AUSTRALIAN INSTITUTE OF HEALTH AND WELFARE
NATIONAL PERINATAL STATISTICS UNIT
AND
THE FERTILITY SOCIETY OF AUSTRALIA

ASSISTED CONCEPTION SERIES
Number 6

Assisted conception Australia and New Zealand 1999 and 2000

Tara Hurst
and
Paul Lancaster

AIHW National Perinatal Statistics Unit
Sydney, 2001

AIHW cat. no. PER 18

This is the sixth publication in the Australian Institute of Health and Welfare National Perinatal Statistics Unit's Assisted Conception Series. A complete list of the AIHW National Perinatal Statistics Unit's publications is available from the Publications Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601, or via the NPSU's website at http://www.aihw.gov.au/npsu/.

ISSN 1038-7234
ISBN 1 74024 147 9

Suggested citation

Hurst T & Lancaster P 2001. Assisted conception Australia and New Zealand 1999 and 2000. AIHW Cat. No. PER 18. Sydney: Australian Institute of Health and Welfare National Perinatal Statistics Unit (Assisted Conception Series No. 6).

Published by the Australian Institute Health and Welfare National Perinatal Statistics Unit
Printed by Panther Publishing and Printing

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Acknowledgements

We thank staff of the IVF units in Australia and New Zealand for completing the data forms and providing additional information. We appreciate the efforts of those individuals, especially clinic co-ordinators and scientists, who have carefully checked records to obtain further details of clinical outcomes, or have provided data on the numbers of women treated, cycles of treatment and laboratory procedures.

We would also like to thank Dr Sarwar Bari for his assistance with the data entry, and Carlo Dazo for his assistance compiling the bibliography.

We gratefully acknowledge financial support from the Fertility Society of Australia. The AIHW National Perinatal Statistics Unit is funded by a grant from the Australian Institute of Health and Welfare to the University of New South Wales.

We thank Professor Michael Chapman, Dr Robert Maclachlan, Dr Richard Madden and Dr David Molloy for reviewing the report.

We acknowledge the use of the book *Getting pregnant* by Professor Robert Jansen for some definitions of assisted conception procedures in Appendix 1.

Requests for data

Any enquiries about data for individual IVF units should be directed to the unit concerned. Other enquiries should be made to the AIHW National Perinatal Statistics Unit.

The report may be obtained from AusInfo Mail Order Sales:

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Collaborating IVF and GIFT units

New South Wales

North Shore Fertility, Sydney (Professor Douglas M. Saunders)

St George Fertility Centre, Sydney (Dr David C. Macourt)

Lingard Fertility Centre, Newcastle (Dr Robert Woolcott)

Westmead Fertility Centre, Sydney (Associate Professor Peter Illingworth)

City West IVF, Sydney (Dr Geoffrey L. Driscoll)

Royal Prince Alfred Hospital, Sydney (Dr Mark Bowman)

Sydney IVF, Sydney (Professor Robert P.S. Jansen)

IVF NSW, Sydney (Dr Trevor Johnson)

Albury Reproductive Medicine Centre, Albury (Dr Scott Giltrap)

IVF South, Sydney (Professor Michael Chapman)

Fertility First, Sydney (Dr Anne Clark)

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The Wesley IVF Services, Brisbane (Dr John Allan)

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IVF Queensland Sunshine Coast, Nambour (Dr James Moir)

Monash IVF Queensland, Sunnybank (Dr Kevin Forbes)

Coastal IVF Fertility Services, Maroochydore (Dr Paul Stokes)

Central Queensland Fertility, Rockhampton (Dr Simon Walton)

Victoria

Royal Women's Hospital and Melbourne IVF, Melbourne (Dr John McBain)

Monash IVF, Melbourne (Professor Gab Kovacs)

Melbourne Assisted Conception Centre, Mercy Hospital for Women, Melbourne (Dr Mac Talbot)

Mildura Reproductive Medicine Centre, Mildura (Dr John Bowditch)

Western Australia

PIVET Medical Centre, Perth (Dr John L. Yovich)

Concept Fertility Centre, Perth (Dr Graeme Thompson)

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South Australia

Reproductive Medicine Unit, Adelaide (Professor Rob Norman)

Flinders Reproductive Medicine, Adelaide (Associate Professor Stephen J. Judd)

Tasmania

Tas IVF, Hobart (Dr Steve Sonneveld)

Sydney IVF, Launceston (Dr Jeffrey Persson)

Australian Capital Territory

Canberra Fertility Centre, Canberra (Dr Martyn A. Stafford-Bell)

New Zealand

Fertility Plus, Auckland (Dr Guy Gudex)

Fertility Associates, Auckland (Dr Richard Fisher, Dr Freddie Graham)

Otago Fertility Services, Dunedin (Associate Professor Wayne Gillett)

Fertility Associates North Shore, Auckland (Dr Barry Lowe)

The Fertility Centre, Christchurch (Dr Peter Benny)

Fertility Associates, Wellington (Professor John Hutton)

Fertility Associates, Hamilton (Dr Stewart Hastie)

Abbreviations

NSW	New South Wales
Vic	Victoria
Qld	Queensland
WA	Western Australia
SA	South Australia
Tas	Tasmania
ACT	Australian Capital Territory
NT	Northern Territory
NZ	New Zealand

AIHW	Australian Institute of Health and Welfare
NPSU	National Perinatal Statistics Unit

GIFT	gamete intrafallopian transfer
GnRH	gonadotrophin-releasing hormone
hCG	human chorionic gonadotrophin
ICSI	intracytoplasmic sperm injection
IVF	in-vitro fertilisation
MESA	microepididymal sperm aspiration
n.a.	not available
PESA	percutaneous epididymal sperm aspiration
SUZI	Subzonal insemination
TESE	testicular sperm extraction

Highlights

- Viable pregnancies are those reaching at least 20 weeks' gestation. The viable pregnancy rates in 2000 were higher than in any previous year for all IVF and ICSI transfers. When all techniques of assisted conception are included together, the viable pregnancy rate increased gradually from 13.0 per 100 embryo transfer cycles in 1992 to 15.9 in 1999, rising to 17.9 in 2000.

- The number of births after assisted conception in 1999 increased by 11.5% in Australia, and 36.2% in New Zealand, since 1998. There were 4,319 births after assisted conception in Australia in 1999, accounting for 1.7% of all births. In New Zealand, there were 421 births after assisted conception in 1999, accounting for 0.7% of all births.

- Between 1992 and 2000, the total number of cycles with oocyte retrieval or embryo transfer for all techniques of assisted conception increased by 66% from 16,288 cycles in 1992 to 27,067 in 2000. This increase has slowed in recent years, increasing by 1.8% from 26,592 cycles in 1999. There was a relatively greater increase in transfer cycles using frozen embryos than for fresh embryos.

- There has been a marked increase in treatment cycles in which intracytoplasmic sperm injection (ICSI) was used. Oocyte retrieval cycles for ICSI have increased each year from 812 in 1992 to 8,895 in 2000. For the first time, ICSI accounted for more than half (51.4%) of all transfer cycles for all types of assisted conception in 2000.

- The use of gamete intrafallopian transfer (GIFT) for treating infertility has continued to decline sharply, from 3,831 oocyte retrieval cycles in 1992 to 817 cycles in 2000, accounting for only 3.2% (800/24,893) of all transfer cycles in that year. The viable pregnancy rate, 21.4 per 100 oocyte retrieval cycles in 2000, continues to be higher than that for IVF or ICSI.

- In 2000, 16.6% of women seeking assisted conception were aged 40 years or more, increasing from 15.2% in 1999. In 1999, 8.9% of all pregnancies, and 7.0% of all live births, were to women aged 40 or more, compared with 2.3% of all mothers giving birth in Australia, and 2.9% in New Zealand. Increasing maternal age is associated with a poorer pregnancy outcome.

- Between 1997 and 2000, the proportion of IVF and ICSI cycles in which one or two fresh embryos were transferred increased, from 64.9% to 81.2% for IVF and from 66.9% to 77.8% for ICSI. For thawed embryos, the proportion increased from 79.3% to 89.1% for IVF in the same period, and from 82.5% to 89.0% for ICSI. For GIFT, one or two oocytes were transferred in only 54.4% in 2000. Four or more oocytes were transferred in 7.5% of GIFT cycles in 2000. Among pregnancies in 1999, increasing the number of embryos/oocytes transferred was associated with a poorer pregnancy outcome.

- In 1999, multiple pregnancy occurred in 26.8% of GIFT pregnancies, compared with 21.2% for IVF pregnancies and 21.8% for ICSI pregnancies. There was 1 quadruplet pregnancy and 49 sets of triplets among all assisted conception pregnancies.

- In the three-year period 1997–1999, multiple pregnancy for all types of assisted conception occurred in 20.9% of viable pregnancies and varied considerably among the IVF units.

1 Introduction

This report contains a summary of the results of treatment of infertility by assisted conception in all IVF units in Australia and New Zealand in 2000, and the outcomes of pregnancies conceived in 1999. The report includes data on in-vitro fertilisation (IVF), intracytoplasmic sperm injection (ICSI) and gamete intrafallopian transfer (GIFT). GIFT was first used in 1985. The first microinsemination technique for treating mainly male infertility, subzonal insemination (SUZI), was introduced in 1990 but this has been superseded by the more successful ICSI. The data on ICSI include those treatment cycles in which SUZI was used and also the subsequent pregnancies. Treatment of infertility by artificial insemination performed at an IVF unit is included in this report, but information on other infertility treatments, such as ovulation induction without IVF, ICSI or GIFT, and treatment of infertility by artificial insemination performed by clinicians outside IVF units, are not collected

In 2000, there were 34 IVF units in Australia and 7 IVF units in New Zealand. Some IVF units have set up satellite clinics that are linked to major IVF centres in capital cities. Regional centres where satellite clinics have been established include: Coffs Harbour, Gosford, Lismore, Orange, Tamworth, Wagga Wagga and Wollongong in New South Wales; Ballarat, Benalla, Bendigo, Broadmeadows, Casterton, Geelong, Maryvale, Morwell, Sale, Shepparton and Wangaratta in Victoria; Cairns, Mackay, Nambour, Rockhampton and Townsville in Queensland; Attadale in Western Australia; and Darwin in the Northern Territory.

Each IVF unit reports summary data on treatment cycles for each year and also notifies pregnancies on a standard form (Appendix 2). The data include the number of cycles commenced each year and the number progressing to the stages of oocyte retrieval, embryo transfer, clinical pregnancy, and viable pregnancies of at least 20 weeks' gestation. The IVF units report mutually exclusive results for IVF with uterine transfer of fresh embryos, IVF with tubal transfer of fresh embryos, IVF with transfer of frozen embryos, ICSI with uterine transfer of fresh embryos, ICSI with tubal transfer of fresh embryos, ICSI with transfer of frozen embryos, GIFT, and the use of IVF, ICSI or GIFT with donor oocytes or donor embryos.

IVF units also provide tabulated data on the age distribution, causes of infertility, drugs used to stimulate ovulation, and the number of embryos or oocytes transferred for women treated by IVF (fresh and frozen), ICSI (fresh and frozen), GIFT, and transfer of donated oocytes or embryos. Tabulated summaries of results and notified pregnancies are returned to each IVF unit to check their accuracy and completeness.

All analyses of treatment cycles and pregnancy outcome in this report are based on the year of treatment and conception. Data on pregnancy outcome are given for 1999 and include births up to September 2000. Similar to the previous report, this report provides separate tabulations on IVF (excluding ICSI), ICSI and GIFT pregnancies.

2 Trends and regional variations in assisted conception

Between 1992 and 2000, the total number of treatment cycles (oocyte retrievals and embryo transfers) for all types of assisted conception increased each year. In 1992, there were 16,288 cycles, increasing to 21,739 in 1996, and 27,067 in 2000.

2.1 Trends in assisted conception, 1992–2000

The number of IVF units in Australia and New Zealand increased from 28 in 1992 to 41 in 2000. The total number of cycles with oocyte retrieval or embryo transfer increased by two-thirds (66%), from 16,288 in 1992 to 27,067 in 2000, with increases of 143% for transfers of frozen embryos and 40% for fresh transfers (Figure 1). Viable pregnancy rates also increased during this period. The greatest increase was for IVF and ICSI fresh transfers (Figure 2).

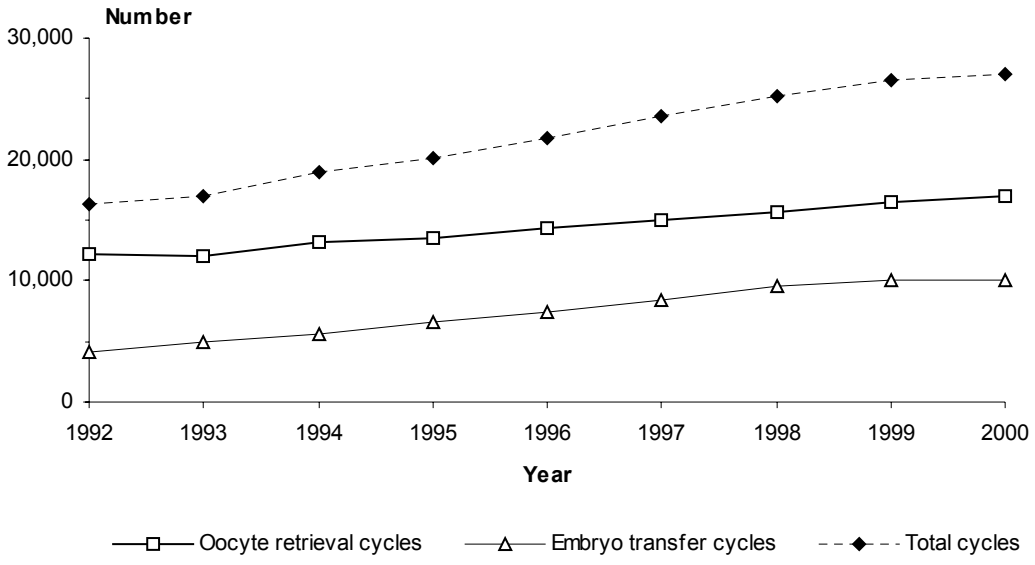


Figure 1: Oocyte retrieval cycles for fresh transfers and embryo transfer cycles for frozen or donor embryos, 1992–2000

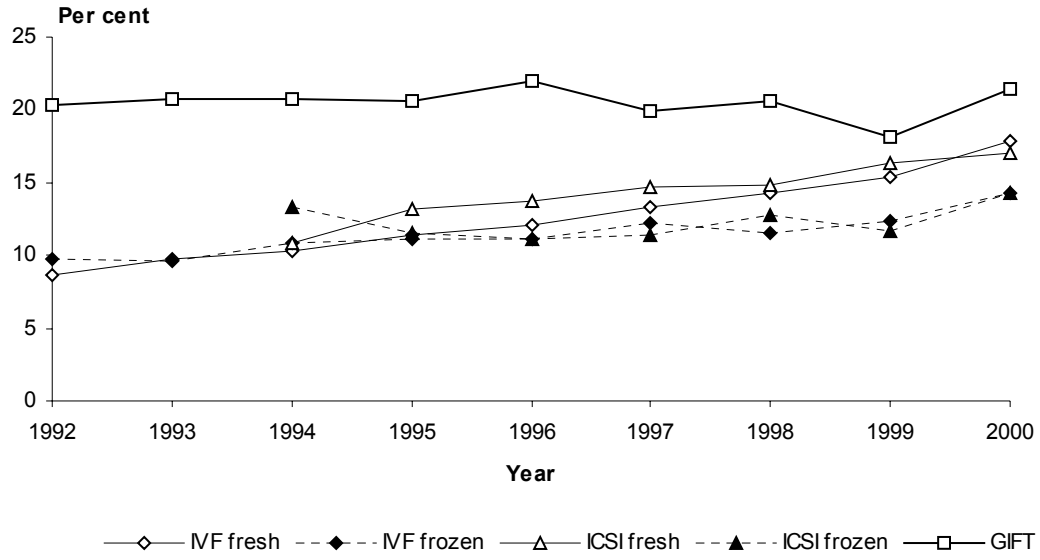


Figure 2: Viable pregnancy rates by method of assisted conception, 1992–2000

The number of treatment cycles commenced for IVF and transfer of fresh embryos changed little, from 8,474 in 1992 to 8,626 in 2000 (Table 1). The number of cycles with oocyte retrieval and fresh embryo transfer declined slightly, from 7,501 and 6,190, respectively, in 1992 to 7,270 and 6,176 in 2000. The viable pregnancy rate doubled during this period, increasing each year from 8.6 per 100 oocyte retrieval cycles in 1992 to 17.9 in 2000. IVF embryo transfer cycles after freezing increased during this period, from 3,813 in 1992 to 4,951 in 1998, then declined to 4,478 in 2000 (Table 2). The viable pregnancy rate for frozen embryos also increased from a low of 9.6 per 100 embryo transfer cycles in 1993 to 14.2 in 2000.

