Advisory Committee on
Assisted Reproductive Technology

# Assisted Reproductive Technology in New Zealand 2011

September 2014

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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Advisory Committee on Assisted Reproductive Technology

# 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 2011*, the third 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. This report is also the first in this series to include data on cumulative success rates.

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. 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 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.

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 Alan Macaldowie and Alex Wang of the Australian Institute of Health and Welfare for collaborating with ACART to develop the report.

**Alison Douglass**
Acting Chair, Advisory Committee on Assisted Reproductive Technology
22 August 2014

# 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 formally affiliated unit of the University of New South Wales (UNSW) under the School of Women's and Children's Health.

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 |
| ICMART | International Committee Monitoring Assisted Reproductive Technologies |
| 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 5189 assisted reproductive technology (ART) treatment cycles reported from New Zealand in 2011. Women used their own oocytes/embryos in 92.2% of treatments (autologous), and almost one-third (32.7%) of all cycles used frozen/thawed embryos.

### Treatment outcomes and number of babies

Of the 5189 ART treatment cycles, 29.5% (1529) resulted in a clinical pregnancy and 23.6% (1225) in a live delivery. There were 1295 live-born babies, and 80.3% (1040) were singletons at term (gestational age of 37–41 weeks) with normal birthweight (≥2500 grams).

### Women's age and parity

The average age of women undertaking autologous cycles was 35.6 years. One in five (21.2%) autologous fresh cycles was in women aged 40 years or over. For women undergoing ART treatment using donor oocytes/embryos, the average age was 40.3 years. Over one-quarter (27.8%) of cycles in 2011 were undertaken by women who had previously given birth.

### Transfer of cryopreserved embryos

Of the 1560 frozen/thawed embryo transfer cycles, 16.3% involved the transfer of embryos that had been cryopreserved using an ultra-rapid method (vitrification). Of these frozen/thawed embryo transfer cycles, 19.6% were cleavage embryo (day 2–3 embryo) transfers and 80.4% were blastocyst (day 5–6 embryo) transfers.

### Success by age

The live-delivery rate per autologous fresh embryo transfer cycle was highest in women aged less than 35 years (32.6%). The rate declined steadily with advancing women's age.

### Deliveries by gestation and women's age

Of the 1228 deliveries following autologous and recipient cycles in 2011, 5.8% were multiple gestation deliveries. Women aged less than 35 years had a lower proportion of multiple gestation deliveries than women aged 35–39 years and those age 40 years or older.

### Cumulative success rates

Since 2009, the ANZARD has included 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 1492 women identified as having their first fresh autologous cycle in 2009. These women were followed through their subsequent fresh and thaw cycles until 31 December 2011, or until they achieved a live delivery (a delivery of at least one live-born baby) up to and including 31 October 2012. For women who undertook their first autologous fresh cycle between 2009 and 2011, the cumulative live delivery rate was 25.8% after the first cycle, increasing to 35.4% after two cycles, 41.2% after three cycles, 43.5% after four cycles and 45.4% after five cycles.

# 1 Introduction

It is estimated that about 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 medical definition of infertility is usually defined as the failure to achieve a clinical pregnancy after 12 or more months of regular unprotected sexual intercourse (Zegers-Hochschild et al 2009). Infertility is increasingly being overcome through advancements in fertility treatment, in particular assisted reproductive technologies (ARTs). ARTs have evolved over the last three decades into a suite of mainstream medical interventions that have resulted in the birth of more than 5 million children worldwide (ICMART 2012).

Scientific advancements continue to emerge in the field of ART treatment, clinical practice and patient characteristics. The purpose of this report on ART treatments undertaken in New Zealand is to keep clinicians, researchers and the public informed about ART treatment and the resulting pregnancy outcomes; to provide an ongoing mechanism for monitoring of ART treatment practices, success rates and perinatal outcomes and; to provide information for national and international comparisons.

## Treatments covered in this report

ART is a group of procedures that involves 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 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 embryo (six to eight 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 for a pregnancy to occur.

Treatment may be discontinued at any stage during a treatment cycle due to a number of reasons, including inadequate or excessive ovarian stimulation, failed 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, the aim being to potentially improve the chance of implantation in the uterus
- gamete intrafallopian transfer (GIFT), when mature oocytes and sperm are placed directly into a woman's fallopian tubes so that in vivo (inside the body) fertilisation may take place. While once popular, this procedure now only accounts for 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 before embryo transfer
- donor/recipient arrangements, when donor oocytes from a woman are used to create embryos for transfer to another (recipient) 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
- surrogacy arrangements, where a woman, known as the gestational carrier, agrees to carry a child for another person or couple, known as the intended parent(s), with the intention that the child will be raised by the intended parent(s).

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

## Data used in this report

This report provides information on ART and DI treatments and the resulting pregnancy and birth outcomes.

As a joint initiative of the National Perinatal Epidemiology and Statistics Unit (NPESU) at the University of New South Wales (UNSW) and the Fertility Society of Australia (FSA), the Australian and New Zealand Assisted Reproduction Database (ANZARD) was upgraded in 2009 to accommodate new ART treatment types and to transform ANZARD from a cycle-based data collection to a woman-based data collection (ANZARD2.0). A more detailed description of ANZARD2.0 can be found in Appendices B and C.

The data presented in this report were supplied by all seven fertility centres in New Zealand, and compiled into ANZARD2.0.

