live deliveries per clinical pregnancy (%)	*66.7*	*86.4*	*75.7*	*100.0*	*82.1*

(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 33.3%. Within age categories live delivery rate per initiated cycle ranged between 0.0% and 37.7%. (Table 18).

Table 18: Outcomes of oocyte/embryo recipient cycles by donor's age group, New Zealand, 2013

Stage/outcome of treatment	Age group (years)[a]				
	< 30	30–34	35–39	≥ 40	All
Initiated cycles	46	75	69	3	195
Embryo transfers	46	73	68	3	192
Clinical pregnancies	16	29	31	1	78
Live deliveries	14	23	26	0	64
Live deliveries per initiated cycle (%)	*30.4*	*30.7*	*37.7*	*0.0*	*32.8*
Live deliveries per embryo transfer cycle (%)	*30.4*	*31.5*	*38.2*	*0.0*	*33.3*
Live deliveries per clinical pregnancy (%)	*87.5*	*79.3*	*83.9*	*0.0*	*82.1*

(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 2013

There were 1,552 clinical pregnancies following autologous and recipient embryo transfer cycles in 2013. Four out of five clinical pregnancies (79.2%) resulted in a delivery and 19.9% resulted in early pregnancy loss (less than 20 weeks gestation and less than 400 grams birthweight). The outcomes of 13 (0.8%) clinical pregnancies were not known because women could not be followed up or contacted by fertility centres.

Early pregnancy loss

Of the 310 early pregnancy losses, 92.6% were miscarriages, 4.2% were due to termination of pregnancy, and 3.2% were ectopic/heterotopic pregnancies. Pregnancies following SET resulted in a lower rate of early pregnancy loss (18.6%) than pregnancies following DET (Table 19).

Table 19: Early pregnancy losses by pregnancy outcome and treatment type, New Zealand, 2013

	Number of embryos transferred							
	One		Two		Three or more		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Early pregnancy loss	242	18.6	66	27.1	2	40.0	310	19.9
Miscarriage	*226*	*17.3*	*59*	*24.3*	*2*	*40.0*	*287*	*18.5*
Termination	*10*	*0.8*	*3*	*1.2*	*0*	*0.0*	*13*	*0.8*
Ectopic or heterotopic pregnancy	*6*	*0.5*	*4*	*1.6*	*0*	*0.0*	*10*	*0.6*
Delivery	1,054	80.8	172	70.8	3	60.0	1,229	79.2
Not stated	8	0.6	5	2.1	0	0.0	13	0.8
Total	**1,304**	**100.0**	**243**	**100.0**	**5**	**100.0**	**1,552**	**100.0**

Deliveries by delivery outcomes and treatment type

There were 1,229 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, 99.1% (1,218) gave birth to at least one liveborn baby (live delivery) (Table 20).

Table 20: Deliveries by delivery outcome and treatment type, New Zealand, 2013

	Autologous							
	Fresh		Thaw		Oocyte/embryo recipient		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Live delivery	703	99.3	451	98.9	64	98.5	1,218	99.1
< 37 weeks	*83*	*11.7*	*50*	*11.0*	*10*	*15.4*	*143*	*11.6*
≥ 37 weeks	*620*	*87.6*	*401*	*87.9*	*54*	*83.1*	*1,075*	*87.5*
Fetal death (stillbirth)[(a)]	5	0.7	5	1.1	1	1.5	11	0.9
Total	**708**	**100.0**	**456**	**100.0**	**65**	**100.0**	**1,229**	**100.0**

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

Deliveries by maternal age

The average age of women at the time of delivery was 35.6 years. Of the 1,229 autologous and recipient deliveries, 5.2% were multiple gestation deliveries. Women aged 40 years and over had the highest proportion of multiple gestation deliveries (9.0%) (Table 21).