Following the trend of recent years, the use of ICSI to treat mainly male infertility continued to increase in 2000. This pattern has been reflected in the resulting clinical pregnancies, which for the first time were greater than the number of IVF clinical pregnancies in 1999 (Figure 3). There were 337 oocyte retrieval cycles for microinsemination in 1990, the number then rising each year to 8,895 cycles in 2000. ICSI with transfer of fresh or frozen embryos accounted for 19.8% of all embryo transfers for all types of assisted conception in 1994. This proportion doubled to 40.9% of all embryo transfers by 1997 and then increased to account for just over half (51.4%) of all embryo transfers in 2000.

ICSI pregnancies after transfer of fresh embryos have increased rapidly since 1994 (Table 3), the first year in which separate data were obtained for fresh and frozen ICSI cycles. The number of cycles with oocyte retrieval and embryo transfer more than trebled, from 2,786 and 2,436, respectively, in 1994 to 8,895 and 7,854 in 2000. The viable pregnancy rate increased each year from 10.9 per 100 oocyte retrieval cycles in 1994 to 17.0 in 2000. The number of ICSI cycles with embryo transfer after embryo freezing increased more than fivefold during this period, from 929 in 1994 to 4,639 in 2000 (Table 4). The viable pregnancy rate varied between 11.1 per 100 embryo transfer cycles in 1996 and 14.2 in 2000.

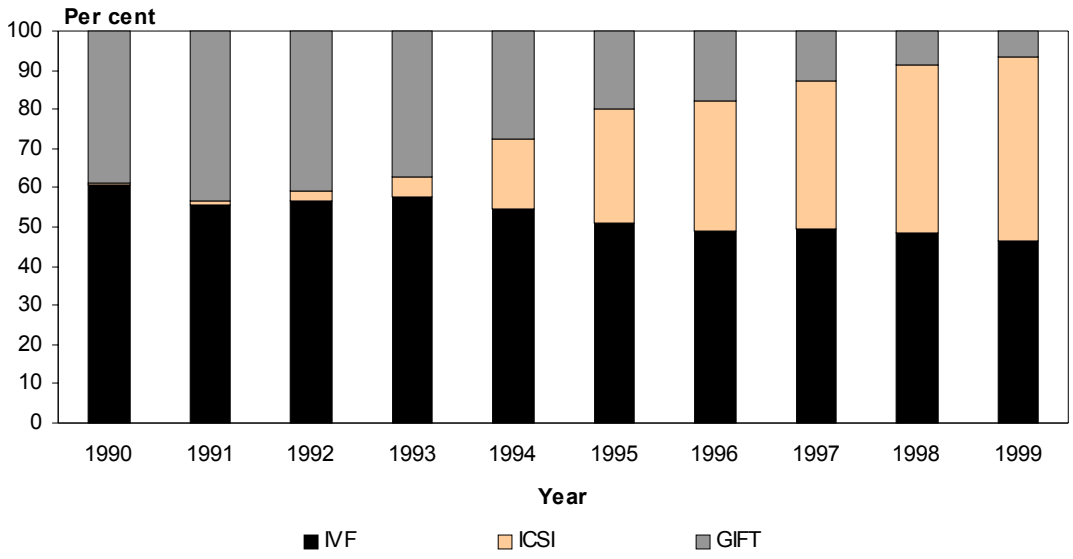


Figure 3: Assisted conception pregnancies by method of conception, 1990–1999

During 1992 to 2000 the number of GIFT cycles with gamete transfer declined by nearly 80%, from 3,757 in 1992 to 800 in 2000 (Table 5). The viable pregnancy rate was 21.4 per 100 oocyte retrievals in 2000, slightly higher than in previous years.

The total number of embryo transfer cycles after use of donor oocytes or donor embryos, combined with IVF, ICSI or GIFT, increased threefold between 1992 and 2000 (Tables 6 and 7). However, the use of donor oocytes or donor embryos in IVF, ICSI or GIFT cycles did not increase as much, from 2.3% (331/14,607) in 1992 to 3.9% (968/24,915) in 1999. Separate data for fresh and frozen embryos were not collected prior to 1996. The viable pregnancy rate for transfer of fresh embryos with donor oocytes or donor embryos varied between a low of 9.5 per 100 embryo transfer cycles in 1994 and 20.6 in 2000. Transfers of embryos after embryo freezing with donor oocytes, or donor embryos, doubled between 1996 and 1999, from 317 to 624, declining to 532 in 2000. The viable pregnancy rate of 17.1 per 100 embryo transfer cycles in 2000 was higher than in previous years.

Despite the fluctuations occurring for the various techniques of assisted conception, the total number of embryo transfer cycles nearly doubled (from 14,607 to 24,915) between 1992 and 2000. The overall viable pregnancy rate for all assisted conceptions increased annually from 13.0 in 1992 to 17.9 in 2000 (Table 8).

There was increasing use of assisted hatching between 1994, the first year for which data were collected, and 2000, accounting for 3.2% (802/24,915) of transfer cycles. The viable pregnancy rates were generally lower than for conventional IVF and ICSI, varying between 6.4 per 100 embryo transfer cycles in 1996 and 16.2 in 2000 (Table 9). Assisted hatching is a limited technique involving the breaching of the zona pellucida (egg shell) prior to embryo transfer. Its use is primarily for older women and those with previous treatment failures.

By using blastocyst culture, embryos are at a more advanced stage of development when embryo transfer occurs. Most commonly it is used for women with a significant number of fertilised oocytes (i.e. greater than 5). Information on these transfers was first collected in 1998. The viable pregnancy rates after blastocyst culture were generally higher than for conventional IVF and ICSI, increasing annually from 17.5 per embryo transfer cycles in 1998 to 30.4 in 2000 (Table 10).

Special techniques of sperm collection were reported among all IVF units using ICSI, and included techniques such as TESE, MESA, PESA and electro-ejaculation. ICSI pregnancies that used sperm collected by one of these methods accounted for 14% of all transfers of fresh embryos and 12% of all transfers after embryo freezing. The viable pregnancy rates for fresh transfers (17.4 per 100 oocyte retrieval cycles) and after embryo freezing (13.9 per 100 embryo transfers) were similar to those for ICSI (Table 11).

Embryo freezing avoids the necessity for repeated ovarian stimulation in every treatment cycle. As more couples have their infertility treated by assisted conception, more embryos are frozen each year. Since 1994, the number of embryos that were frozen, and the number of embryos thawed, has increased annually, doubling from 19,563 frozen and 14,375 thawed in 1994 to 41,413 frozen and 29,371 thawed in 2000 (Table 12). The number of embryos that are frozen each year exceeds the number thawed, thus increasing the total number of embryos in storage. The number of embryos in storage has more than trebled during this same period, from 22,280 in 1994 to 71,176 in 2000. Policies on how long frozen embryos are kept in storage vary among the IVF units and is dependent upon State legislation.

Cycles of treatment resulting from artificial insemination at an IVF unit were reported for the first time in 1998 for husband's sperm and donor sperm. In 1999, the number of pregnancies for each technique was also reported. There were around 12,500 cycles of artificial insemination in each year. Insemination with husband's sperm accounted for 60% of all artificial inseminations (Table 13). The viable pregnancy rates for insemination of husband's sperm and donor sperm in 2000 were similar to those in 1999, 9.6 and 8.7 per 100 insemination cycles, respectively. It should be noted that the information about artificial insemination in this report was obtained only from clinics and practitioners also treating infertility by assisted conception. The full extent of the use of artificial insemination in Australia and New Zealand cannot be estimated from these data.

2.2 Regional variations in the use of assisted conception

The use of assisted conception to treat infertility can be compared in different populations by relating the number of treatment cycles during a year to the number of women in the reproductive age group. The total number of treatment cycles can be estimated by adding those that reach the stage of oocyte retrieval for IVF, ICSI and GIFT to the number of transfer cycles for frozen IVF and ICSI embryos and donor oocytes/donor embryos. As most women treated by assisted conception are aged between 25 and 44 years, the ratio of the number of treatment cycles is expressed per 100,000 women aged 25–44 years. In the figures for 2000, South Australia and the Northern Territory are reported together because the only IVF clinic in Darwin is a satellite clinic of The

Queen Elizabeth Hospital in Adelaide. The figures for Tasmania and the Australian Capital Territory are also combined for confidentiality purposes as there are only three IVF units between the two regions.

There were considerable variations in treatment ratios among the Australian States, and marked differences between Australia and New Zealand (Table 14, Figure 4). In 2000, the treatment ratio in Australia was 867 cycles per 100,000 women, increasing from 850 cycles per 100,000 women in 1999. This ratio was nearly three times higher than in New Zealand which had a ratio of 300 per 100,000 women in 2000, decreasing from 310 in 1999. In Australia, the highest treatment ratios were in Victoria and New South Wales and the lowest ratios were in Queensland and Western Australia. As these ratios are based on the States in which the IVF units are located, comparisons between States may be slightly affected by interstate movements of infertile women for treatment.

In 2000, IVF was used relatively more in Western Australia and relatively less in Queensland than in the other States. The highest relative use of ICSI was in Victoria and the lowest was in Western Australia and Queensland. GIFT was more likely to be used in Queensland than in the other States.

In 2000, the use of ICSI increased to account for just over half of all treatment cycles in Australia (50.8%), with a relatively smaller proportion of IVF, GIFT and donor oocytes/embryos treatment cycles, 42.3%, 3.4% and 3.4%, respectively. In New Zealand in 2000, where the treatment ratios were much lower than in Australia, IVF accounted for nearly half of all treatment cycles (49.0%), with the proportion of ICSI and GIFT cycles much lower than Australia (40.9% and 0.1%, respectively), and the proportion of donor oocytes/embryos cycles much higher than Australia (10.1%).

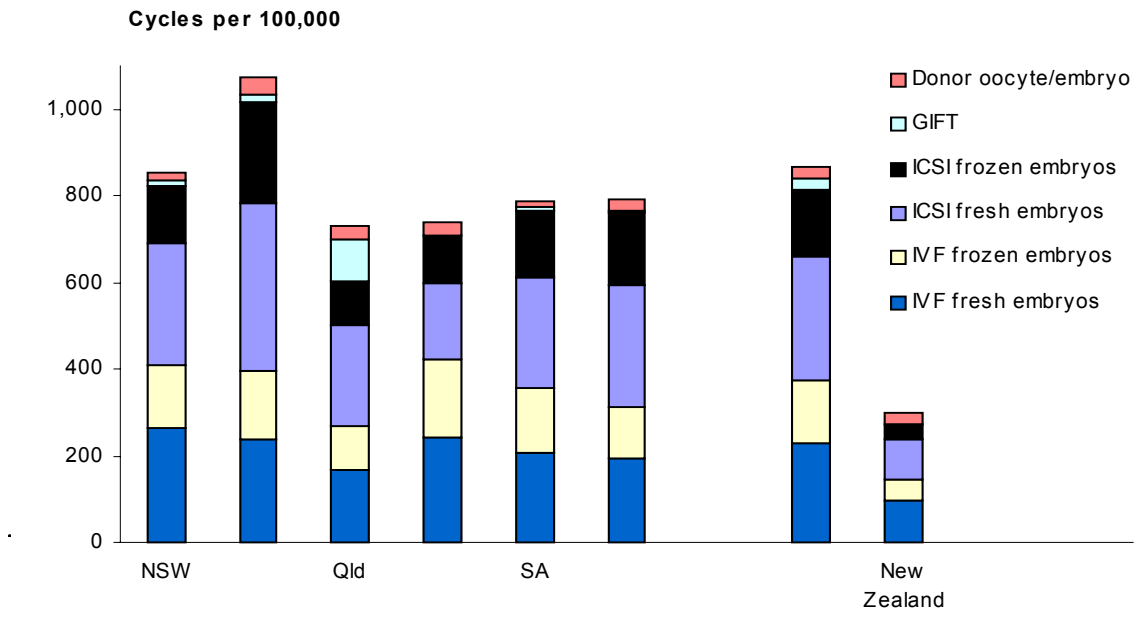


Figure 4: Ratio of treatment cycles to number of women in reproductive age group, 2000

3 Variations in pregnancy rates among IVF units

In this report, the pregnancy rates for each technique of assisted conception are given for all IVF units and also for IVF units grouped into four quarters to demonstrate the range of success rates across Australia and New Zealand. Depending on the total number of IVF units using a particular technique, the number of units in each of the four groups may vary. The four quarters are ranked in descending order from Q1, which includes IVF units with the highest pregnancy rates, to Q4, which has the lowest rates. Data are given for the total number of treatment cycles, pregnancies and pregnancy rates for all units in each of the four groups, as well as the range of pregnancy rates within each group. This method of reporting pregnancy rates follows the style of the previous assisted conception report.

For transfers to the uterus or fallopian tubes of fresh embryos, and for transfers of oocytes to the fallopian tubes, clinical and viable pregnancies are reported as rates per 100 oocyte retrievals (egg collections), or per 100 embryo transfers. Results are expressed in this manner for IVF (excluding ICSI), ICSI and GIFT. For transfers of frozen embryos, clinical and viable pregnancies are reported as rates per 100 embryo transfer cycles. In general, any comparisons of pregnancy rates are based on viable pregnancies, which result in births, rather than on clinical pregnancies, which also include early pregnancy losses of less that 20 weeks' gestation.

3.1 Viable pregnancy rates

The interpretation of pregnancy rates for the various techniques of assisted conception, and comparison of results between IVF units, are influenced not only by factors such as the age of treated women and number of embryos or oocytes transferred but also by the relative use of a constantly changing array of techniques.

Combining the results for IVF, ICSI and GIFT (but excluding cycles in which frozen embryos or donor oocytes/embryos were transferred), the overall viable pregnancy rates were 17.6 per 100 oocyte retrieval cycles in 2000 (Table 15). When all techniques of assisted conception are included, the viable pregnancy rates for all cycles in which embryos or oocytes were transferred were 17.9 per 100 transfer cycles in 2000.

The viable pregnancy rates were higher in 2000 than in any previous year for all IVF and ICSI transfers.

3.2 Characteristics of treated women

The IVF units provided summary data on the age of treated women, causes of infertility, drugs used for ovarian stimulation, and number of embryos or oocytes transferred for treatment cycles which progressed to this stage of treatment. Separate data were given for oocyte retrieval cycles and transfers of fresh embryos or oocytes for IVF, ICSI, and GIFT (Tables 16 and 17) and for frozen embryo transfers for IVF, ICSI and donor oocytes (Table 18).

There were relatively more older women among those treated by assisted conception in 2000, continuing the trend of recent years. The proportion of women aged 35 years and over in 2000 was 53.5% for IVF, 49.5% for ICSI and 57.2% for GIFT (Table 16). For women with frozen embryo transfers, this proportion was 49.0% for IVF, 42.1% for ICSI and 76.4% for donor oocytes (Table 18).

The causes of infertility and the drugs used to stimulate ovulation generally showed a pattern similar to that in previous years. The main causes of infertility were unexplained infertility and tubal abnormalities for women treated by IVF, male factor for those treated by ICSI, unexplained infertility for women treated by GIFT and other female causes for those using donor oocytes.

For IVF, ICSI and GIFT, the main ovarian stimulants were GnRH analogues and hMG/FSH, accounting for more than 90% of all stimulated cycles.