## Structure of this report

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

- Chapter 2—'Overview of ART treatment in 2011', provides an outline of the numbers and outcomes of all ART treatments undertaken in New Zealand.
- Chapter 3—'Autologous and donation/recipient cycles in 2011', presents data on women undergoing treatment, cycle types, and the outcomes of treatment in terms of discontinued treatment, clinical pregnancies and deliveries.
- Chapter 4—'Pregnancy and birth outcomes following embryo transfer cycles in 2011', 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 2011', presents data on DI cycles and their outcomes, including a description of pregnancy and perinatal outcomes.
- Chapter 7—'Cumulative success rates for women undertaking autologous treatment 2009–2011', presents information on all women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009.
- Appendices—Appendix A lists the contributing fertility clinics. Appendix B provides an overview of the ANZARD2.0 data collection that was used to prepare this report. Appendix C provides a detailed list of the data items in the collection.

# 2 Overview of ART treatment in 2011

There were 5189 ART treatment cycles reported from New Zealand clinics in 2011. Of these, 92.2% of cycles were autologous cycles (where a woman intended to use, or used her own oocytes or embryos). Of these 4784 autologous cycles, 3221 (67.3%) were fresh cycles and 1563 (32.7%) were thaw cycles. Other treatment cycles accounted for a small proportion of cycles comprising 3.9% oocyte recipient cycles, 0.5% embryo recipient cycles, 2.5% oocyte donation cycles and 0.9% surrogacy cycles.

Of all the ART treatments in 2011, 29.5% (1529) resulted in a clinical pregnancy and 23.6% (1225) in a live delivery. There were 1295 live-born babies, 80.3% (1040) were singletons at term (gestational age of 37–41 weeks) with normal birthweight (≥2500 grams).

**Table 1: Number of initiated ART treatment cycles by treatment type, New Zealand, 2011**

| 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 | 4784 | 92.2 | 1440 | 1151 | 1219 | 981 |
| *Fresh* | *3221* | *62.1* | *994* | *794* | *845* | *675* |
| *Thaw* | *1563* | *30.1* | *446* | *357* | *374* | *306* |
| Oocyte recipient | 203 | 3.9 | 79 | 65 | 67 | 51 |
| Embryo recipient | 24 | 0.5 | 5 | 5 | 5 | 4 |
| Oocyte donation | 130 | 2.5 | – | – | – | – |
| Surrogacy arrangement cycles | 48 | 0.9 | 5 | 4 | 4 | 4 |
| *Intended parent cycles* | *16* | *0.3* | – | – | – | – |
| *Gestational carrier cycles* | *32* | *0.6* | *5* | *4* | *4* | *4* |
| **Total** | **5189** | **100.0** | **1529** | **1225** | **1295** | **1040** |

# 3 Autologous and donation/recipient cycles in 2011

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.

## 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 40.3 years, almost four years older than for autologous cycles (35.6 years).

Of all autologous and oocyte/embryo recipient cycles, one in five (21.6%) were undertaken by women aged 40 years or older (Table 2). The average age of partners was 38.6 years, with more than one-third (37.8%) 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, 2011**

| Age group (years)[(a)] | Autologous | | | | Oocyte/embryo recipient | | All | |
|---|---|---|---|---|---|---|---|---|
| | Fresh | | Thaw | | | | | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| < 30 | 299 | 9.3 | 144 | 9.2 | 4 | 1.8 | 447 | 8.9 |
| 30–34 | 866 | 26.9 | 474 | 30.3 | 24 | 10.6 | 1364 | 27.2 |
| 35–39 | 1374 | 42.7 | 685 | 43.8 | 57 | 25.1 | 2116 | 42.2 |
| 40–44 | 662 | 20.6 | 249 | 15.9 | 103 | 45.4 | 1014 | 20.2 |
| ≥ 45 | 20 | 0.6 | 11 | 0.7 | 39 | 17.2 | 70 | 1.4 |
| **Total** | **3221** | **100.0** | **1563** | **100.0** | **227** | **100.0** | **5011** | **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 women's partners' age group and treatment type, New Zealand, 2011**

| Age group (years)[(a)] | Autologous | | | | Oocyte/embryo recipient | | All | |
|---|---|---|---|---|---|---|---|---|
| | Fresh | | Thaw | | | | | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| < 30 | 168 | 5.2 | 70 | 4.5 | 5 | 2.2 | 243 | 4.8 |
| 30–34 | 698 | 21.7 | 336 | 21.5 | 23 | 10.1 | 1057 | 21.1 |
| 35–39 | 1012 | 31.4 | 526 | 33.7 | 66 | 29.1 | 1604 | 32.0 |
| 40–44 | 727 | 22.6 | 363 | 23.2 | 69 | 30.4 | 1159 | 23.1 |
| ≥ 45 | 462 | 14.3 | 223 | 14.3 | 51 | 22.5 | 736 | 14.7 |
| Not stated | 154 | 4.8 | 45 | 2.9 | 13 | 5.7 | 212 | 4.2 |
| **Total** | **3221** | **100.0** | **1563** | **100.0** | **227** | **100.0** | **5011** | **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), 72.0% were undertaken by nulliparous women compared with 76.2% for oocyte/embryo recipient cycles (Table 4).