Table 21: Deliveries by gestation and maternal age group, New Zealand, 2013

	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	431	22	453	447	53	500	150	212	59
Multiple	14	7	21	6	16	22	6	21	15
Twin	*14*	*7*	*21*	*6*	*15*	*21*	*6*	*21*	*15*
Higher order multiple	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*0*
Total	**445**	**29**	**474**	**453**	**69**	**522**	**156**	**233**	**74**
					Percent				
Singleton	96.9	75.9	95.6	98.7	76.8	95.8	96.2	91.0	79.7
Multiple	3.1	24.1	4.4	1.3	23.1	4.2	3.8	9.0	20.3
Twin	*3.1*	*24.1*	*4.4*	*1.3*	*21.7*	*4.0*	*3.8*	*9.0*	*20.3*
Higher order multiple	*0.0*	*0.0*	*0.0*	*0.0*	*1.4*	*0.2*	*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 38.3 weeks (Table 22). One in six babies (12.5%) were preterm (less than 37 weeks gestation). The average gestational age of ART singletons was 38.4 weeks, while the average gestational age for ART twins was 35.3 weeks.

Table 22: Babies by gestational age and plurality, New Zealand, 2013

	Singletons		Twins		Higher order multiples		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
≤ 27	15	1.3	6	4.8	0	0.0	21	1.6
28–31	12	1.0	8	6.3	3	100.0	23	1.8
32–36	89	7.6	58	46.0	0	0.0	147	11.4
≥ 37	1,049	90.0	54	42.9	0	0.0	1,103	85.2
Total	**1,165**	**100.0**	**126**	**100.0**	**3**	**100.0**	**1,294**	**100.0**
≤ 36	116	9.9	72	57.1	3	100.0	191	14.8

Birth outcomes

The average birthweight for liveborn babies to women who had autologous and recipient embryo transfer cycles was 3,275 grams. Of all liveborn babies, 11.2% were low birthweight (less than 2,500 grams) (Table 23). The average birthweight was 3,370 grams and 2,401 grams for liveborn ART singletons and twins respectively. Low birthweight was reported for 6.8% of liveborn singletons following SET, lower than the 11.2% of liveborn singletons following DET.

Table 23: Liveborn babies by birthweight group and plurality, New Zealand, 2013

Birthweight (g)	Singletons		Twins	Higher order multiples	Total[c]
	SET[a]	DET[b]			
			Number		
< 1,000	5	0	1	0	6
1,000–1,499	5	0	7	1	13
1,500–1,999	12	4	11	2	29
2,000–2,499	47	11	37	0	95
2,500–2,999	155	14	47	0	217
3,000–3,499	358	46	16	0	421
3,500–3,999	290	44	1	0	336
≥ 4,000	146	15	0	0	161
Not stated	1	0	0	0	1
Total	**1,019**	**134**	**120**	**3**	**1,279**
< 2,500	*69*	*15*	*56*	*3*	*143*
			Percent		
< 1,000	0.5	0.0	0.8	0.0	0.5
1,000–1,499	0.5	0.0	5.8	33.3	1.0
1,500–1,999	1.2	3.0	9.2	66.7	2.3
2,000–2,499	4.6	8.2	30.8	0.0	7.4
2,500–2,999	15.2	10.4	39.2	0.0	17.0
3,000–3,499	35.1	34.3	13.3	0.0	32.9
3,500–3,999	28.5	32.8	0.8	0.0	26.3
≥4,000	14.3	11.2	0.0	0.0	12.6
Not stated	0.1	0.0	0.0	0.0	0.1
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
< 2,500	*6.8*	*11.2*	*46.6*	*100*	*11.2*

(a) SET: single embryo transfer.

(b) DET: double embryo transfer.

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

5 Preimplantation genetic diagnosis in 2013

Preimplantation genetic diagnosis (PGD) is a procedure in which cells from the embryo are removed and analysed for chromosomal disorders or genetic diseases before embryo transfer. In 2013, PGD was performed in 94 cycles, representing 1.9% of cycles in which embryos were created or thawed. Of the 94 PGD cycles, 52 (55.3%) had embryos transferred, resulting in 16 (17%) clinical pregnancies and 10 (10.6%) live deliveries.