Between 1997 and 2000, there was a decrease in the proportion of IVF and ICSI cycles in which three or more embryos were transferred. For fresh IVF cycles, the proportion fell from 35.1% in 1997 to 18.8% in 2000 and, for fresh ICSI cycles, from 33.1% to 22.2%. For thawed IVF cycles, the proportion halved from 20.7% in 1997 to 10.9% in 2000 and, for thawed ICSI cycles, fell from 17.5% to 11.0%. On the other hand, the proportion of GIFT cycles in which three or more oocytes were transferred increased slightly from 48.4% in 1997 to 52.2% in 1999, reducing to 45.6% in 2000. The data for fresh embryo transfers and GIFT in 2000 are given in Table 17 and for thawed embryos in Table 18.

3.3 IVF, ICSI and GIFT treatment cycles and pregnancy rates

In 2000, 8,870 treatment cycles were commenced for IVF with a view to subsequent transfer of fresh embryos, including transfer of fresh donor oocytes/embryos (Table 19). Oocyte retrieval was attempted in 7,514 cycles and embryos were transferred in 6,420 cycles. There were 1,613 clinical pregnancies (21.5 per 100 oocyte retrieval cycles) and 1,353 viable pregnancies (18.0 per 100 oocyte retrieval cycles).

The viable pregnancy rate of 18.0 per 100 oocyte retrieval cycles in 2000 for transfer of fresh IVF embryos was higher than in previous years. The pregnancy rates in the highest ranked group of IVF units (Q1) were two and a half times higher than those in the lowest group (Q4)

(Table 19). For example, the viable pregnancy rate for the highest group was 26.5 per 100 oocyte retrieval cycles and, for the lowest group, it was 10.0, with intermediate rates of 19.9 and 15.4, respectively, for the second and third ranked groups.

In 2000, 40 of the 41 IVF units in Australia and New Zealand used ICSI to treat infertility. There were 10,147 attempted oocyte retrieval cycles (including transfer of fresh donor oocytes/embryos), and the viable pregnancy rate was 17.1 per 100 oocyte retrieval cycles (Table 19). Again, the pregnancy rates in the highest group were two and a half times higher than the lowest ranked group of IVF units.

As already indicated, the use of GIFT to treat infertility has declined considerably in recent years. There were 931 treatment cycles (including transfer of fresh donor oocytes) commenced for GIFT in 2000 (Table 19). The viable pregnancy rates for GIFT have been consistently higher than for IVF and ICSI, partly due to differences in the underlying causes of infertility. The viable pregnancy rate for GIFT was 21.5 per 100 oocyte retrieval cycles in 2000. There were again marked variations between the GIFT pregnancy rates for IVF units in the highest and lowest ranked groups. Some IVF units perform only occasional GIFT cycles, resulting in no pregnancies in a specified year and accounting for the zero value in the lowest groups of IVF units.

The pregnancy rates after transfer of frozen embryos are usually lower than after transfer of fresh embryos, partly attributable to fewer frozen embryos being transferred. In 2000, there were 4,868 embryo transfer cycles for IVF and 4,781 cycles for ICSI. For thawed IVF embryo transfers, the viable pregnancy rate was 14.6 per 100 embryo transfers and for thawed ICSI embryo transfers, the rate was 14.2 (Table 20). There were three- to fourfold differences in viable pregnancy rates between IVF units in the highest and lowest ranked groups.

For all techniques of assisted conception in 2000, there were marked variations in the range of viable pregnancy rates for individual IVF units in each of the four ranked groups of IVF units (Table 21).

4 Assisted conception pregnancies

This section contains data on all pregnancies resulting from assisted conception, including IVF, ICSI and GIFT. It includes pregnancies occurring after transfer of fresh embryos to the uterus or fallopian tubes, transfer of frozen embryos, and the use of donor oocytes. Unless otherwise stated, the data for pregnancies conceived in 1999 are generally presented separately for IVF (excluding ICSI), ICSI and GIFT, often in conjunction with data for earlier years. A copy of the pregnancy notification form used in 1999 is in Appendix 2.

There were 4,952 clinical pregnancies after assisted conception in 1999 (Table 22, Figure 5), more than in any previous year and an increase of 492 (11.0%) above the number conceived in 1998. The number of clinical pregnancies in 1999 have doubled since 1992, and have nearly quadrupled since 1987. In 1999, live birth was the outcome in 76.6% of all assisted conception pregnancies (77.7% of ICSI pregnancies, 76.1% of IVF pregnancies and 72.3% of GIFT pregnancies). Spontaneous abortion was the outcome in 19.4% of all assisted conception pregnancies in 1999. There were slightly fewer spontaneous abortions among ICSI pregnancies (19.0%) and relatively more among GIFT pregnancies (24.2%).

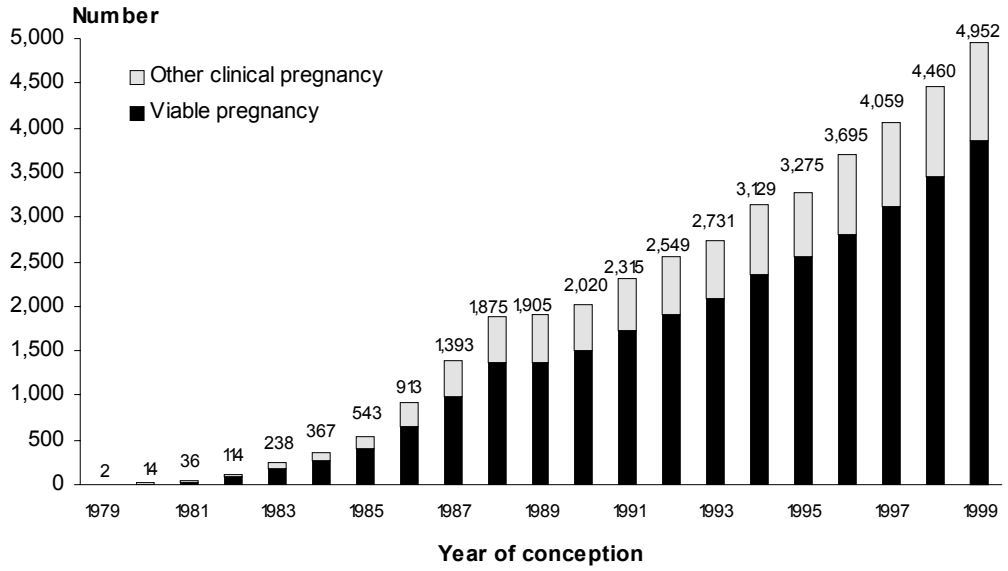


Figure 5: Outcome of assisted conception pregnancies by year of conception, 1979–1999

4.1 Maternal and paternal characteristics

4.1.1 Place of residence

The number of assisted conception pregnancies has continued to increase in most Australian States and Territories and in New Zealand during the 1990s. There were relatively fewer pregnancies in Tasmania and the Australian Capital Territory in 1999 than in 1998. The regional occurrence of assisted conception pregnancies generally reflects population size and the extent to which clinical services are used. GIFT has been relatively more likely to be used in Queensland (52.5% of GIFT pregnancies) than elsewhere over the past two decades (Table 23, Figure 6).

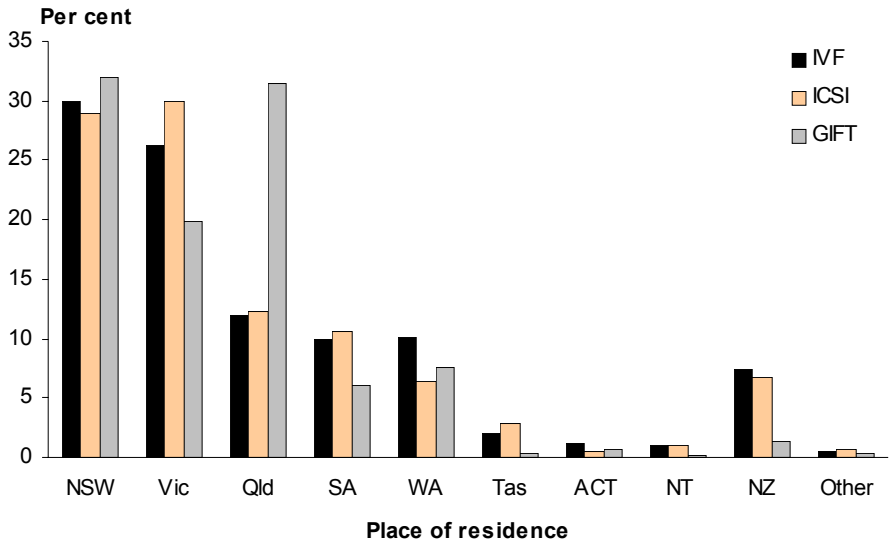


Figure 6: Place of parental residence, assisted conception pregnancies, 1979–1999

4.1.2 Parental age

The majority (79.4%) of women who conceived by assisted conception in 1998 were in their 30s or 40s; this proportion increased slightly to 80.3% in 1999 (Table 24). The proportion of women aged 40 years and over was 8.8% in 1999, much higher than the proportion for all mothers giving birth in Australia and New Zealand in 1999 (2.4% and 2.9%, respectively). There were relatively more women conceiving by ICSI in their 20s (21.8%) than there were for IVF or GIFT conceptions (17.0% and 18.9%, respectively). Women seeking assisted conception ranged in age from 19 to 53 years of age, with a median age of 33 years. There were eight women aged 50 and over. Use of oocyte donation increases with maternal age, most noticeably after the age of forty (Figure 7). Among all pregnancies after assisted conception, only 7% of pregnancies to women aged 47 or more were after the use of their own oocytes.

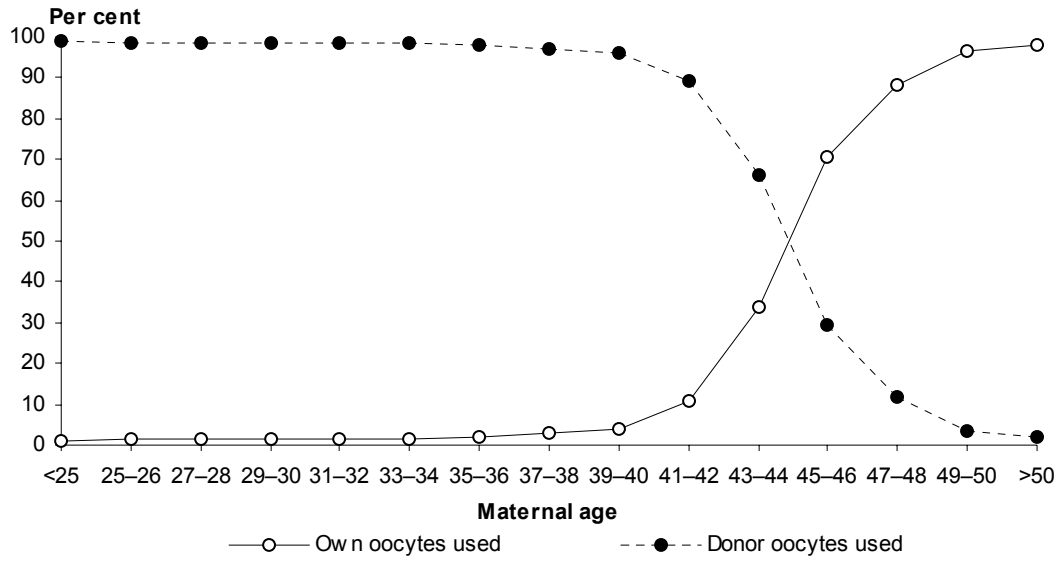


Figure 7: Maternal age and use of donor oocytes, assisted conception pregnancies, 1979–1999

The male partners of women treated by assisted conception were generally older than the women. Men aged 40 years and over accounted for 24.6% of all the male partners in 1999 (Table 25). The proportion of men aged 50 years and over varied from 3.7% for ICSI pregnancies to 3.6% for GIFT pregnancies and 2.5% for IVF pregnancies. Only 10.7% of the men were aged in their 20s. Male partners of women who were pregnant after assisted conception in 1999 varied in age between their early 20s and their 70s, with a median age of 36 years. There were 156 men aged 50 years and over.

4.1.3 Previous pregnancies

Women who conceived in 1999 had similar previous reproductive experiences to those who conceived in earlier years, but there was a slight increase in the proportion of women who had been pregnant previously. Women who conceived with ICSI were more likely not to have been pregnant previously (58.7%) than other women seeking assisted conception (47.8% of GIFT pregnancies and 47.1% of IVF pregnancies) (Table 26). Women who conceived after IVF were more likely to have been pregnant on two or more occasions than women treated by the other techniques (IVF 26.1%, GIFT 18.6% and ICSI 15.0%).

4.1.4 Duration of infertility

There were relatively more women with shorter periods of infertility in 1998 and 1999 than in previous years (Figure 8). The proportion of women infertile for a period of less than four years was 51.7% for IVF conceptions, 54.7% for ICSI, and 58.0% for GIFT (Table 27). Women who had been infertile for 8 years or more were less likely to achieve a live birth (73.5%) than those who had

been infertile for shorter periods (77.0%), were more likely to have a spontaneous abortion (22.3% and 19.2%, respectively), and an ectopic pregnancy (3.0% and 2.1%, respectively).

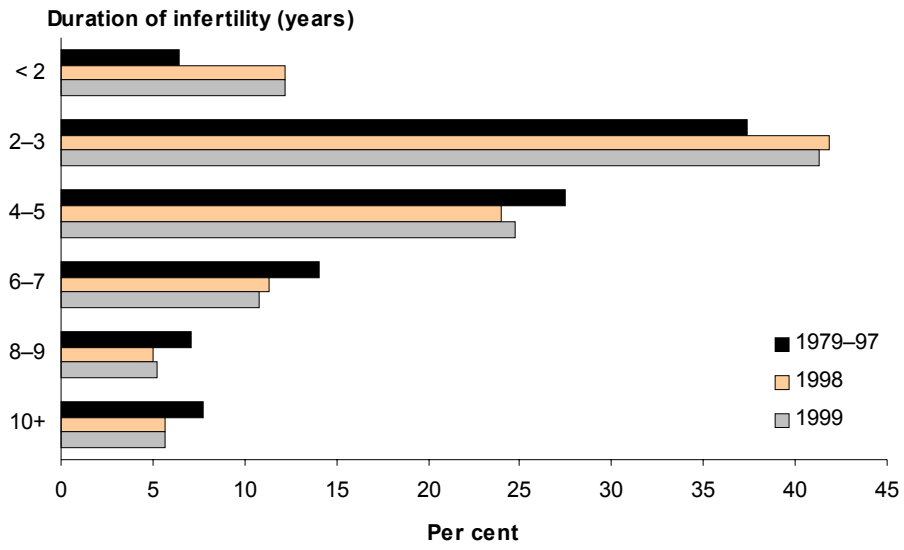


Figure 8: Duration of infertility, assisted conception pregnancies, 1979–1999

4.1.5 Causes of infertility

Among women who conceived after IVF in 1999, multiple causes (24.4%), unexplained infertility (21.7%) and tubal causes (19.3%) accounted for two-thirds of the stated causes (Table 28). Endometriosis and other stated causes were relatively more common as the reason for treatment than in earlier years.

Women conceiving after ICSI in 1999 were most likely to have infertility due to male factor (55.8%) or multiple causes (28.0%). The most common cause of infertility among women who conceived with GIFT in 1999 was unexplained infertility, accounting for one-third (36.3%) of all GIFT conceptions.

Among all assisted conception pregnancies, male factor has been the leading stated cause of infertility since 1991 (Figure 9). This also contributes to 'multiple causes', another category that has become more prominent in recent years. With increasing use of ICSI during the 1990s, tubal abnormalities have declined in significance as an indication for assisted conception but may also contribute to the 'multiple causes' group. Unexplained infertility accounts for about 15% of couples treated by assisted conception.

The expected high occurrence of male infertility among women who were pregnant after ICSI is shown when the broad causal categories of infertility are compared for IVF, ICSI and GIFT (Figure 10).