**Table 4: Number of autologous and recipient cycles by parity and treatment type, New Zealand, 2011**

| Parity | Autologous | | | | Oocyte/embryo recipient | | All | |
|---|---|---|---|---|---|---|---|---|
| | Fresh | | Thaw | | | | | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Nulliparous | 2536 | 78.7 | 907 | 58.0 | 173 | 76.2 | 3616 | 72.2 |
| Parous | 685 | 21.3 | 655 | 41.9 | 54 | 23.8 | 1394 | 27.8 |
| Not stated | – | – | 1 | 0.1 | – | – | 1 | 0.0 |
| **Total** | **3221** | **100.0** | **1563** | **100.0** | **227** | **100.0** | **5011** | **100.0** |

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

**Table 5: Number of autologous and recipient cycles with fertilisation attempted by treatment type and procedure, New Zealand, 2011**

| | Autologous | | | | Oocyte/embryo recipient | | | |
|---|---|---|---|---|---|---|---|---|
| | Fresh[(a)] | | Thaw[(b)] | | Fresh[(a)] | | Thaw[(b)] | |
| Procedure | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| IVF | 1237 | 42.7 | 687 | 47.5 | 60 | 56.1 | 83 | 72.2 |
| ICSI[(c)] | 1660 | 57.3 | 758 | 52.5 | 47 | 43.9 | 32 | 27.8 |
| **Total** | **2897** | **100.0** | **1445** | **100.0** | **107** | **100.0** | **115** | **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.

**Table 6: Number of autologous and recipient embryo transfer cycles by number of embryos transferred per cycle and women's age group, New Zealand, 2011**

| | Number of embryos transferred | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Age group (years)[(a)] | One | | Two | | Three or more | | All | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| < 30 | 338 | 10.7 | 26 | 2.5 | 0 | 0.0 | 364 | 8.5 |
| 30–34 | 1080 | 34.0 | 110 | 10.5 | 0 | 0.0 | 1190 | 27.8 |
| 35–39 | 1275 | 40.2 | 528 | 50.4 | 5 | 9.1 | 1808 | 42.3 |
| 40–44 | 432 | 13.6 | 375 | 35.8 | 47 | 85.5 | 854 | 20.0 |
| ≥ 45 | 48 | 1.5 | 9 | 0.9 | 3 | 5.5 | 60 | 1.4 |
| **Total** | **3173** | **100.0** | **1048** | **100.0** | **55** | **100.0** | **4276** | **100.0** |

(a) Age at start of a treatment cycle.

**Table 7: Number of autologous and recipient embryo transfer cycles by treatment type and stage of embryo development, New Zealand, 2011**

| | Autologous | | | | Oocyte/embryo recipient | | | |
|---|---|---|---|---|---|---|---|---|
| | Fresh | | Thaw | | Fresh | | Thaw | |
| Type and procedure | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Cleavage embryo | 1633 | 62.5 | 279 | 19.3 | 56 | 53.3 | 26 | 22.6 |
| Blastocyst | 978 | 37.5 | 1166 | 80.7 | 49 | 46.7 | 89 | 77.4 |
| **Total** | **2611** | **100.0** | **1445** | **100.0** | **105** | **100.0** | **115** | **100.0** |

**Table 8: Number of autologous and recipient embryo transfer cycles by freezing method and stage of embryo development, New Zealand, 2011**

| | Autologous | | | | Oocyte/embryo recipient | | | |
|---|---|---|---|---|---|---|---|---|
| | Cleavage embryo | | Blastocyst | | Cleavage embryo | | Blastocyst | |
| Type and procedure | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Slow frozen embryo | 279 | 100.0 | 932 | 79.9 | 26 | 100.0 | 69 | 77.5 |
| Vitrified(a) embryo | 0 | 0.0 | 234 | 20.1 | 0 | 0.0 | 20 | 22.5 |
| **Total** | **279** | **100.0** | **1166** | **100.0** | **26** | **100.0** | **89** | **100.0** |

(a) Ultra-rapid cryopreservation.

## 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 24.7%. The highest live delivery rate per embryo transfer cycle was in women aged less than 35 years (32.6%). 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, 2011**

| | Age group (years)[a] | | | | | |
|---|---|---|---|---|---|---|
| **Stage/outcome of treatment** | **< 30** | **30–34** | **35–39** | **40–44** | **≥ 45** | **All** |
| Initiated cycles | 299 | 866 | 1374 | 662 | 20 | 3221 |
| Cycles with OPU | 276 | 816 | 1272 | 596 | 16 | 2976 |
| Embryo transfers | 225 | 732 | 1116 | 526 | 12 | 2611 |
| Clinical pregnancies | 101 | 332 | 433 | 126 | 2 | 994 |
| Live deliveries | 90 | 290 | 336 | 77 | 1 | 794 |
| *Live deliveries per initiated cycle (%)* | 30.1 | 33.5 | 24.5 | 11.6 | 5.0 | 24.7 |
| *Live deliveries per embryo transfer cycle (%)* | 40.0 | 39.6 | 30.1 | 14.6 | 8.3 | 30.4 |
| *Live deliveries per clinical pregnancy (%)* | 89.1 | 87.3 | 77.6 | 61.1 | 50.0 | 79.9 |

(a) Age at start of a treatment cycle.

## 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 22.8%, varying between 25.1% and 17.3% (Table 10). It is important to note that embryos thawed during a thaw cycle were created at an earlier initiated fresh cycle, therefore a woman's age at the start of a thaw cycle is older than her age at the start of the initiated fresh cycle.