Table 24: Number of cycles with PGD by type of embryo, New Zealand, 2013

Type of embryo	Stage of treatment		
	Number of cycles with embryos fertilised/thawed	Number of cycles with PGD	Number of cycles with embryos fertilised/thawed (%)
Fresh	2,960	63	2.1
Thaw	1,880	31	1.6
Total	**4,840**	**94**	**1.9**

6 Donor insemination cycles in 2013

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

In 2013, there were 481 DI cycles reported, which included 12.5% (60) undertaken with controlled ovarian hyperstimulation and 75.3% (362) undertaken in unstimulated cycles. Of all DI cycles, 20.6% resulted in a clinical pregnancy and 16.6% resulted in a live delivery (Table 25). The multiple birth rate following DI cycles was 2.5%. 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 35 and decreased with advancing women's age. Of the DI cycles in women aged under 35 years, 22.7% resulted in a live delivery, compared with 5% 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, 2013

Stage/outcome of treatment	Age group (years)[a]				
	< 30	30–34	35–39	≥ 40	Total
DI cycles[b]	66	119	195	101	481
Clinical pregnancies	19	32	37	11	99
Live deliveries	13	29	33	5	80
Clinical pregnancies per DI cycle (%)	*28.8*	*26.9*	*19.0*	*10.9*	*20.6*
Live deliveries per DI cycle (%)	*19.7*	*24.4*	*16.9*	*5.0*	*16.6*
Live deliveries per clinical pregnancy (%)	*68.4*	*90.6*	*89.2*	*45.5*	*80.8*

(a) Age at start of treatment cycle.

(b) DI : Donor Insemination

Clinical pregnancies following DI cycles

Of the 99 clinical pregnancies following DI cycles, 18.2% ending in early pregnancy loss (18 miscarriages). Of the 80 live deliveries, 78 (97.5%) were singleton deliveries and 2 (2.5%) were twin deliveries.

Perinatal outcomes of babies

There were 83 babies born to women who had DI treatment, including 82 liveborn babies and 1 stillborn baby. Of these, none were born preterm (less than 37 weeks gestation). The mean birthweight of liveborn babies was 3,363 grams. This was greater than the mean birthweight (3,275 grams) of babies following embryo transfer cycles. There were seven liveborn babies (8.5%) born with low birthweight (less than 2,500 grams).

7 Trends in ART treatment and outcomes 2009-2013

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

In 2013, 5,373 initiated fresh or thaw ART treatment cycles were undertaken in New Zealand. This was an increase of 3.8% on 2012 and an increase of 0.6% on 2009 (Table 26). The proportion of initiated fresh or thaw cycles reaching embryo transfer has decreased steadily from 83.7% in 2009 to 81.2% in 2013 partly due to changes in clinical practice whereby all embryos resulting from a fresh cycle are frozen and subsequently transferred in thaw cycles. This practice reduces the risk of OHSS in some patients and is a treatment option used by clinicians. Between 2009 and 2013, the live delivery rates per initiated cycle ranged from 22.3% to 23.6% respectively (Table 26).

Table 26: Number of fresh and thaw cycles by stage/outcome of treatment, New Zealand, 2013

Stage/outcome of treatment	2009	2010	2011	2012	2013
Initiated cycles[(a)]	5,339	5,285	5,189	5,177	5,373
Cycles with OPU[(b)]	3,071	3,050	3,113	3,021	3,167
Embryo transfers	4,469	4,416	4,300	4,291	4,365
Clinical pregnancies	1,546	1,537	1,529	1,564	1,560
Live deliveries	1,190	1,193	1,225	1,209	1,225
Embryo transfers per initiated cycle (%)	*83.7*	*83.6*	*82.9*	*82.9*	*81.2*
Clinical pregnancies per initiated cycle (%)	*29.0*	*29.1*	*29.5*	*30.2*	*29.0*
Clinical pregnancies per embryo transfer (%)	*34.6*	*34.8*	*35.6*	*36.4*	*35.7*
Live deliveries per initiated cycle (%)	*22.3*	*22.6*	*23.6*	*23.4*	*22.8*
Live deliveries per embryo transfer (%)	*26.6*	*27.0*	*28.5*	*28.2*	*28.1*

(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 2011–2013

This section presents information on all women who started their first autologous fresh ART treatment cycle between 1st January 2011 and 31st December 2011. Women were followed from the start of their first autologous fresh cycle through subsequent fresh and thaw cycles until 31st December 2013 or until they achieved a live delivery (a delivery of at least one liveborn baby) up to and including 31st October 2014. 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 2013 and their treatment information and resulting outcomes will be captured in subsequent annual reports. Therefore, in this dynamic cohort of women undergoing their first autologous fresh ART treatment between 1st January 2011 and 31st December 2011, 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. Cycles which were cancelled at any stage and did not proceed to oocyte collection or embryo transfer are included. Donor sperm insemination cycles, oocyte/embryo recipient cycles, oocyte/embryo donation cycles, surrogacy arrangement cycles and gamete intrafallopian transfer (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 for all age groups and women aged <30, 30–34, 35–39 and ≥40 years. Only the first five cycles are presented due to the small number of women undertaking six or more treatment cycles between 1st January 2011 and 31st December 2013.