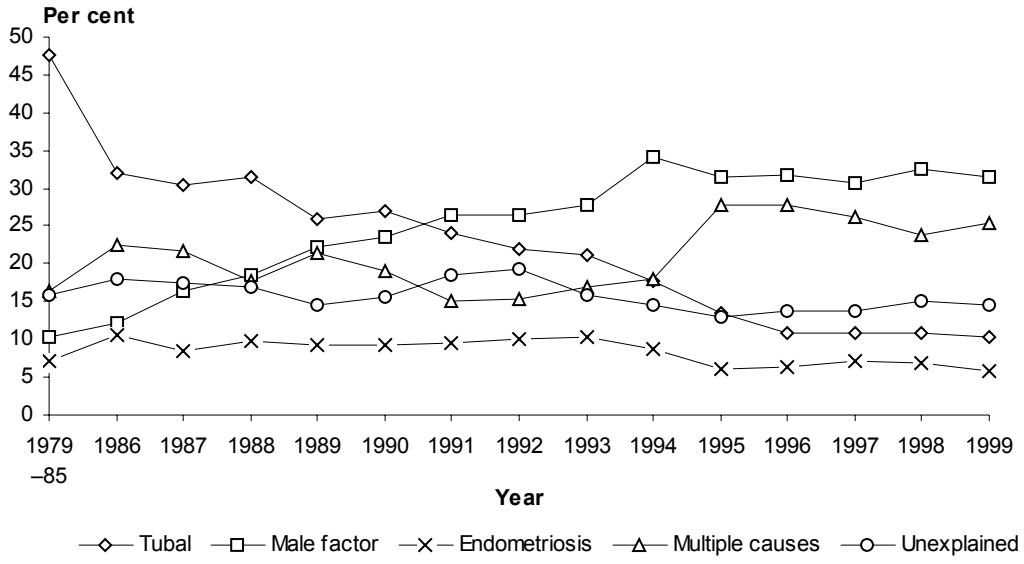


Figure 9: Causes of infertility, assisted conception pregnancies, 1979–1999

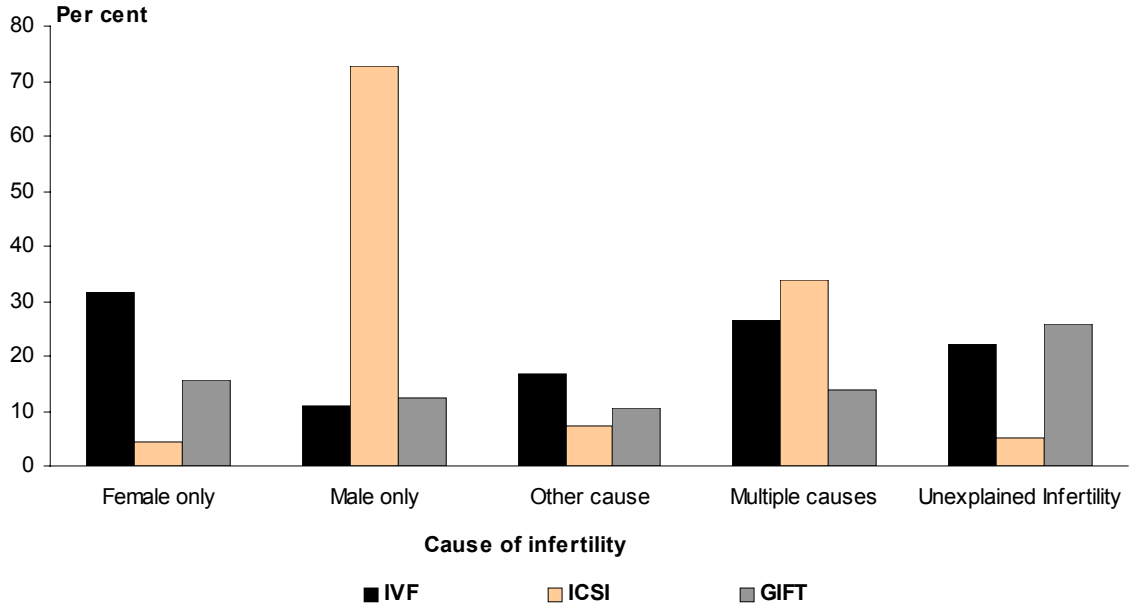


Figure 10: Cause of infertility by method of conception, 1997–1999

The proportion of pregnancies resulting in live births was highest for endometriosis (81.3%) and lowest for tubal causes of infertility (72.3%) (Table 29). Spontaneous abortion varied little for the different causes of infertility and was more strongly associated with the woman's age. Ectopic pregnancy was more likely among women treated for tubal causes of infertility (5.0%) than for other causes. Stillbirth was more frequent among women treated for endometriosis (1.4%) than for other causes, but the number of stillbirths in each group was relatively small.

4.2 Management of IVF pregnancies

4.2.1 Ovarian stimulation

Continuing the trend of recent years, gonadotrophin-releasing hormone analogues (GnRHa) combined with gonadotrophins were the main drugs used for stimulating ovulation. In 1999, these drugs were used in over 95% of treatment cycles that resulted in pregnancies (Table 30, Figure 11). The use of clomiphene to stimulate ovulation has declined from over 90% of treatment cycles in the mid-1980s to less than 2% of treatment cycles in 1999. There has been an increase in the number of natural cycles during this period (0.4% in 1979–1997 and 2.1% in 1998–1999).

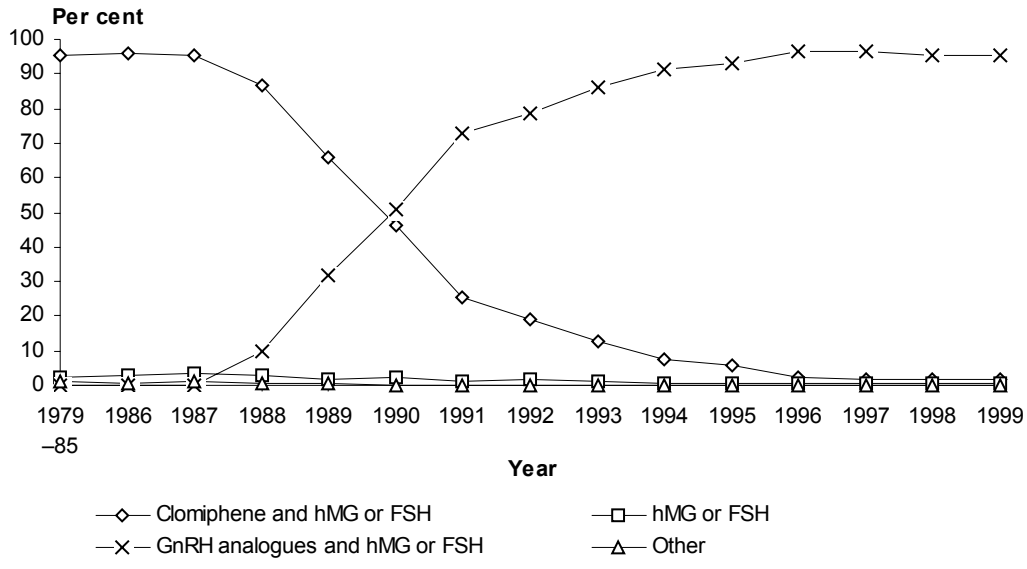


Figure 11: Drugs used to stimulate ovulation, assisted conception pregnancies, 1979–1999

4.2.2 Treatment cycle in which pregnancy occurred

Over half (59.1%) of all IVF pregnancies occurred in the first treatment cycle, and more than two-thirds (79.9%) occurred in the first or second treatment cycle (Table 31). Similarly, 50.6% of all GIFT

pregnancies occurred in the first treatment cycle, and more than two-thirds (79.6%) occurred in the first or second treatment cycle. Just over two-thirds (69.5%) of ICSI pregnancies occurred in the first or second treatment cycle.

4.2.3 Number of oocytes collected

The average number of oocytes collected by laparoscopy or ultrasound guidance has shown a continuing upward trend, more oocytes being collected for IVF or ICSI than for GIFT (Table 32, Figure 12). The mean number of oocytes collected in 1999 was 12.7 for ICSI, 12.1 for IVF, and 8.1 for GIFT. There was a further increase in the proportion of oocyte retrievals in which 15 or more oocytes were collected compared to previous years, occurring in almost one-third (30.1%) of all retrievals.

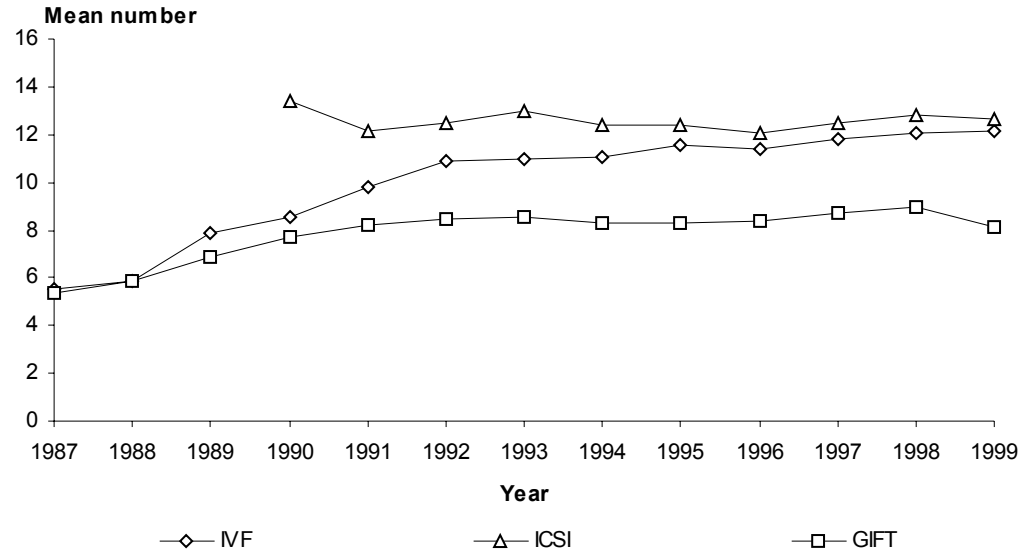


Figure 12: Mean number of oocytes collected by laparoscopy or ultrasound guidance, assisted conception pregnancies, 1987–1999

4.2.4 Ovarian hyperstimulation syndrome (OHSS)

In 1999, 2.4% of women pregnant after assisted conception required hospitalisation for OHSS as a complication of ovarian stimulation (Table 33). The proportion of women hospitalised for OHSS increased with the number of oocytes collected, from 0.2% for those with 1–4 oocytes, 1.0% for 7–8 oocytes, and increasing to 3.9% for 13 or more oocytes.

4.2.5 Number of embryos/oocytes transferred

There has been a continuing decline in the proportion of assisted conception pregnancies that resulted from transfer of 3 or more embryos or oocytes. However, still more than half of the pregnancies resulting from GIFT followed transfer of 3 or more oocytes (Figures 13, 14 and 15). In 1999 1.2% of IVF pregnancies, 1.5% of ICSI pregnancies and 11.3% of GIFT pregnancies followed transfer of 4 or more embryos or oocytes (Table 34). Nearly 80% of IVF and ICSI pregnancies followed transfer of 1 or 2 embryos, compared to 44.7% for GIFT pregnancies. The average number of embryos transferred for IVF and ICSI has continued to decline, being similar for these two techniques since 1994 (Figure 16). In 1999, the average number of embryos transferred for IVF and ICSI was 2.1 and 2.2, respectively. The average number of oocytes transferred for GIFT in 1998 was 2.7, slightly higher than in recent years. There was an association between an increase in the number of oocytes/embryos transferred in 1999 and poorer pregnancy outcome, with an increase in spontaneous abortion and ectopic pregnancy (18.5% and 1.9%, respectively, for 1–2 oocytes/embryos transferred increasing to 27.6% and 5.1%, respectively, for transfer of four or more oocytes/embryos) and a decrease in livebirths from 77.9% to 65.3%, respectively (Table 35).

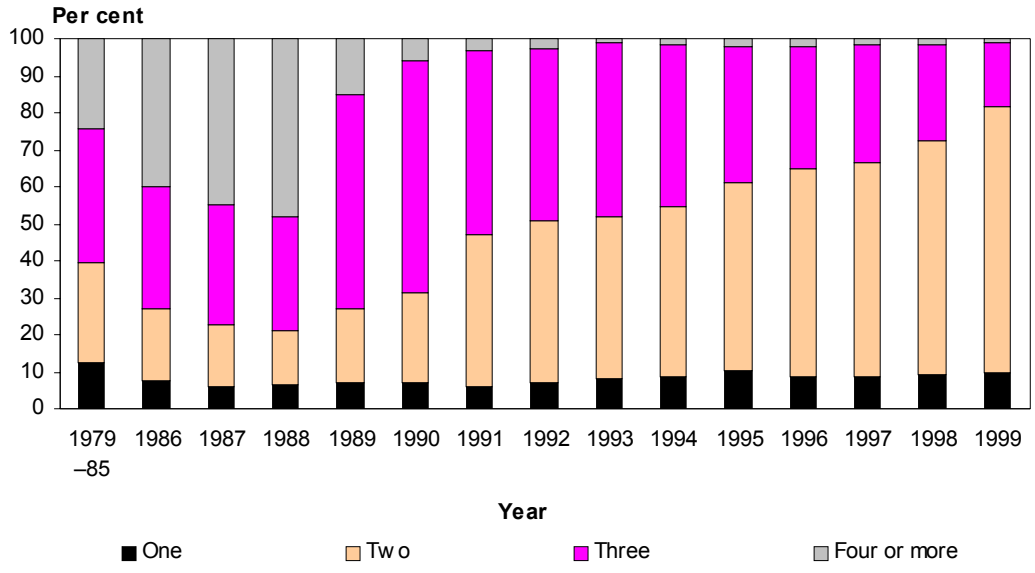


Figure 13: Percentage distribution of number of embryos transferred, IVF pregnancies, 1979–1999

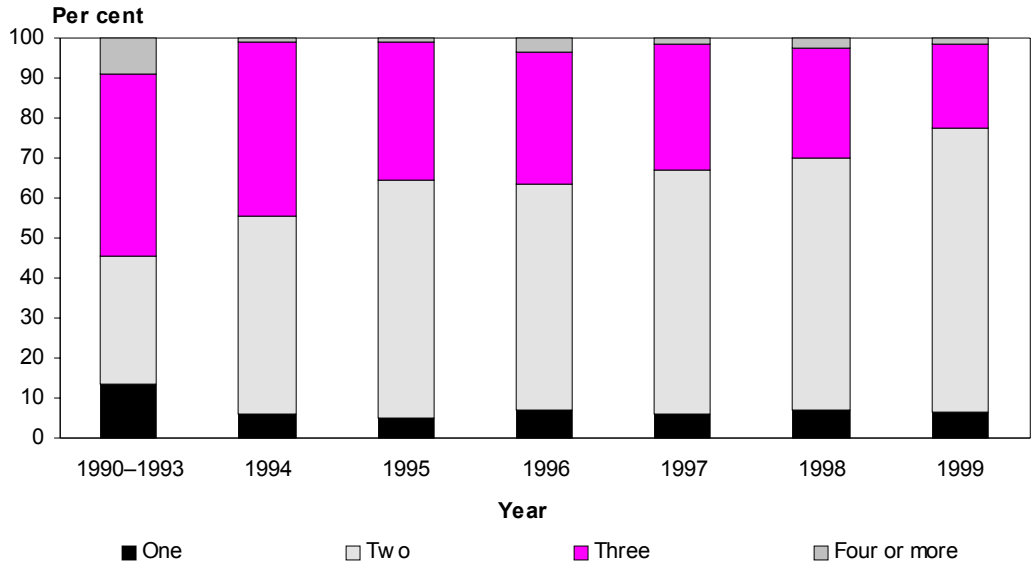


Figure 14: Percentage distribution of number of embryos transferred, ICSI pregnancies, 1990–1999