**Table 10: Outcomes of autologous thaw cycles by women's age group, New Zealand, 2011**

| | Age group (years)[a] | | | | | |
|---|---|---|---|---|---|---|
| **Stage/outcome of treatment** | **< 30** | **30–34** | **35–39** | **40–44** | **≥ 45** | **All** |
| Initiated cycles | 144 | 474 | 685 | 249 | 11 | 1563 |
| Embryo transfers | 135 | 435 | 638 | 227 | 10 | 1445 |
| Clinical pregnancies | 35 | 136 | 216 | 56 | 3 | 446 |
| Live deliveries | 30 | 110 | 172 | 43 | 2 | 357 |
| *Live deliveries per initiated cycle (%)* | *20.8* | *23.2* | *25.1* | *17.3* | *18.2* | *22.8* |
| *Live deliveries per embryo transfer cycle (%)* | *22.2* | *25.3* | *27.0* | *18.9* | *20.0* | *24.7* |
| *Live deliveries per clinical pregnancy (%)* | *85.7* | *80.9* | *79.6* | *76.8* | *66.7* | *80.0* |

(a) Age at start of a treatment cycle.

## Oocyte donation cycles

The average age of women donating oocytes was 33.0 years, with 41.5% of cycles in women aged 35 years or older. Of the 130 cycles where the intention was to donate oocytes to a recipient, 91.5% resulted in donations (Table 11).

**Table 11: Number of oocyte donation cycles by donor's age group, New Zealand, 2011**

| 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 | 27 | 23 | 85.2 | 23 | 85.2 |
| 30–34 | 49 | 48 | 98.0 | 44 | 89.8 |
| 35–39 | 48 | 47 | 97.9 | 47 | 97.9 |
| ≥ 40 | 6 | 5 | 83.3 | 5 | 83.3 |
| **Total** | **130** | **123** | **94.6** | **119** | **91.5** |

(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 227 oocyte/embryo recipient cycles in 2011. The majority of these, 89.4% (203), were oocyte recipient cycles and 10.6% (24) were embryo recipient cycles. Of the 227 cycles where the embryos were derived from donated oocytes, 47.3% were thaw cycles (Table 12).

Of the 107 fresh oocyte recipient cycles, 36.4% resulted in a live delivery, which is markedly higher than the live delivery rate for thaw oocyte recipient cycles (27.1%). The live delivery rate for embryo recipient cycles was 20.8%; however, the number of embryo recipient cycles was considerably smaller than the number of oocyte recipient cycles.

**Table 12: Outcomes of oocyte/embryo recipient cycles by treatment type, New Zealand, 2011**

| | Oocyte recipient | | | |
|---|---|---|---|---|
| Stage/outcome of treatment | Fresh | Thaw | Embryo recipient | All |
| Initiated cycles | 107 | 96 | 24 | 227 |
| Embryo transfers | 105 | 93 | 22 | 220 |
| Clinical pregnancies | 45 | 34 | 5 | 84 |
| Live deliveries | 39 | 26 | 5 | 70 |
| *Live deliveries per initiated cycle (%)* | *36.4* | *27.1* | *20.8* | *30.8* |
| *Live deliveries per embryo transfer cycle (%)* | *37.1* | *28.0* | *22.7* | *31.8* |
| *Live deliveries per clinical pregnancy (%)* | *86.7* | *76.5* | *100.0* | *83.3* |

## 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 30.8%. The live delivery rate per initiated cycle ranged between 25.0% and 35.1%. The live delivery rate of oocyte/embryo recipient cycles in recipients aged ≥ 45 years (25.6%) was higher (Table 13) than the rate of autologous fresh cycles (5.0%) and autologous thaw cycles (18.2%) in women aged ≥ 45 years (Tables 9 and 10).

**Table 13: Outcomes of oocyte/embryo recipient cycles by recipient's age group, New Zealand, 2011**

| | Age group (years)[a] | | | | | |
|---|---|---|---|---|---|---|
| **Stage/outcome of treatment** | **< 30** | **30–34** | **35–39** | **40–44** | **≥ 45** | **All** |
| Initiated cycles | 4 | 24 | 57 | 103 | 39 | 227 |
| Embryo transfers | 4 | 23 | 54 | 101 | 38 | 220 |
| Clinical pregnancies | 1 | 9 | 23 | 37 | 14 | 84 |
| Live deliveries | 1 | 8 | 20 | 31 | 10 | 70 |
| *Live deliveries per initiated cycle (%)* | *25.0* | *33.3* | *35.1* | *30.1* | *25.6* | *30.8* |
| *Live deliveries per embryo transfer cycle (%)* | *25.0* | *34.8* | *37.0* | *30.7* | *26.3* | *31.8* |
| *Live deliveries per clinical pregnancy (%)* | *100.0* | *88.9* | *87.0* | *83.8* | *71.4* | *83.3* |

(a) Age at start of a treatment cycle.

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

The clinical pregnancy and live delivery rates were higher for recipient cycles where donors were in their 20s than for cycles with donors in all other age groups.

The overall live delivery rate per embryo transfer cycle was 31.8%. This rate was 41.7% in donors aged less than 30 years, and it decreased with advancing donors age (Table 14).