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 20.2% for cycle number 3 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 31st December 2013 divided by the number of women who did not have a live delivery in that cycle. For example, the non-progression rate of 23.1% for cycle number 3 measures the proportion of women who did not achieve a live delivery in cycle number 3, and did not progress to a fourth cycle (Table 28). Reasons why a woman/couple did not progress for further treatment, such as

poor prognosis, natural pregnancy, migration, financial, psychological and other unrelated reasons are not collected by ANZARD.

- 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 1st January 2011 and 31st December 2011. For example, the cumulative live delivery rate of 43.5% for cycle number 3 measures the proportion of women who started ART treatment in 2009 and achieved a live delivery following their first 3 cycles (Table 28).

Note, only the first birth to a woman 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 between 1st January 2011 and 31st December 2011, New Zealand, 2011–2013

Cycle number[b]	Age group years[a]				
	< 30	30–34	35–39	≥ 40	All
			Number		
One	83	229	263	142	717
Two	58	128	171	72	429
Three	22	52	88	27	189
Four	12	28	45	15	100
Five or more	18	29	36	2	85
Total	**193**	**466**	**603**	**258**	**1,520**
			Percent		
One	43.0	49.1	43.6	55.0	47.2
Two	30.1	27.5	28.4	27.9	28.2
Three	11.4	11.2	14.6	10.5	12.4
Four	6.2	6.0	7.5	5.8	6.6
Five or more	9.3	6.2	6.0	0.8	5.6
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

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

(b) Women who started their first autologous fresh ART treatment cycle between 1st January 2011 and 31st December 2011 and were followed through subsequent fresh and thaw cycles until 31st December 2013 or delivery of a liveborn baby up to and including 31st October 2014.

Note: Totals and subtotals may not equal 100.0 due to rounding. Data should be interpreted with caution due to small numbers in certain cells.

Table 28: Cycle-specific and cumulative live delivery rates for all women who started their first autologous fresh cycle between 1st January 2011 and 31st December 2011, New Zealand, 2011–2013

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	1,520	398	26.2	319	21.0	26.2
Two	803	209	26.0	220	27.4	39.9
Three	374	81	21.7	108	28.9	45.3
Four	185	41	22.2	59	31.9	48.0
Five	85	20	23.5	24	28.2	49.3

(a) Women who started their first autologous fresh ART treatment cycle between 1st January 2011 and 31st December 2011 and were followed through subsequent fresh and thaw cycles until 31st December 2013 or delivery of a liveborn baby up to and including 31st October 2014.

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

(c) The cycle-specific live delivery rate 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 31st December 2013 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 1st January 2011 and 31st December 2011.

Note: Further treatment cycles after the 5th 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 between 1st January 2011 and 31st December 2011, New Zealand, 2011–2013

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	193	52	26.9	31	16.1	26.9
Two	110	35	31.8	23	20.9	45.1
Three	52	8	15.4	14	26.9	49.2
Four	30	8	26.7	4	13.3	53.4
Five	18	8	44.4	3	16.7	57.5

(a) Women who started their first autologous fresh ART treatment cycle between 1st January 2011 and 31st December 2011 and were followed through subsequent fresh and thaw cycles until 31st December 2013 or delivery of a liveborn baby up to and including 31st October 2014.

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

(c) The cycle-specific live delivery rate 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 31st December 2013 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 1st January 2011 and 31st December 2011.