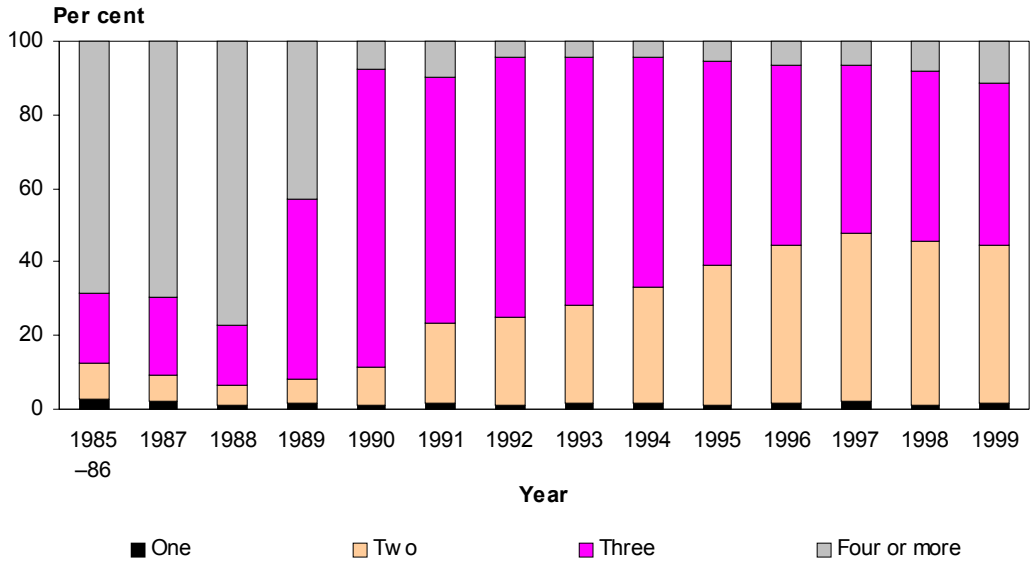


Figure 15: Percentage distribution of number of oocytes transferred, GIFT pregnancies, 1985–1999

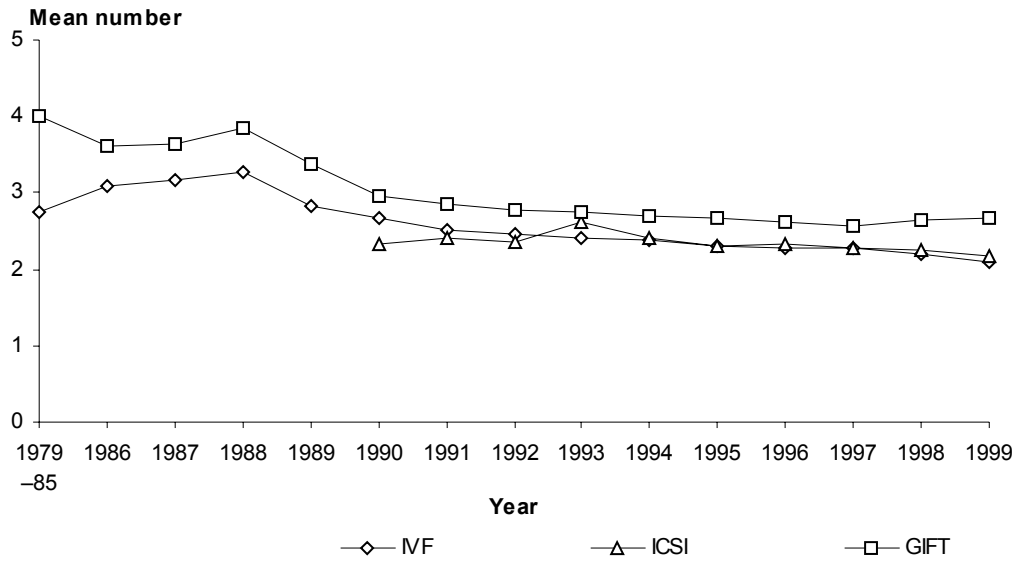


Figure 16: Mean number of embryos/oocytes transferred, assisted conception pregnancies, 1979–1999

4.2.6 Donor or frozen gametes and embryos

The number of assisted conception pregnancies that followed transfer of frozen embryos has continued to increase each year from 530 in 1992 to 1,506 in 1999. The number of pregnancies after use of donor embryos or donor oocytes increased from 104 in 1995 to 233 in 1999. The outcome of pregnancies after frozen embryos and donor oocytes or donor embryos was similar to that of all assisted conception pregnancies (Table 36). Among pregnancies resulting from donor sperm, there were relatively fewer spontaneous abortions (16.5%) and more live births when compared with all assisted conception pregnancies.

4.2.7 Drugs used in luteal phase of pregnancy

Over 85% of women who became pregnant in 1999 were treated with drugs during the luteal phase (Table 37). Human chorionic gonadotrophin (hCG) and Proluton were the most commonly used drugs, in 38.2% and 30.7% of IVF pregnancies, in 41.7% and 32.0% of ICSI pregnancies, and in 61.3% and 24.8% of GIFT pregnancies, respectively.

5 Outcomes of assisted conception pregnancies

5.1 Characteristics of assisted conception pregnancies

5.1.1 Maternal deaths

No maternal deaths were reported among women who conceived by assisted conception in 1999. Six maternal deaths have previously been reported among a total of 40,585 assisted conception pregnancies.

5.1.2 Maternal age and outcome of pregnancy

The likelihood of achieving a live birth after conceiving with reproductive techniques decreases with advancing maternal age. Over 80% of women aged less than 35 years gave birth to liveborn infants compared with 74.1% of women aged 35 to 39 years and 60.1% of women aged 40 years and over (Table 38). Spontaneous abortion and termination of pregnancy were more likely among women of 40 years and over. There was little variation in the occurrence of stillbirths in the various age groups, except for a slightly higher proportion among women aged 40 or more.

5.1.3 Spontaneous abortion

There has been little change in the occurrence of spontaneous abortion in assisted conception pregnancies in recent years (Figure 17). Spontaneous abortion was more likely for older women, increasing from 15.7% for women less than 30 years to 36.4% for women 40 years and over (Table 39, Figure 18).

5.1.4 Ectopic pregnancy

The proportion of ectopic pregnancies has declined from 5.2% in 1979–1985 to 2.6% in 1997, 2.4% in 1998 and 2.2% in 1999 (Table 40, Figure 17). This declining trend is partly attributable to relatively fewer ectopic pregnancies among the increasing proportion of women whose infertility was due to male factors (2.5% in IVF, 2.2% in GIFT and 1.8% in ICSI), and the decreasing proportion of women with tubal causes of infertility.

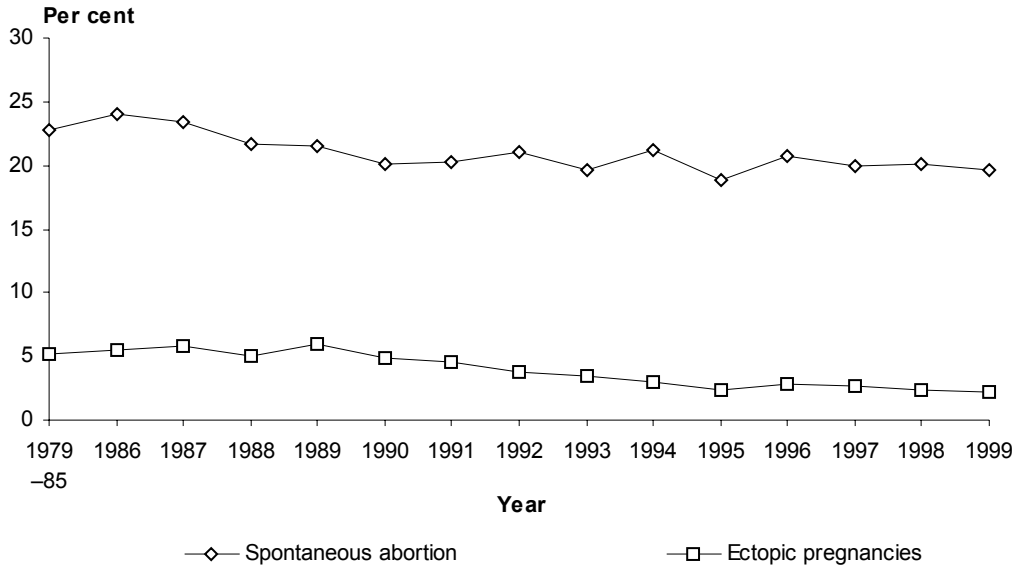


Figure 17: Incidence of ectopic pregnancy and spontaneous abortion, assisted conception pregnancies, 1979–1999

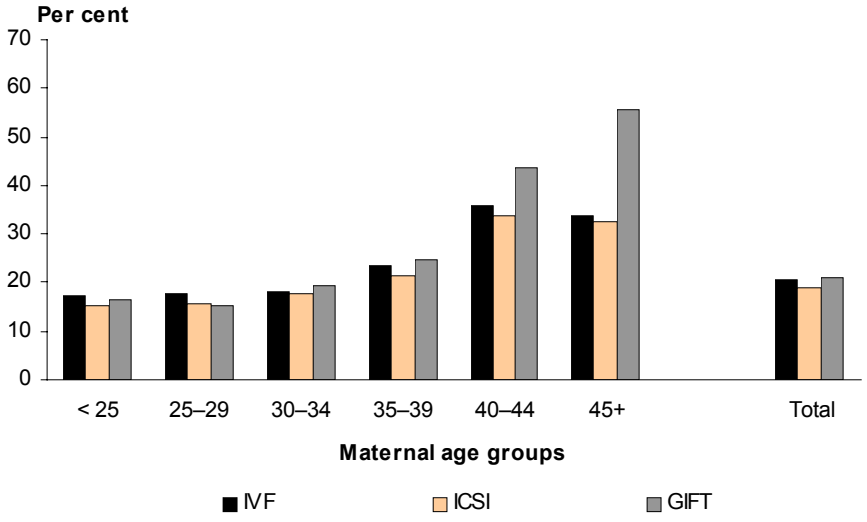


Figure 18: Spontaneous abortions by maternal age groups, assisted conception pregnancies, 1979–1999

5.1.5 Heterotopic pregnancies

Heterotopic pregnancies are those in which there is both a uterine and tubal (ectopic) pregnancy simultaneously. The uterine pregnancy may abort or continue on to a birth. Heterotopic pregnancies are uncommon. Since assisted conception began in Australia and New Zealand, 185 cases of heterotopic pregnancies (116 leading to abortion and 69 continuing to a birth) have been reported, accounting for 0.5% of all assisted conception pregnancies (Table 41). There were no reported IVF heterotopic pregnancies prior to 1984 and the first GIFT heterotopic pregnancy was reported in 1986. There have been 23 ICSI heterotopic pregnancies (12 leading to abortion and 11 continuing to a birth). In 1999 there were 3 heterotopic IVF pregnancies, 2 heterotopic ICSI pregnancies and 2 heterotopic GIFT pregnancies.

5.1.6 Selective reduction of fetuses

Selective reduction of fetuses may be performed in early pregnancy to abort a severely malformed fetus in a multiple pregnancy or to avoid multiple births. Among pregnancies conceived in 1999, selective reduction was performed in 4 IVF pregnancies, 2 ICSI pregnancies and 1 GIFT pregnancy. Fetal reduction had previously been performed in 65 pregnancies between 1988 and 1998. Of the 7 pregnancies with selective reduction in 1999, three fetuses were reduced to two in 1 IVF pregnancy and 1 ICSI pregnancy and two fetuses were reduced to one in 3 IVF pregnancies, 1 ICSI pregnancy and 1 GIFT pregnancy. The indication for fetal reduction was a congenital malformation in 3 IVF pregnancies (anencephalic, Down syndrome and trisomy 13) and 1 ICSI pregnancy (trisomy 18), all reduced from two fetuses to one. None of the other selective reductions was for fetal malformations. Among the 7 pregnancies in which selective reduction was performed in 1999, spontaneous abortion of the remaining fetuses occurred in 1 pregnancy.

5.1.7 Complications of pregnancy

Significant complications of pregnancy are recorded in tick boxes on the forms used to notify assisted conception pregnancies. Ascertainment of pregnancy complications is improving; this data item was not completed in only 0.2% of pregnancies conceived in 1997 and in 0.1% of pregnancies conceived in 1998 and 1999, compared with 15.8% in the period from 1990 to 1996. Any comparison of these reported complications between assisted conception and other pregnancies should take account of how the information is collected. Pregnancy complications were similar for all methods of assisted conception. Pregnancy-induced hypertension was reported in 6–7% of pregnancies, threatened abortion in 2–4%, antepartum haemorrhage in almost 2%, and placenta praevia in about 1.5% (Table 42). Other complications such as maternal medical conditions, fetal growth restriction and premature labour were reported in 11.7% of ICSI pregnancies, 11.2% of IVF pregnancies and 10.4% of GIFT pregnancies. Three-quarters of all pregnancies (IVF 76.3%, GIFT 76.1% and ICSI 75.9%) had no pregnancy complications.

5.1.8 Viable pregnancies of at least 20 weeks' gestation

Reflecting the overall increase in assisted conception pregnancies in 1999, there was also a considerable increase in births conceived in that year. In Australia, there were 4,319 births after assisted conception in 1999, accounting for 1.7% of all births in the population, compared with 3,873 infants conceived in 1998, 3,514 in 1997, 3,162 in 1996, 2,947 in 1995, and 2,719 in 1994. In New Zealand, the were 421 births after assisted conception in 1999, 36% more than in 1998 and accounting for 0.7% of all births.

Preterm births of less than 37 weeks' gestation occurred in 24.8% of all IVF pregnancies, 24.4% of all ICSI pregnancies, and 30.3% of all GIFT pregnancies in 1999 (Table 43). The incidence of preterm births was higher with increasing plurality, ranging from 13.8% for singleton assisted conception pregnancies to 62.6% for twin pregnancies and 100% for triplet pregnancies. Preterm births among singleton assisted conception pregnancies declined to their lowest level of 12.9% in 1997, increasing slightly to 13.8% in 1999 (Figure 19), but this proportion was more than double that for all Australian singleton pregnancies (6.2% in 1999). Extremely preterm births of less than 28 weeks' gestation occurring among singleton assisted conception pregnancies declined to their lowest level of 1.5% in 1998, increasing to 1.9% in 1999, compared with 0.6% for all Australian singleton pregnancies.

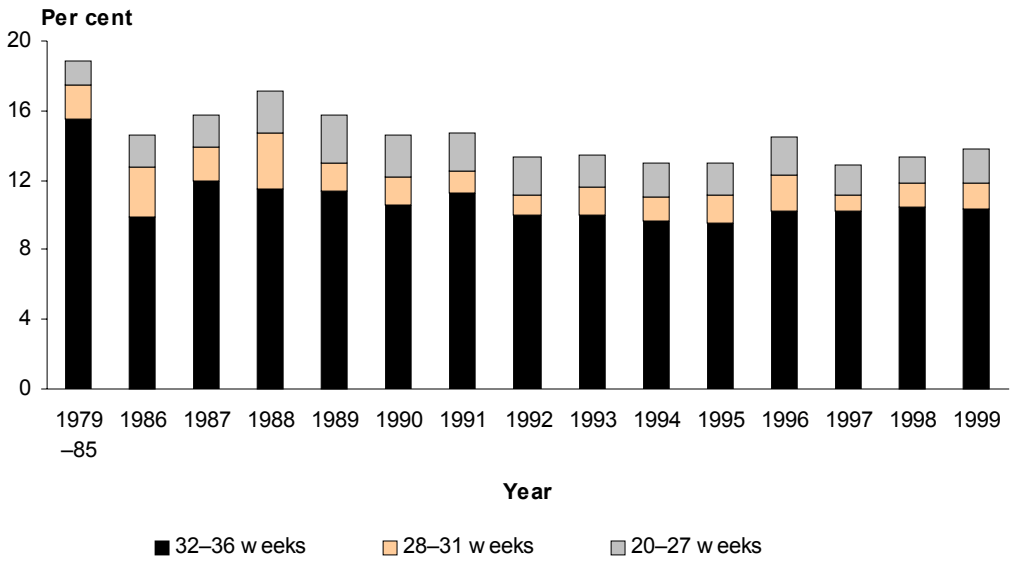


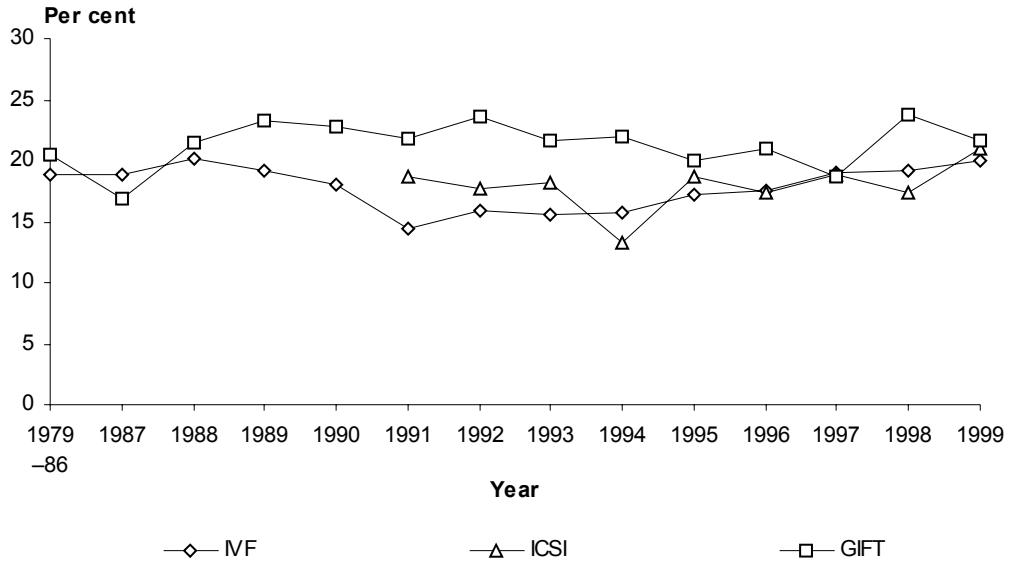
Figure 19: Incidence of preterm birth in singleton assisted conception pregnancies, 1979–1999

As in previous years, there was a high proportion of preterm births among singleton assisted conception pregnancies in all maternal age groups (Table 44) and for all causes of infertility (Table 45). The proportion was lowest for mothers aged 30–39 (13.4%) and highest for mothers aged less than 25 years (15.8%) and for those aged 40 and over (16.9%). Preterm birth was less likely if infertility was due to endometriosis (12.1%), male factor infertility (12.4%) or unexplained

infertility (12.6%); the highest incidence was among women whose infertility was due to multiple causes or tubal causes (15.7% and 15.1%, respectively). Multiple causes of infertility also include women with tubal causes of infertility.