**Table 14: Outcomes of oocyte/embryo recipient cycles by donor's age group, New Zealand, 2011**

| | Age group (years)[a] | | | | | |
|---|---|---|---|---|---|---|
| **Stage/outcome of treatment** | **< 25** | **25–29** | **30–34** | **35–39** | **≥ 40** | **All[b]** |
| Initiated cycles | 17 | 19 | 95 | 85 | 8 | 227 |
| Embryo transfer cycles | 17 | 17 | 93 | 82 | 8 | 220 |
| Clinical pregnancies | 8 | 10 | 37 | 27 | 1 | 84 |
| Live deliveries | 6 | 9 | 31 | 23 | 0 | 70 |
| *Live deliveries per initiated cycle (%)* | *35.3* | *47.4* | *32.6* | *27.1* | *0.0* | *30.8* |
| *Live deliveries per embryo transfer cycle (%)* | *35.3* | *52.9* | *33.3* | *28.0* | *0.0* | *31.8* |
| *Live deliveries per clinical pregnancy (%)* | *75.0* | *90.0* | *83.8* | *85.2* | *0.0* | *83.3* |

(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 2011

There were 1524 clinical pregnancies following autologous and recipient embryo transfer cycles in 2011. Four out of five clinical pregnancies (80.8%) resulted in a delivery, and 18.3% resulted in early pregnancy loss (less than 20 weeks gestation and less than 400 grams birthweight). The outcomes of 14 (0.9%) clinical pregnancies were not known because women could not be followed up or contacted by fertility centres.

## Early pregnancy loss

Of the 279 early pregnancy losses, 87.8% were miscarriages, 5.4% were due to termination of pregnancy, and 6.8% were ectopic pregnancies.

**Table 15: Early pregnancy losses by pregnancy outcome and treatment type, New Zealand, 2011**

| | Number of embryos transferred | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | One | | Two | | Three or more | | All | |
| Pregnancy outcome | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Early pregnancy loss | 190 | 16.9 | 79 | 20.9 | 10 | 47.6 | 279 | 18.3 |
| *Miscarriage* | *169* | *15.0* | *66* | *17.5* | *10* | *47.6* | *245* | *16.1* |
| *Termination* | *11* | *1.0* | *4* | *1.1* | *0* | *0.0* | *15* | *1.0* |
| *Ectopic* | *10* | *0.9* | *9* | *2.4* | *0* | *0.0* | *19* | *1.2* |
| Delivery | 925 | 82.2 | 295 | 78.0 | 11 | 52.4 | 1231 | 80.8 |
| Not stated | 10 | 0.9 | 4 | 1.1 | 0 | 0.0 | 14 | 0.9 |
| **Total** | **1125** | **100.0** | **378** | **100.0** | **21** | **100.0** | **1524** | **100.0** |

(a) Age at start of a treatment cycle.

## Deliveries by delivery outcomes and treatment type

There were 1228 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, 99.4% (1221) gave birth to at least one live-born baby (live delivery). Nearly all autologous cycles and oocyte/embryo recipient cycles resulted in a live delivery (99.5% and 98.6% respectively) (Table 16).

**Table 16: Deliveries by delivery outcome and treatment type, New Zealand, 2011**

| | Autologous | | | | Oocyte /embryo recipient | | All | |
|---|---|---|---|---|---|---|---|---|
| | Fresh | | Thaw | | | | | |
| Pregnancy outcome | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Live delivery | 794 | 99.4 | 357 | 99.7 | 70 | 98.6 | 1221 | 99.4 |
| *< 37 weeks* | *80* | *10.0* | *36* | *10.1* | *14* | *19.7* | *130* | *10.6* |
| *≥ 37 weeks* | *714* | *89.4* | *321* | *89.7* | *56* | *78.9* | *1091* | *88.8* |
| Fetal death (stillbirth)[(a)] | 5 | 0.6 | 1 | 0.3 | 1 | 1.4 | 7 | 0.6 |
| **Total** | **799** | **100.0** | **358** | **100.0** | **71** | **100.0** | **1228** | **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 35.8 years. Of the 1231 deliveries, 5.8% were multiple gestation deliveries. Women aged less than 35 years had the lowest proportion of multiple gestation deliveries (5.0%)(Table 17).

**Table 17: Deliveries by gestation and maternal age group, New Zealand, 2011**

| | Age group (years)[(a)] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | < 35 | | | 35–39 | | | ≥ 40 | | |
| Gestation | One embryo | Two embryos | All[(b)] | One embryo | Two embryos | All[(b)] | One embryo | Two embryos | All[(b)] |
| | | | | | Number | | | | |
| Singleton | 409 | 24 | 433 | 377 | 106 | 485 | 126 | 108 | 242 |
| Multiple | *5* | *18* | *23* | *5* | *29* | *34* | *3* | *10* | *14* |
| *Twin* | 5 | 17 | 22 | 4 | 29 | 33 | 3 | 9 | 13 |
| *Higher order multiple* | – | 1 | 1 | 1 | – | 1 | – | 1 | 1 |
| Total | **414** | **42** | **456** | **382** | **135** | **519** | **129** | **118** | **256** |
| | | | | | Percent | | | | |
| Singleton | 98.8 | 57.1 | 95.0 | 98.7 | 78.5 | 93.4 | 97.7 | 91.5 | 94.5 |
| Multiple | *1.2* | *42.9* | *5.0* | *1.3* | *21.5* | *6.6* | *2.3* | *8.5* | *5.5* |
| *Twin* | 1.2 | 40.5 | 4.8 | 1.0 | 21.5 | 6.4 | 2.3 | 7.6 | 5.1 |
| *Higher order multiple* | – | 2.4 | 0.2 | 0.3 | – | 0.2 | – | 0.8 | 0.4 |
| **Total** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |

(a) Age at time of delivery.
(b) Included three or more embryos.