Note: Further treatment cycles after the 5th 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 between 1st January 2011 and 31st December 2011, New Zealand, 2011–2013

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	466	167	35.8	62	13.3	35.8
Two	237	80	33.8	48	20.3	53.0
Three	109	28	25.7	24	22.0	59.0
Four	57	14	24.6	14	24.6	62.0
Five	29	6	20.7	6	20.7	63.3

(a) Women who started their first autologous fresh ART treatment cycle between 1st January 2011 and 31st December 2011 and were followed through subsequent fresh and thaw cycles until 31st December 2013 or delivery of a liveborn baby up to and including 31st October 2014.

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

(c) The cycle-specific live delivery rate 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 31st December 2013 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 1st January 2011 and 31st December 2011.

Note: Further treatment cycles after the 5th 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 between 1st January 2011 and 31st December 2011, New Zealand, 2011–2013

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	603	153	25.4	110	18.2	25.4
Two	340	78	22.9	93	27.4	38.3
Three	169	38	22.5	50	29.6	44.6
Four	81	16	19.8	29	35.8	47.3
Five	36	6	16.7	13	36.1	48.3

(a) Women who started their first autologous fresh ART treatment cycle between 1st January 2011 and 31st December 2011 and were followed through subsequent fresh and thaw cycles until 31st December 2013 or delivery of a liveborn baby up to and including 31st October 2014.

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

(c) The cycle-specific live delivery rate 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 31st December 2013 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 1st January 2011 and 31st December 2011.

Note: Further treatment cycles after the 5th 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 between 1st January 2011 and 31st December 2011, New Zealand, 2011–2013

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	258	26	10.1	116	45.0	10.1
Two	116	16	13.8	56	48.3	16.3
Three	44	7	15.9	20	45.5	19.0
Four	17	3	17.6	12	70.6	20.2
Five	2	0	0.0	2	100.0	20.2

(a) Women who started their first autologous fresh ART treatment cycle between 1st January 2011 and 31st December 2011 and were followed through subsequent fresh and thaw cycles until 31st December 2013 or delivery of a liveborn baby up to and including 31st October 2014.

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

(c) The cycle-specific live delivery rate 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 31st December 2013 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 1st January 2011 and 31st December 2011.

Note: Further treatment cycles after the 5th 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 Christchurch, Christchurch (Dr Sarah Wakeman)
Fertility Associates Hamilton, Hamilton (Dr VP Singh)
Fertility Associates Wellington, Wellington (Dr Andrew Murray)
Fertility Plus, Auckland (Dr Neil Johnson)
Repromed Auckland, Auckland (Dr Guy Gudex)
The Otago Fertility Services, Dunedin (Associate Professor Wayne Gillett)

Appendix B: Data used in this report

The data presented in this report are supplied by 7 fertility clinics in New Zealand and are compiled into ANZARD2.0. ANZARD2.0 includes autologous treatment cycles, treatment involving donated oocytes or embryos and treatment involving surrogacy arrangements. ANZARD2.0 collects data on the use of ART techniques such as ICSI, oocyte/embryo freezing methods, PGD and cleavage stage/blastocyst transfers. In addition to ART procedures, ANZARD2.0 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 ANZARD2.0. 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 ART and DI treatment cycles that took place in fertility clinics in New Zealand in 2013, and the resulting pregnancies and births. The babies included in this report were conceived through treatment cycles undertaken in 2013, and were born in either 2013 or 2014.

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 2013, information relating to pregnancy and birth outcomes was provided for all New Zealand based cycles.

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

Data presentation

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. This means that information reported about patient characteristics, such as age, parity and cause of infertility, is based on calculations in which individuals may be counted more than once.

The rates of clinical pregnancy and live delivery in Chapters 2 to 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, 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 fertility centre and includes follow-up with the patient or clinician or the use of routine data sourced from a health department. In a small proportion of cases this information is not available. For pregnancies in which there is successful follow-up, data are limited by the self-reported nature of the information. Fertility centre staff invest 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.

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

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

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

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

Blastocyst: an embryo comprising about 100 cells usually developed by 5 or 6 days after fertilisation.

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

Cleavage stage embryo: an embryo comprising about 8 cells usually developed by 2 or 3 days after fertilisation.

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

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

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

Cryopreservation: freezing embryos for potential future ART treatment.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Nulliparous: refers to 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 experienced that reached 20 weeks or more gestation.

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

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

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

Preterm: a gestation of less than 37 weeks.

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

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

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

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

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

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

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

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