5.1.9 Multiple pregnancies

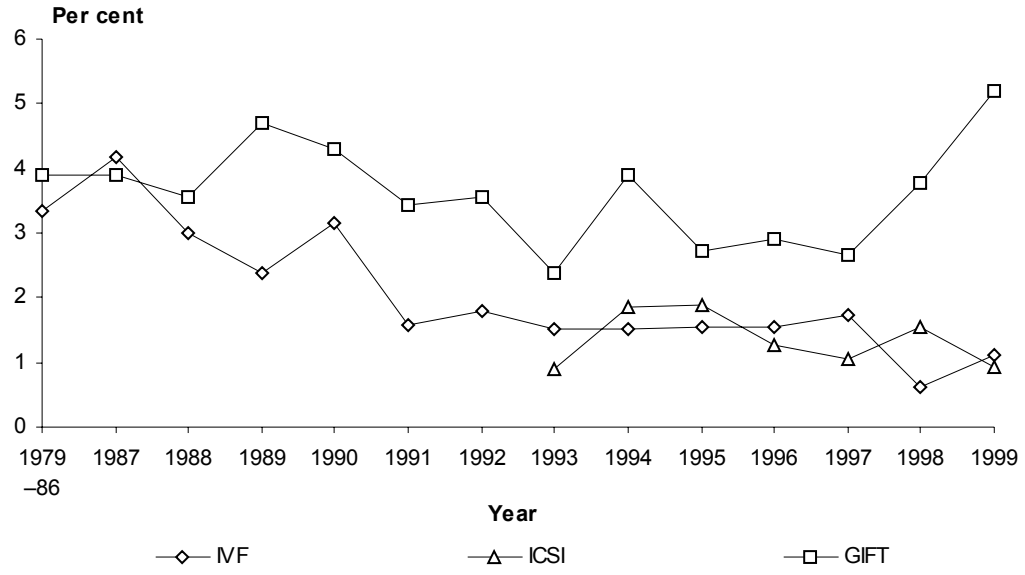
Multiple pregnancy occurred in 21.2% of IVF pregnancies, 21.8% of ICSI pregnancies and 26.8% of GIFT pregnancies in 1999 (Table 46). Multiple pregnancies after all types of assisted conception (21.8%) were much more likely than for all Australian births (1.6% in 1999). The incidence of twin pregnancy after IVF declined from 20.2% in 1988 to 14.4% in 1991 but has since risen again to 20.0% in 1999 (Figure 20). The incidence of twin pregnancy after ICSI has varied between 13.2% in 1994 and 20.9% in 1998. After GIFT, the incidence of twin pregnancy has generally been higher than for IVF or ICSI, having declined from 23.5% in 1992 to 18.7% in 1997 but then rising again to 23.7% in 1998. Triplet pregnancies declined to their lowest level of 0.6% among IVF pregnancies in 1998, but increased to 1.1% in 1999. Among ICSI pregnancies, triplets declined to their lowest level of 0.9%, but among GIFT pregnancies they increased to their highest level ever, 5.2%, based on fewer pregnancies (Figure 21). There was one quadruplet pregnancy in 1999.



Note: In 1990, there were no twin pregnancies in the ICSI group, which in the earlier years was mostly made up of other forms of microinsemination, such as SUZI

Figure 20: Incidence of twin pregnancy, assisted conception pregnancies, 1979–1999

Multiple pregnancy was more likely after transfer of fresh embryos than after transfer of frozen embryos. In 1999, twins occurred in 23.1% of pregnancies after transfer of fresh embryos, triplets in 1.6% and there was 1 quadruplet pregnancy. Among pregnancies after transfer of frozen embryos, twins occurred in 14.4%, triplets in 0.4% and there were no quadruplet pregnancies.



Note: In 1990–1992, there were no triplet pregnancies in the ICSI group, which in those years was mostly made up of other forms of microinsemination, such as SUZI

Figure 21: Incidence of triplet pregnancy, assisted conception pregnancies, 1979–1999

The likelihood of multiple pregnancy is usually related to the number of embryos or oocytes transferred. In 1999, twins occurred in 20.9% of all assisted conception pregnancies after transfer of 2 embryos or oocytes, in 25.4% after transfer of 3 embryos or oocytes, and in 21.5% after transfer of 4 or more embryos or oocytes (Table 47). Among all assisted conception pregnancies, triplets occurred in 3.8% after transfer of 3 embryos or oocytes, in 6.8% after transfer of 4 embryos or oocytes, and in 16.7% (1 pregnancy) after transfer of 5 or more embryos or oocytes.

The occurrence of multiple pregnancies after assisted conception was lower in Australia (21.4%) than in New Zealand (26.4%) (Table 48, Figure 22). In Australia, New South Wales and South Australia/Northern Territory had the highest multiple pregnancy rates, 24.2% and 23.8%, respectively, and the Australian Capital Territory and Tasmania had the lowest, 16.4%. There were relatively more triplets and quadruplets in Queensland (3.3%), Victoria (1.5%) and the Australian Capital Territory/Tasmania (1.5%) than in other Australian States. There were more twin pregnancies in New Zealand (24.9%) than in any Australian State.

The incidence of multiple pregnancy in 1997–1999 varied considerably among the 38 IVF units, ranging from 10.5% to 50.0% (Table 49). Some of this variation may be due to the relatively small number of pregnancies reported in many of the IVF units. In 1999, 34.2% reported fewer than 100 pregnancies and 63.2% reported fewer than 200 pregnancies. There were only 24 pregnancies in the IVF unit that had 50% multiple births. The incidence of multiple pregnancy for all assisted conceptions in this period was 20.9%. For the grouped IVF units, multiple pregnancy occurred in 26.5% of 2,914 pregnancies in the group with the highest incidence, almost double that of 15.1% among 2,890 pregnancies in the lowest group.

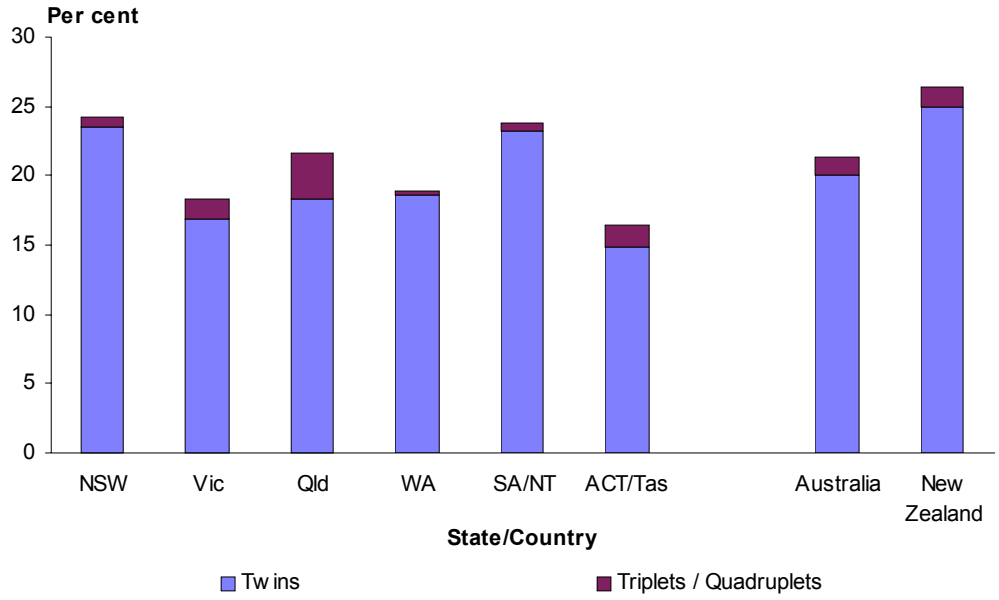


Figure 22: Multiple pregnancies after assisted conception, Australia and New Zealand, 1999

5.1.10 Method of delivery

As in previous years, caesarean rates were higher for multiple than for singleton assisted conception pregnancies (Figure 23). In 1999, the caesarean rate was 39.7% for singleton pregnancies, 63.2% for twin pregnancies and 89.6% for triplet pregnancies (Table 50). The caesarean rate for singleton ICSI pregnancies, 37.4%, was lower than that for IVF and GIFT pregnancies, 42.0% and 40.2%, respectively, all of which were considerably higher than the rate of 21.5% for singleton Australian births in 1999. The caesarean rate for singleton assisted conception pregnancies increased with maternal age, from 33.0% for mothers under 30 years of age to 54.9% for mothers aged 40 years and over.

5.2 Characteristics of infants born after assisted conception

5.2.1 Sex of infants

The sex ratio of infants born after assisted conception was 106.8 in 1999, similar to Australia in 1999 (105.6) and previous years (Table 51). The sex ratio of infants born after IVF was 109.0, after ICSI, 105.4, and after GIFT, 102.0. The sex ratio of infants born in all years after use of donor sperm and assisted conception was 111.7 among 3,352 births; after use of donor oocytes, it was 112.5 among 935 births; and after use of frozen embryos, it was 106.1 among 7,869 births.

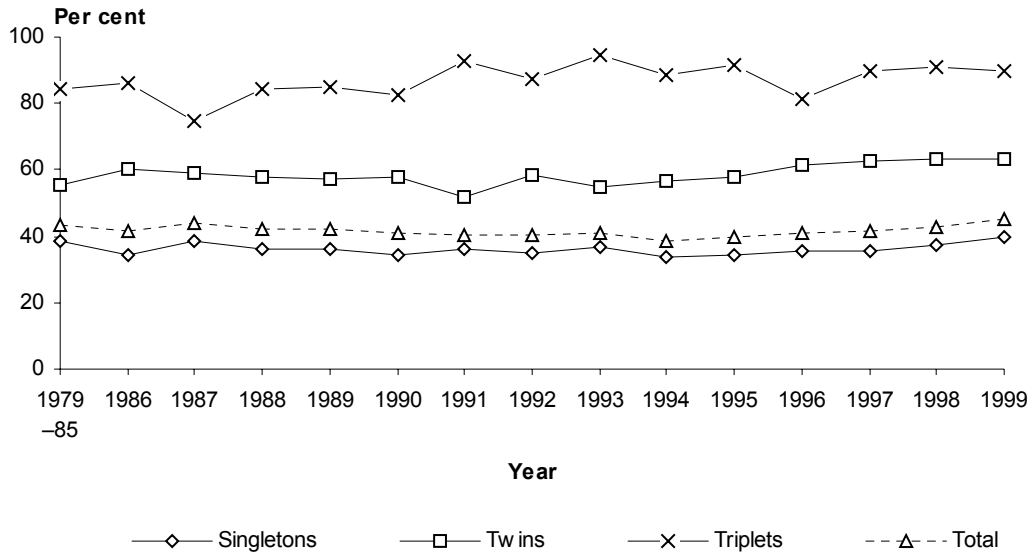


Figure 23: Caesarean birth rates, singleton and multiple assisted conception pregnancies, 1979–1999

5.2.2 Birthweight

The mean birthweight and the incidence of low birthweight (less than 2500g) for infants born after assisted conception in 1999 differed considerably from the birthweights for all Australian births. The mean birthweight of assisted conception births in 1999 was 2,883g (Table 52), 477g less than the mean birthweight of 3,360g for all Australian births in 1999. The high incidence of multiple births after assisted conception accounted for much of this difference (Table 53). For singleton births, the mean birthweight was 3,243g after assisted conception and 3,392g for all Australian births; for twins, 2,329g and 2,396, respectively; and for triplets, 1,543g and 1,506, respectively. Among singleton IVF births in 1999, low birthweight occurred in 9.9%, compared with 5.2% for all singleton births in Australia.

The mean birthweight of singleton births after IVF was 3,223g, after ICSI, 3,274g, and after GIFT, 3,147g. In 1999, low birthweight occurred in 10.1% of singleton births after IVF, in 9.6% after ICSI, and in 10.7% after GIFT. Low birthweight in singleton births in all years occurred in 10.9% after assisted conception using donor sperm, in 13.1% after donor oocytes, and in 7.8% after embryo freezing.

There were relatively fewer low birthweight infants born after ICSI than after IVF or GIFT (Figure 24). The incidence of low birthweight in singleton assisted conception births has declined during the last decade but is still about 9–10% in the most recent years (Figure 25).