## Birth outcomes

The average birthweight for live-born babies to women who had autologous and recipient embryo transfer cycles was 3310 grams. Of all live-born babies, 11.0% were low birthweight (less than 2500 grams) (Table 18).

The average birthweight was 3428 grams and 2355 grams for live-born ART singletons and twins, respectively. Low birthweight was reported for 5.0% of live-born singletons following SET, lower than the 6.0% of those following DET.

**Table 18: Live-born babies by birthweight group and plurality, New Zealand, 2011**

| Birthweight (g) | Singletons | | Twins | Higher order multiples | Total |
|---|---|---|---|---|---|
| | SET(a) | DET(b) | | | |
| | | | **Number** | | |
| < 1000 | 6 | – | 6 | – | 12 |
| 1000–1499 | 4 | – | 9 | 1 | 14 |
| 1500–1999 | 13 | 5 | 21 | 2 | 42 |
| 2000–2499 | 22 | 9 | 38 | 5 | 74 |
| 2500–2999 | 128 | 39 | 35 | 1 | 206 |
| 3000–3499 | 304 | 87 | 17 | – | 411 |
| 3500–3999 | 285 | 54 | 2 | – | 344 |
| ≥ 4000 | 142 | 37 | 1 | – | 180 |
| Not stated | 5 | 3 | – | – | 8 |
| **Total** | **909** | **234** | **129** | **9** | **1291** |
| *< 2500* | *45* | *14* | *74* | *8* | *142* |
| | | | **Percent** | | |
| < 1000 | 0.7 | – | 4.7 | – | 0.9 |
| 1000–1499 | 0.4 | – | 7.0 | 11.1 | 1.1 |
| 1500–1999 | 1.4 | 2.1 | 16.3 | 22.2 | 3.3 |
| 2000–2499 | 2.4 | 3.8 | 29.5 | 55.6 | 5.7 |
| 2500–2999 | 14.1 | 16.7 | 27.1 | 11.1 | 16.0 |
| 3000–3499 | 33.4 | 37.2 | 13.2 | – | 31.8 |
| 3500–3999 | 31.4 | 23.1 | 1.6 | – | 26.6 |
| ≥ 4000 | 15.6 | 15.8 | 0.8 | – | 13.9 |
| Not stated | 0.6 | 1.3 | – | – | 0.6 |
| **Total** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |
| *< 2500* | *5.0* | *6.0* | *57.4* | *88.9* | *11.0* |

(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 2011

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 2011, PGD was performed in 40 cycles, representing 0.9% of cycles in which embryos were created or thawed.

**Table 19: Number of cycles with PGD by type of embryo, New Zealand, 2011**

| | Stage of treatment | | |
|---|---|---|---|
| Type of embryo | Number of cycles with embryo fertilised/thawed | Number of cycles with PGD | PGD per cycle with embryo fertilised/thawed (percent) |
| Fresh | 2912 | 35 | 1.2 |
| Thaw | 1675 | 5 | 0.3 |
| **Total** | **4587** | **40** | **0.9** |

# 6 Donor insemination cycles in 2011

In 2011, there were 480 donor insemination (DI) cycles reported from clinics in New Zealand. The average age of women who had a DI cycle was 35.8 years. The overall live delivery rate per DI cycle was 15.2%. The live delivery rate for women aged less than 35 years was 20.8% and decreased steadily with advancing women's age.

**Table 20: Outcomes of DI cycles by women's age group, New Zealand, 2011**

| | Age group (years)[(a)] | | | | |
|---|---|---|---|---|---|
| **Stage/outcome of treatment** | **< 30** | **30–34** | **35–39** | **≥ 40** | **Total** |
| DI cycles | 60 | 113 | 212 | 95 | 480 |
| Clinical pregnancies | 21 | 21 | 46 | 5 | 93 |
| Live deliveries | 18 | 18 | 34 | 3 | 73 |
| *Clinical pregnancies per DI cycle (percent)* | *35.0* | *18.6* | *21.7* | *5.3* | *19.4* |
| *Live deliveries per DI cycle (percent)* | *30.0* | *15.9* | *16.0* | *3.2* | *15.2* |
| *Live deliveries per clinical pregnancy (percent)* | *85.7* | *85.7* | *73.9* | *60.0* | *78.5* |

(a) Age at start of treatment cycle.

# 7 Cumulative success rates for women undertaking autologous treatment 2009–2011

This section presents information on all women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009. Women were followed from the start of their first autologous fresh cycle, through subsequent fresh and thaw cycles until 31 December 2011, or until they achieved a live delivery (a delivery of at least one live-born baby) up to and including 31 October 2012. This longitudinal perspective provides a measure of the outcomes of successive ART treatment cycles undertaken by the same woman. These women might have had additional treatment cycles after 2011, and their treatment information and resulting outcomes will be captured in subsequent annual reports. Therefore, in this dynamic cohort of women undergoing their first autologous fresh ART treatment between 1 January 2009 and 31 December 2009, the cumulative success rates may increase over time as more women return for treatment at a later date.

ART treatment cycles presented in Tables 21 to 26 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. The following types of cycles were out of scope, and were not included in Tables 21 to 26: donor sperm insemination cycles, oocyte/embryo recipient cycles, oocyte/embryo donation cycles, surrogacy arrangement cycles and gamete intrafallopian transfer cycles. A pregnancy that ended before 20 weeks or stillbirth (fetal death) are not counted as a live delivery.

Table 21 presents the number of cycles by women's age group. Tables 22 to 26 present cycle-specific live delivery rates, non-progression rates and cumulative live delivery rates for all women (Table 22) and women aged < 30, 30–34, 35–39 and ≥ 40 (Tables 23 to 26). Only the first five cycles are presented in Tables 21 to 26 due to the small number of women undertaking six or more treatment cycles between 1 January 2009 and 31 December 2011.

The 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 same 'cycle number'. For example, the cycle specific rate of 21.7% for cycle number 3 measures the proportion of women who undertook a third cycle and achieved a live delivery in that cycle (Table 22).

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 2011 divided by the number of women who did not have a live delivery in that 'cycle number'. For example, the non-progression rate of 25.5% 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 22). 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.

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 2009 and 31 December 2009. For example, the cumulative live delivery rate of 41.2% for cycle number three measures the proportion of women who started ART treatment in 2009, and achieved a live delivery following their first three cycles (Table 22). Note, the denominator used in the cumulative live delivery rate includes all women who started treatment in 2009, irrespective of whether they had future ART treatment up until 31 December 2011.

**Table 21: Number of cycles by women's age group for all women who started their first autologous fresh cycle between 1 January 2009 and 31 December 2009, New Zealand[(a)]**

| | Age group (years)[(a)] | | | | |
|---|---|---|---|---|---|
| **Cycle number[(b)]** | **< 30** | **30–34** | **35–39** | **40–44** | **All** |
| | | | **Number** | | |
| 1 | 94 | 197 | 293 | 169 | 753 |
| 2 | 37 | 88 | 163 | 55 | 343 |
| 3 | 19 | 42 | 90 | 36 | 187 |
| 4 | 14 | 25 | 37 | 16 | 92 |
| ≥ 5 | 13 | 41 | 54 | 9 | 117 |
| **Total** | **177** | **393** | **637** | **285** | **1492** |
| | | | **Percent** | | |
| 1 | 53.1 | 50.1 | 46.0 | 59.3 | 50.5 |
| 2 | 20.9 | 22.4 | 25.6 | 19.3 | 23.0 |
| 3 | 10.7 | 10.7 | 14.1 | 12.6 | 12.5 |
| 4 | 7.9 | 6.4 | 5.8 | 5.6 | 6.2 |
| ≥ 5 | 7.3 | 10.4 | 8.5 | 3.2 | 7.8 |
| **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 1 January 2009 and 31 December 2009 and were followed through subsequent fresh and thaw cycles until 31 December 2011 or delivery of a live-born baby up to 31 October 2012.

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

| 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][e] | Cumulative live delivery rate (%)[a][f] |
|---|---|---|---|---|---|---|
| 1 | 1492 | 385 | 25.8 | 368 | 24.7 | 25.8 |
| 2 | 739 | 143 | 19.4 | 200 | 27.1 | 35.4 |
| 3 | 396 | 86 | 21.7 | 101 | 25.5 | 41.2 |
| 4 | 209 | 35 | 16.7 | 57 | 27.3 | 43.5 |
| 5 | 117 | 29 | 24.8 | 39 | 33.3 | 45.4 |

(a) Women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009 and were followed through subsequent fresh and thaw cycles until 31 December 2011 or delivery of a live-born baby up to 31 October 2012.

(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 2011 divided by the number of women who did not have a live delivery in that 'cycle number'.

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

(f) 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 2009 and 31 December 2009. Note, the denominator used in the cumulative live delivery rate includes all women who started treatment in 2009 irrespective of whether they had future ART treatment until 31 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.

**Table 23: Cycle-specific and cumulative live delivery rates for women aged less than 30 years who started their first autologous fresh cycle between 1 January 2009 and 31 December 2009, New Zealand**

| 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][e] | Cumulative live delivery rate (%)[a][f] |
|---|---|---|---|---|---|---|
| 1 | 177 | 57 | 32.2 | 37 | 20.9 | 32.2 |
| 2 | 83 | 11 | 13.3 | 26 | 31.3 | 38.4 |
| 3 | 46 | 12 | 26.1 | 7 | 15.2 | 45.2 |
| 4 | 27 | 6 | 22.2 | 8 | 29.6 | 48.6 |
| 5 | 13 | 4 | 30.8 | 5 | 38.5 | 50.8 |

(a) Women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009 and were followed through subsequent fresh and thaw cycles until 31 December 2011 or delivery of a live-born baby up to 31 October 2012.

(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 2011 divided by the number of women who did not have a live delivery in that 'cycle number'.

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

(f) 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 2009 and 31 December 2009. Note, the denominator used in the cumulative live delivery rate includes all women who started treatment in 2009 irrespective of whether they had future ART treatment until 31 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.