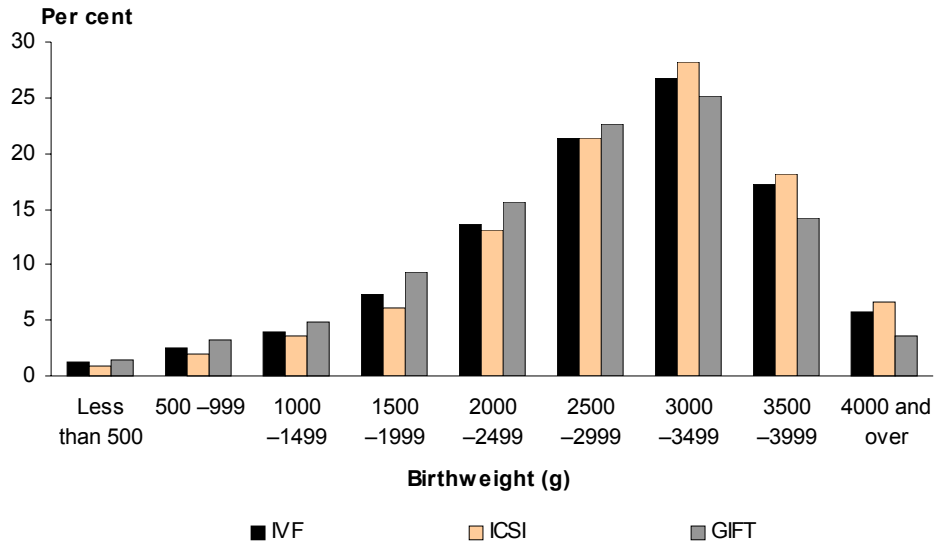


Figure 24: Birthweight of assisted conception births, 1979–1999

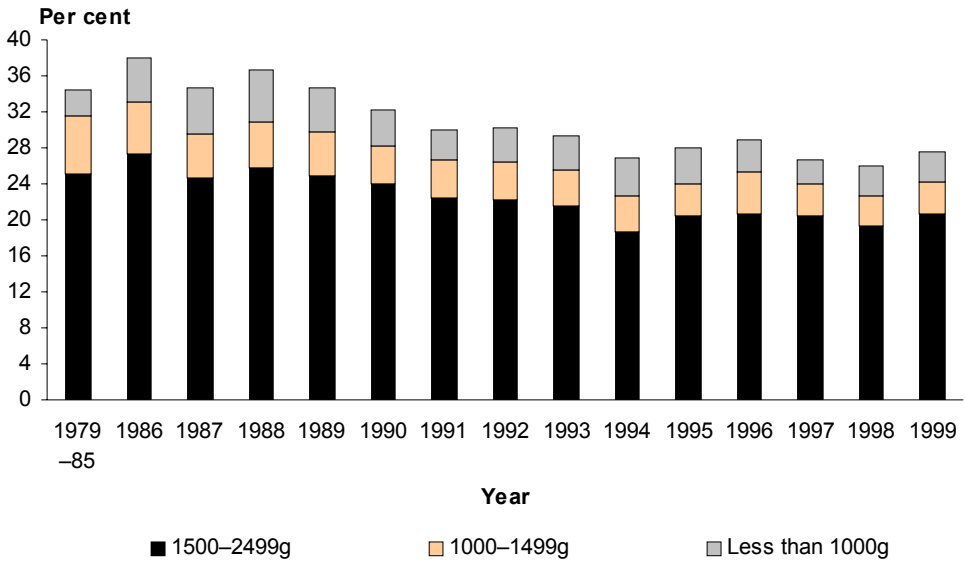


Figure 25: Incidence of low birthweight in singleton assisted conception births, 1979–1999

5.2.3 Perinatal mortality

Perinatal deaths include fetal deaths (stillbirths) of at least 20 weeks' gestation and neonatal deaths of liveborn infants occurring within 28 days of birth. The perinatal death rate for all assisted conception births in 1999 was 24.7 per 1,000 births (Table 54), similar to 1998 but lower than in earlier years (Figure 26). For singleton births, the perinatal death rate was 17.3 per 1,000 births, for twins, 32.3 per 1,000 births, for triplets, 95.2 per 1,000 births. There were no quadruplet perinatal deaths. Among 2,186 births after IVF in 1999, the perinatal death rate was 28.8 per 1,000 births; for singleton births, it was 19.2 per 1,000 births, for twins, 36.4 per 1,000 births, and 166.7 per 1,000 triplet births. Among 2,249 births after ICSI in 1999, the perinatal death rate was 22.2 per 1,000 births; for singleton births, it was 16.8 per 1,000 births, for twins, 28.7 per 1,000 births, and for triplets, 78.4 per 1,000 births. Among 305 births after GIFT in 1999, the perinatal death rate was 13.1 per 1,000 births; for singleton births, it was 5.9 per 1,000 births, for twins, 30.0 per 1,000 births, and there were no triplet perinatal deaths.

The perinatal death rate after assisted conception is considerably higher than for all Australian births. In 1999, the perinatal death rate among all births of at least 20 weeks' gestation or 400g birthweight in Australia was 10.1 per 1,000 births. Factors contributing to the higher perinatal death rate after assisted conception include relatively more older mothers, their underlying causes of infertility, and the much higher incidence of multiple births than in the general population.

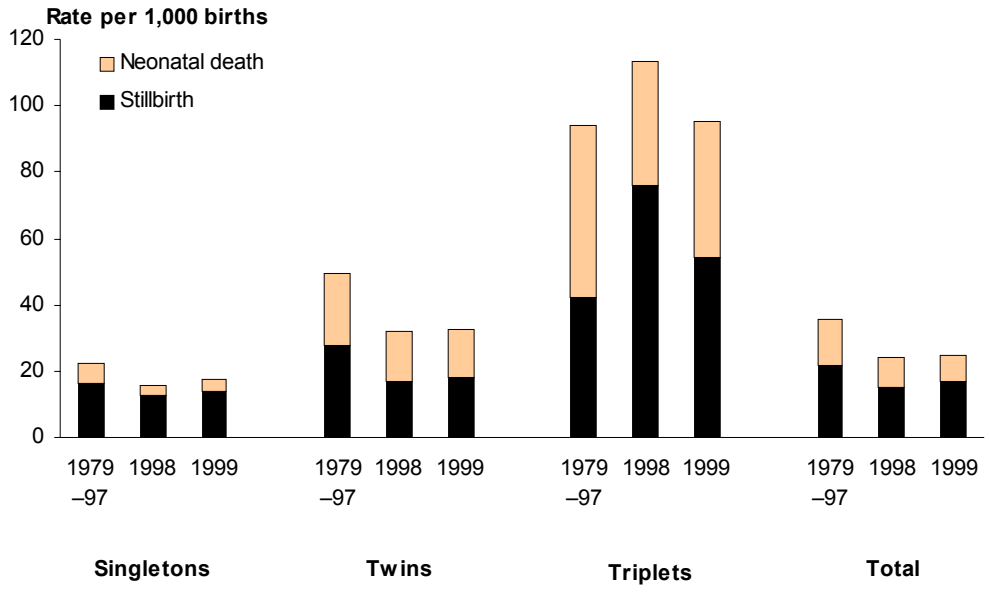


Figure 26: Perinatal mortality in singleton and multiple assisted conception births, 1979–1999

5.2.4 Congenital malformations

Among 4,740 live births and stillbirths and 23 pregnancies terminated for fetal abnormality after assisted conception in 1999, there were 95 (2.0%) infants and fetuses with major congenital malformations (Table 55). The malformation rate was higher in singleton births (1.9%) than in multiple births (0.9%).

Among pregnancies conceived in 1999 after IVF, there were 11 pregnancies terminated for fetal abnormality and 2,186 births. Major congenital malformations were notified in 36 fetuses and infants, a malformation rate of 1.6%. There were 17 (1.2%) malformations among 1,408 singleton births and 8 (1.0%) among 778 multiple births.

Among pregnancies conceived after ICSI in 1999, there were 11 pregnancies terminated for fetal abnormality and 2,249 births. Major congenital malformations were notified in 52 fetuses and infants, a malformation rate of 2.3%. There were 34 (2.4%) malformations among 1,432 singleton births and 7 (0.9%) among 817 multiple births.

There were 305 births conceived after GIFT in 1999 and 1 pregnancy was terminated for fetal abnormality. Major congenital malformations were notified in 7 fetuses and infants, a malformation rate of 2.3%. There were 5 (3.0%) malformations among 169 singleton births and 1 (0.7%) among 136 multiple births.

6 Tables

Table 1: IVF pregnancies after transfer of fresh embryos, numbers and pregnancy rates, 1992–2000

Stage of treatment	Year of treatment								
	1992	1993	1994	1995	1996	1997	1998	1999	2000
Treatment cycles commenced	8,474	8,297	8,638	8,573	8,297	8,275	8,744	8,591	8,626
Cycles with oocyte retrieval	7,501	7,144	7,298	6,833	6,825	6,839	7,177	7,174	7,270
Cycles with embryo transfer	6,190	5,836	5,889	5,547	5,659	5,593	5,822	6,066	6,176
Clinical pregnancies	925	969	1,025	990	1,087	1,171	1,294	1,436	1,561
Viable pregnancies	644	693	753	783	823	911	1,021	1,105	1,301
Clinical pregnancies per 100 oocyte retrieval cycles	12.3	13.6	14.0	14.5	15.9	17.1	18.0	20.0	21.5
Viable pregnancies per 100 oocyte retrieval cycles	8.6	9.7	10.3	11.5	12.1	13.3	14.2	15.4	17.9

Table 2: IVF pregnancies after embryo freezing, numbers and pregnancy rates, 1992–2000

Stage of treatment	Year of treatment								
	1992	1993	1994	1995	1996	1997	1998	1999	2000
Cycles with embryo transfer	3,813	4,607	4,309	4,404	4,504	4,520	4,951	4,667	4,478
Clinical pregnancies	513	622	657	637	655	715	745	772	817
Viable pregnancies	373	440	469	487	502	551	571	579	638
Clinical pregnancies per 100 embryo transfer cycles	13.5	13.5	15.2	14.5	14.5	15.8	15.0	16.5	18.2
Viable pregnancies per 100 embryo transfer cycles	9.8	9.6	10.9	11.1	11.1	12.2	11.5	12.4	14.2

Table 3: ICSI pregnancies after transfer of fresh embryos, numbers and pregnancy rates, 1992–2000

Stage of treatment	Year of treatment								
	1992	1993	1994	1995	1996	1997	1998	1999	2000
Treatment cycles commenced	n.a.	n.a.	n.a.	n.a.	5,816	6,840	7,736	9,046	9,978
Cycles with oocyte retrieval	812	1,243	2,786	4,261	5,220	6,308	7,093	8,022	8,895
Cycles with embryo transfer	516	937	2,436	3,778	4,741	5,438	6,085	7,098	7,854
Clinical pregnancies	80	136	430	698	913	1,135	1,316	1,643	1,871
Viable pregnancies	55	110	303	560	720	928	1,052	1,311	1,513
Clinical pregnancies per 100 oocyte retrieval cycles	9.9	10.9	15.4	16.4	17.5	18.0	18.6	20.5	21.0
Viable pregnancies per 100 oocyte retrieval cycles	6.8	8.8	10.9	13.1	13.8	14.7	14.8	16.3	17.0

Note : Data for 1992–1995 include treatment cycles using subzonal insemination and other types of microinsemination.

Table 4: ICSI pregnancies after embryo freezing, numbers and pregnancy rates, 1994–2000

Stage of treatment	Year of treatment						
	1994	1995	1996	1997	1998	1999	2000
Cycles with embryo transfer	929	1,794	2,297	3,203	3,769	4,463	4,639
Clinical pregnancies	154	262	318	457	603	670	801
Viable pregnancies	124	208	254	364	480	520	661
Clinical pregnancies per 100 embryo transfer cycles	16.6	14.6	13.8	14.3	16.0	15.0	17.3
Viable pregnancies per 100 embryo transfer cycles	13.3	11.6	11.1	11.4	12.7	11.7	14.2

Note : Separate data for pregnancies after ICSI and embryo freezing were not collected prior to 1994.

Table 5: GIFT pregnancies, numbers and pregnancy rates, 1992–2000

Stage of treatment	Year of treatment								
	1992	1993	1994	1995	1996	1997	1998	1999	2000
Treatment cycles commenced	4,342	4,215	3,653	2,884	2,613	2,195	1,608	1,384	924
Cycles with oocyte retrieval	3,831	3,663	3,163	2,462	2,292	1,924	1,458	1,265	817
Cycles with gamete transfer	3,757	3,637	3,012	2,387	2,250	1,858	1,415	1,239	800
Clinical pregnancies	1,042	1,015	873	666	629	506	390	320	223
Viable pregnancies	780	761	655	506	505	384	301	230	175
Clinical pregnancies per 100 oocyte retrieval cycles	27.2	27.7	27.6	27.1	27.4	26.3	26.7	25.3	27.3
Viable pregnancies per 100 oocyte retrieval cycles	20.4	20.8	20.7	20.6	22.0	20.0	20.6	18.2	21.4

Table 6: Assisted conception pregnancies using donor oocytes, transfer of fresh embryos or GIFT, numbers and pregnancy rates, 1992–2000

Stage of treatment	Year of treatment								
	1992	1993	1994	1995	1996	1997	1998	1999	2000
Cycles with embryo transfer[a]	331	342	391	427	284	342	282	364	436
Clinical pregnancies	55	67	56	86	64	80	64	98	113
Viable pregnancies	42	48	37	65	43	59	48	66	90
Clinical pregnancies per 100 embryo transfer cycles	16.6	19.6	14.3	20.1	22.5	23.4	22.7	26.9	25.9
Viable pregnancies per 100 embryo transfer cycles	12.7	14.0	9.5	15.2	15.1	17.3	17.0	18.1	20.6

(a) Data prior to 1996 include transfers after embryo freezing.

Table 7: Assisted conception pregnancies using donor oocytes or donor embryos, transfers after embryo freezing, numbers and pregnancy rates, 1996–2000

Stage of treatment	Year of treatment				
	1996	1997	1998	1999	2000
Cycles with embryo transfer	317	376	505	637	532
Clinical pregnancies	62	62	82	99	118
Viable pregnancies	40	46	56	81	91
Clinical pregnancies per 100 embryo transfer cycles	19.6	16.5	16.2	15.5	22.2
Viable pregnancies per 100 embryo transfer cycles	12.6	12.2	11.1	12.7	17.1

Table 8: Assisted conception pregnancies, numbers and pregnancy rates, 1992–2000

Stage of treatment	Year of treatment								
	1992	1993	1994	1995	1996	1997	1998	1999	2000
Cycles with oocyte retrieval[a]	12,144	12,050	13,247	13,556	14,337	15,071	15,728	16,461	16,982
Cycles with embryo transfer	14,607	15,359	16,966	18,337	20,052	21,330	22,829	24,534	24,915
Clinical pregnancies	2,615	2,809	3,195	3,339	3,728	4,126	4,494	5,038	5,504
Viable pregnancies[a]	1,479	1,564	1,711	1,849	2,048	2,223	2,374	2,646	2,989
Viable pregnancies	1,894	2,052	2,341	2,609	2,887	3,243	3,529	3,892	4,469
Viable pregnancies per 100 oocyte retrieval cycles[a]	12.2	13.0	12.9	13.6	14.3	14.8	15.1	15.7	17.6
Viable pregnancies per 100 embryo transfer cycles	13.0	13.4	13.8	14.2	14.4	15.2	15.5	15.9	17.9

(a) Exclude data on cycles with frozen/thawed embryos or donor eggs/embryos.

Table 9: Embryo transfer cycles after assisted hatching, numbers and pregnancy rates, 1994–2000

Stage of treatment	Year of treatment						
	1994	1995	1996	1997	1998	1999	2000
Cycles with embryo transfer	125	273	626	397	435	576	802
Clinical pregnancies	17	24	56	38	57	80	164
Viable pregnancies	12	19	40	26	50	62	130
Clinical pregnancies per 100 embryo transfer cycles	13.6	8.8	8.9	9.6	13.1	13.9	20.4
Viable pregnancies per 100 embryo transfer cycles	9.6	7.0	6.4	6.5	11.5	10.8	16.2

Note: Cycles with assisted hatching are included in earlier IVF and ICSI tables.

Table 10: Embryo transfer cycles after blastocyst culture, numbers and pregnancy rates, 1998–2000

Stage of treatment	Year of treatment		
	1998	1999	2000
Cycles with embryo transfer	343	437	1,138
Clinical pregnancies	70	160	414
Viable pregnancies	60	121	346
Clinical pregnancies per 100 embryo transfer cycles	20.4	36.6	36.4
Viable pregnancies per 100 embryo transfer cycles	17.5	27.7	30.4

Note: Cycles with blastocyst culture are included in earlier IVF and ICSI tables.

Table 11: Special techniques of sperm collection (TESE, MESA, PESA, etc), ICSI pregnancies after transfer of fresh embryos or embryo freezing, numbers and pregnancy rates, 1996–2000

Stage of treatment	Year of treatment				
	1996	1997	1998	1999	2000
Transfer of fresh embryos					
Treatment cycles commenced	n.a.	902	1,111	1,192	1,255
Cycles with oocyte retrieval	521	874	1,072	1,145	1,223
Cycles with embryo transfer	463	769	925	1,046	1,105
Clinical pregnancies	106	178	220	244	266
Viable pregnancies	88	151	178	200	213
Clinical pregnancies per 100 oocyte retrieval cycles	20.3	20.4	20.5	21.3	21.7
Viable pregnancies per 100 oocyte retrieval cycles	16.9	17.3	16.6	17.5	17.4
Transfer after embryo freezing					
Cycles with embryo transfer	n.a.	n.a.	35	56	346
Clinical pregnancies			27	43	58
Viable pregnancies			14	18	48
Clinical pregnancies per 100 embryo transfer cycles			77.1	76.8	16.8
Viable pregnancies per 100 embryo transfer cycles			38.9	31.7	13.9

Note: 1. Cycles with special techniques of sperm collection are included in the earlier ICSI tables.
2. Three large IVF units were unable to provide this information for transfers after embryo freezing.