**Table 24: Cycle-specific and cumulative live delivery rates for women aged 30–34 years who started their first autologous fresh cycle between 1 January 2009 and 31 December 2009, New Zealand**

| 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][e] | Cumulative live delivery rate (%)[a][f] |
|---|---|---|---|---|---|---|
| 1 | 393 | 127 | 32.3 | 70 | 17.8 | 32.3 |
| 2 | 196 | 49 | 25.0 | 39 | 19.9 | 44.8 |
| 3 | 108 | 26 | 24.1 | 16 | 14.8 | 51.4 |
| 4 | 66 | 13 | 19.7 | 12 | 18.2 | 54.7 |
| 5 | 41 | 12 | 29.3 | 10 | 24.4 | 57.8 |

(a) Women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009 and were followed through subsequent fresh and thaw cycles until 31 December 2011 or delivery of a live-born baby up to 31 October 2012.

(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 2011 divided by the number of women who did not have a live delivery in that 'cycle number'.

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

(f) 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 2009 and 31 December 2009. Note, the denominator used in the cumulative live delivery rate includes all women who started treatment in 2009 irrespective of whether they had future ART treatment until 31 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.

**Table 25: Cycle-specific and cumulative live delivery rates for women aged 35–39 years who started their first autologous fresh cycle between 1 January 2009 and 31 December 2009, New Zealand**

| 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][e] | Cumulative live delivery rate (%)[a][f] |
|---|---|---|---|---|---|---|
| 1 | 637 | 161 | 25.3 | 132 | 20.7 | 25.3 |
| 2 | 344 | 71 | 20.6 | 92 | 26.7 | 36.4 |
| 3 | 181 | 42 | 23.2 | 48 | 26.5 | 43.0 |
| 4 | 91 | 14 | 15.4 | 23 | 25.3 | 45.2 |
| 5 | 54 | 11 | 20.4 | 22 | 40.7 | 46.9 |

(a) Women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009 and were followed through subsequent fresh and thaw cycles until 31 December 2011 or delivery of a live-born baby up to 31 October 2012.

(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 2011 divided by the number of women who did not have a live delivery in that 'cycle number'.

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

(f) 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 2009 and 31 December 2009. Note, the denominator used in the cumulative live delivery rate includes all women who started treatment in 2009 irrespective of whether they had future ART treatment until 31 December 2011.

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.

**Table 26: Cycle-specific and cumulative live delivery rates for women aged 40 years and over who started their first autologous fresh cycle between 1 January 2009 and 31 December 2009, New Zealand**

| 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)(e)] | Cumulative live delivery rate (%)[(a)(f)] |
|---|---|---|---|---|---|---|
| 1 | 285 | 40 | 14.0 | 129 | 45.3 | 14.0 |
| 2 | 116 | 12 | 10.3 | 43 | 37.1 | 18.2 |
| 3 | 61 | 6 | 9.8 | 30 | 49.2 | 20.4 |
| 4 | 25 | 2 | 8.0 | 14 | 56.0 | 21.1 |
| 5 | 9 | 2 | 22.2 | 2 | 22.2 | 21.8 |

(a) Women who started their first autologous fresh ART treatment cycle between 1 January 2009 and 31 December 2009 and were followed through subsequent fresh and thaw cycles until 31 December 2011 or delivery of a live-born baby up to 31 October 2012.

(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 2011 divided by the number of women who did not have a live delivery in that 'cycle number'.

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

(f) 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 2009 and 31 December 2009. Note, the denominator used in the cumulative live delivery rate includes all women who started treatment in 2009 irrespective of whether they had future ART treatment until 31 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.

# Appendix A: Contributing fertility clinics

Fertility Associates, Auckland (Dr Mary Birdsall)
Fertility Associates Hamilton, Hamilton (Dr VP Singh)
Fertility Associates Wellington, Wellington (Dr Andrew Murray)
Fertility Plus, Auckland (Dr Barry Lowe)
Repromed Auckland, Auckland (Dr Guy Gudex)
Repromed Christchurch, Christchurch (Dr Greg Phillipson)
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 seven fertility centres in New Zealand, and it is compiled into ANZARD2.0. ANZARD2.0 includes autologous treatment cycles, treatment involving donated oocytes or embryos, and treatment involving surrogacy arrangements. ANZARD2.0 collects data on the use of ART techniques, such as ICSI, oocyte/embryo freezing methods, PGD and cleavage/blastocyst transfers. In addition to ART procedures, ANZARD2.0 also collects data from fertility centres about artificial insemination cycles using donated sperm. 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 New Zealand in 2011, and the resulting pregnancies and births. The babies included in this report were conceived through treatment cycles undertaken in 2011, and were born in either 2011 or 2012.

## Data validation

Most fertility centres have computerised data information management systems, and they 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 2011, information relating to pregnancy and birth outcomes was not provided for 0.9% of clinical pregnancies.

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 five or six days after fertilisation.

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

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

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

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

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

**Cryopreservation:** freezing embryos for potential future ART treatment.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Live birth:** according to the World Health Organization (WHO) definition, a live birth is defined as the complete expulsion or extraction from its mother of a product of conception irrespective of the duration of the pregnancy, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of the voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such a birth is considered live-born. 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 live-born infants, with the birth of twins, triplets or more counted as one live delivery.

**Low birthweight:** a birthweight of less than 2500 grams.

**Oocyte (egg):** a female reproductive cell.

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

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

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

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

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

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

**Preterm:** a gestation of less than 37 weeks.

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

**Secondary sex ratio:** the number of male 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 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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