Table 12: Embryo freezing, thawing and storage of frozen embryos, 1994–2000

Stage of treatment	Year of treatment						
	1994	1995	1996	1997	1998	1999	2000
No. patients having embryos frozen	n.a.	n.a.	n.a.	n.a.	n.a.	7,834	7,955
No. patient cycles having embryos frozen	4,404	4,912	6,213	6,391	7,462	8,669	8,819
No. embryos that were frozen	19,563	22,499	26,550	32,327	37,057	39,682	41,413
No. patients having thawed embryos transferred	n.a.	n.a.	n.a.	n.a.	n.a.	6,771	6,927
No. patient cycles having thawed embryos transferred	4,105	4,872	5,495	5,719	8,159	9,995	9,748
No. embryos thawed	14,375	17,313	19,027	22,611	25,521	28,286	29,371
No. embryos transferred after thawing	10,581	12,515	13,430	15,959	18,085	18,907	18,362
Frozen embryos in storage on 31 December	22,280	30,475	41,662	46,322	56,136	65,518	71,176

Table 13: Cycles of treatment resulting from artificial insemination, 1998–2000

Type of insemination	Year of treatment				
	1998	1999		2000	
	Number of cycles	(Pregnancy rate per 100 transfer cycles)			
Husband's sperm	7,246	7,505		7,953	
Clinical pregnancies		875	11.7	901	11.3
Viable pregnancies		724	9.6	573 (a)	9.6 (b)
Donor sperm	5,405	4,912		4,443	
Clinical pregnancies		565	11.5	481	10.8
Viable pregnancies		466	9.5	297 (a)	8.7 (b)
All artificial inseminations	12,651	12,417		12,396	
Clinical pregnancies		1,440	11.6	1,382	11.1
Viable pregnancies		1,190	9.6	870 (a)	9.3 (b)

(a) Three units were unable to provide viable pregnancies after insemination.
(b) Viable pregnancy rate adjusted for three units unable to provide viable pregnancies after insemination

Table 14: Use of assisted conception to treat infertility, selected States, Australia and New Zealand, 2000

State / Country	Women aged 25–44 years (thousands)	Treatment cycles (a)	Ratios (b)
New South Wales	982	8,402	856
Victoria	736	7,895	1,073
Queensland	541	3,944	729
Western Australia	288	2,127	738
South Australia (c)	252	1,986	789
Australian Capital Territory and Tasmania	118	936	794
Australia	2,917	25,290	867
New Zealand	590	1,770	300

(a) Includes oocyte retrieval cycles for fresh IVF and ICSI, and GIFT, and all frozen transfer cycles (including donor oocytes/embryos).
(b) Treatment cycles per 100,000 women aged 25–44 years.
(c) Includes external unit based in the Northern Territory.

Table 15: Viable pregnancy rates for all techniques of assisted conception, 2000

Type of assisted conception	Oocyte retrieval cycles	Embryo/gamete transfer cycles	Viable pregnancies	Viable pregnancy rate per 100 oocyte retrievals	Viable pregnancy rate per 100 embryo transfers
IVF: fresh embryos	7,269	6,175	1,301	17.9	21.1
IVF: frozen embryos	-	4,478	638	-	14.2
IVF: donor oocytes	-	636	123	-	19.3
IVF: donor sperm (b)	281	235	57	20.3	24.3
ICSI: fresh embryos	8,895	7,854	1,513	17.0	19.3
ICSI: frozen embryos	-	4,639	661	-	14.2
ICSI: donor oocytes	-	311	55	-	17.7
ICSI: donor sperm (b)	251	237	43	17.1	18.1
GIFT	817	800	175	21.4	21.9
GIFT: donor oocytes	-	7	2	-	28.6
GIFT: donor sperm (b)	91	90	22	24.2	24.4
All techniques	**16,981** (a)	**24,900**	**4,468**	**17.6** (a)	**17.9**

(a) Exclude data on cycles with frozen embryos and donor oocytes.
(b) Cycles with donor sperm are not mutually exclusive, therefore they are not included in all techniques.

Table 16: Oocyte retrieval cycles for IVF, ICSI and GIFT, by maternal age, cause of infertility, and drugs used to stimulate ovulation, 2000

Characteristic	Oocyte retrieval cycles attempted					
	IVF		ICSI		GIFT	
	Number	Per cent	Number	Per cent	Number	Per cent
Maternal age (at start of treatment)						
<20	-	-	1	0.0	-	-
20–24	81	1.1	149	1.7	6	0.7
25–29	869	12.0	1,328	14.9	96	11.8
30–34	2,430	33.4	3,015	33.9	248	30.4
35–39	2,559	35.2	2,835	31.9	306	37.5
40–44	1,237	17.0	1,449	16.3	150	18.4
45+	93	1.3	118	1.3	11	1.3
Not stated	-		-		-	
All ages	**7,269**	**100.0**	**8,895**	**100.0**	**817**	**100.0**
Cause(s) of infertility						
Tubal only	1,756	25.0	417	4.8	44	5.4
Other female only	1,366	19.4	578	6.7	247	30.4
Male factors only	578	8.2	4,406	50.7	90	11.1
Multiple causes	1,312	18.6	2,040	23.5	125	15.4
Unexplained	2,025	28.8	1,242	14.3	306	37.7
Not stated	232		212		5	
All causes	**7,269**	**100.0**	**8,895**	**100.0**	**817**	**100.0**
Ovarian stimulation						
GnRH analogues + other	6,800	93.5	8,257	92.8	716	87.6
No GnRH analogues						
— clomiphene + any other	274	3.8	453	5.1	57	7.0
— other drugs	37	0.5	33	0.4	12	1.5
— natural cycles	158	2.2	152	1.7	32	3.9
Not stated	-		-		-	
Total	**7,269**	**100.0**	**8,895**	**100.0**	**817**	**100.0**

Table 17: Embryo transfer cycles for IVF, ICSI and GIFT, by number of embryos or oocytes transferred, 2000

Number of embryos / oocytes transferred	Embryo transfer cycles					
	IVF		ICSI		GIFT	
	Number	Per cent	Number	Per cent	Number	Per cent
One	963	15.6	1,123	14.3	43	5.4
Two	4,054	65.7	4,990	63.5	392	49.0
Three	1,084	17.6	1,604	20.4	305	38.1
Four	71	1.1	125	1.6	57	7.1
Five	2	0.0	5	0.1	1	0.1
Six or more	1	0.0	7	0.1	2	0.3
Not stated	-		-		-	
Total	**6,175**	**100.0**	**7,854**	**100.0**	**800**	**100.0**

Table 18: Number of embryo transfer cycles after cryopreservation, by maternal age, cause of infertility, and number of embryos transferred, 2000

Characteristic	Embryo transfer cycles					
	IVF		ICSI		Donor oocytes	
	Number	Per cent	Number	Per cent	Number	Per cent
Maternal age (at start of treatment)						
<20	-	-	2	0.0	-	-
20–24	48	1.1	97	2.1	-	-
25–29	558	12.5	792	17.1	36	6.7
30–34	1,677	37.4	1,794	38.7	91	16.9
35–39	1,571	35.1	1,503	32.4	114	21.2
40–44	572	12.8	415	8.9	189	35.1
45+	52	1.2	36	0.8	108	20.1
Not stated	-		-		-	
All ages	**4,478**	**100.0**	**4,639**	**100.0**	**538**	**100.0**
Cause(s) of infertility[a]						
Tubal only	809	24.9	174	4.9	21	5.4
Other female only	639	19.7	207	5.8	148	38.3
Male factors only	275	8.5	1,897	53.2	49	12.7
Multiple causes	598	18.4	863	24.2	102	26.4
Unexplained	928	28.6	425	11.9	66	17.1
Not stated	1,229		1,073		152	
All causes	**4,478**	**100.0**	**4,639**	**100.0**	**538**	**100.0**
Number of embryos transferred						
One	1,026	22.9	1,076	23.2	98	18.2
Two	2,964	66.2	3,051	65.8	335	62.3
Three	462	10.3	486	10.5	95	17.7
Four	25	0.6	25	0.5	10	1.9
Five	1	0.0	-	-	-	-
Six or more	-	-	1	0.0	-	-
Not stated	-		-		-	
Total	**4,478**	**100.0**	**4,639**	**100.0**	**538**	**100.0**

(a) Six units were unable to provide this data.

Table 19: Assisted conception pregnancies after transfer of fresh embryos or oocytes, numbers and pregnancy rates for grouped IVF units, 2000

Stage of treatment	Q1	Q2	Q3	Q4	Total
	IVF treatment cycles				
IVF units (n)	10	10	10	10	40
Treatment cycles commenced	2,088	1,933	3,039	1,810	8,870
Cycles with oocyte retrieval	1,845	1,645	2,498	1,526	7,514
Cycles with embryo transfer	1,530	1,449	2,235	1,206	6,420
Clinical pregnancies	589	377	454	193	1,613
Viable pregnancies	489	328	384	152	1,353
Clinical pregnancies per 100 oocyte retrieval cycles	31.9	22.9	18.2	12.6	21.5
Viable pregnancies per 100 oocyte retrieval cycles	26.5	19.9	15.4	10.0	18.0
	ICSI treatment cycles				
IVF units (n)	10	10	10	10	40
Treatment cycles commenced	2,345	1,742	3,523	2,537	10,147
Cycles with oocyte retrieval	2,147	1,618	3,162	2,137	9,064
Cycles with embryo transfer	1,860	1,461	2,829	1,873	8,023
Clinical pregnancies	667	404	532	316	1,919
Viable pregnancies	566	317	443	222	1,548
Clinical pregnancies per 100 oocyte retrieval cycles	31.1	25.0	16.8	14.8	21.2
Viable pregnancies per 100 oocyte retrieval cycles	26.4	19.6	14.0	10.4	17.1
	GIFT treatment cycles				
IVF units (n)	5	6	6	5	22
Treatment cycles commenced	590	304	30	7	931
Cycles with oocyte retrieval	562	228	28	6	824
Cycles with embryo transfer	549	224	28	6	807
Clinical pregnancies	182	41	2	-	225
Viable pregnancies	149	28	-	-	177
Clinical pregnancies per 100 oocyte retrieval cycles	32.4	18.0	7.1	-	27.3
Viable pregnancies per 100 oocyte retrieval cycles	26.5	12.3	-	-	21.5

Table 20: Assisted conception pregnancies after transfer of thawed embryos, numbers and pregnancy rates for grouped IVF units, 2000

Stage of treatment	Q1	Q2	Q3	Q4	Total
	IVF treatment cycles				
IVF units (n)	10	10	10	10	40
Cycles with embryo transfer	738	1,108	2,241	781	4,868
Clinical pregnancies	206	247	380	74	907
Viable pregnancies	186	188	283	52	709
Clinical pregnancies per 100 embryo transfer cycles	27.9	22.3	17.0	9.5	18.6
Viable pregnancies per 100 embryo transfer cycles	25.2	17.0	12.6	6.7	14.6
	ICSI treatment cycles				
IVF units (n)	10	10	10	10	40
Cycles with embryo transfer	656	1,642	2,036	447	4,781
Clinical pregnancies	162	331	293	43	829
Viable pregnancies	140	257	253	31	681
Clinical pregnancies per 100 embryo transfer cycles	24.7	20.2	14.4	9.6	17.3
Viable pregnancies per 100 embryo transfer cycles	21.3	15.7	12.4	6.9	14.2

Table 21: Assisted conception pregnancy rates after IVF, ICSI and GIFT, 2000

		Viable pregnancy rates[a]				
Method of conception	Units (n)	Q1	Q2	Q3	Q4	Total
IVF fresh	40	24.3 – 50.0	17.1 – 22.3	13.3 – 16.9	3.7 – 13.3	18.0
IVF frozen	40	18.0 – 38.0	15.3 – 17.7	10.0 – 14.3	0.0 – 9.3	14.6
ICSI fresh	40	22.9 – 31.4	17.3 – 22.8	11.3 – 16.3	3.0 – 11.0	17.1
ICSI frozen	40	20.0 – 27.7	14.2 – 19.3	9.7 – 14.1	0.0 – 8.6	14.2
GIFT	22	25.0 – 33.3	4.0 – 16.3	0.0 – 0.0	0.0 – 0.0	21.5

(a) Viable pregnancy rates are expressed per 100 oocyte retrieval cycles for fresh embryo transfers and GIFT, and per 100 embryo transfer cycles for frozen embryo transfers.

Table 22: Numbers and outcomes of assisted conception pregnancies by year of conception, 1979–1999

Outcome of pregnancy and method of assisted conception	Year of conception					
	Number			Per cent		
IVF conceptions	**1979–97**	**1998**	**1999**	**1979–97**	**1998**	**1999**
Spontaneous abortion	3,744	436	446	21.0	20.2	19.4
Termination of pregnancy	93	10	14	0.5	0.5	0.6
Ectopic pregnancy	808	62	57	4.5	2.9	2.5
Stillbirth	240	20	33	1.3	0.9	1.4
Live birth[(a)]	12,972	1,631	1,753	72.6	75.5	76.1
All IVF outcomes	**17,857**	**2,159**	**2,303**	**100.0**	**100.0**	**100.0**
ICSI conceptions	**1990–97**	**1998**	**1999**	**1990–97**	**1998**	**1999**
Spontaneous abortion	863	354	443	19.1	18.6	19.0
Termination of pregnancy	27	11	13	0.6	0.6	0.6
Ectopic pregnancy	86	40	43	1.9	2.1	1.8
Stillbirth	43	15	20	1.0	0.8	0.9
Live birth[(a)]	3,493	1,485	1,812	77.4	78.0	77.7
All ICSI outcomes	**4,512**	**1,905**	**2,331**	**100.0**	**100.0**	**100.0**
GIFT conceptions	**1985–97**	**1998**	**1999**	**1985–97**	**1998**	**1999**
Spontaneous abortion	1,823	99	77	20.7	25.0	24.2
Termination of pregnancy	53	1	3	0.6	0.3	0.9
Ectopic pregnancy	283	5	7	3.2	1.3	2.2
Stillbirth	94	2	1	1.1	0.5	0.3
Live birth[(a)]	6,551	289	230	74.4	73.0	72.3
All GIFT outcomes	**8,804**	**396**	**318**	**100.0**	**100.0**	**100.0**
All assisted conceptions	**1979–97**	**1998**	**1999**	**1979–97**	**1998**	**1999**
Spontaneous abortion	6,430	889	966	20.6	19.9	19.5
Termination of pregnancy	173	22	30	0.6	0.5	0.6
Ectopic pregnancy	1,177	107	107	3.8	2.4	2.2
Stillbirth	377	37	54	1.2	0.8	1.1
Live birth[(a)]	23,016	3,405	3,795	73.8	76.3	76.6

Table 23: Place of parental residence, assisted conception pregnancies, 1999

Place of usual residence	Number			Per cent		
	IVF	ICSI	GIFT	IVF	ICSI	GIFT
New South Wales	828	734	58	36.0	31.5	18.2
Victoria	494	618	65	21.5	26.5	20.4
Queensland	257	321	167	11.2	13.8	52.5
South Australia	147	181	17	6.4	7.8	5.3
Western Australia	267	151	6	11.6	6.5	1.9
Tasmania	24	92	-	1.0	4.0	-
Australian Capital Territory	29	15	4	1.3	0.6	1.3
Northern Territory	26	23	-	1.1	1.0	-
New Zealand	219	181	1	9.5	7.8	0.3
Other countries	9	13	-	0.4	0.6	-
Not stated	3	2	-			
All regions	**2,303**	**2,331**	**318**	**100.0**	**100.0**	**100.0**

Table 24: Maternal ages, assisted conception pregnancies, 1999

Age group (years)	Number			Per cent		
	IVF	ICSI	GIFT	IVF	ICSI	GIFT
Less than 20	1	1	-	0.0	0.0	-
20–24	28	56	7	1.2	2.4	2.2
25–29	363	452	53	15.8	19.4	16.7
30–34	860	981	116	37.3	42.1	36.5
35–39	804	681	109	34.9	29.2	34.3
40–44	220	147	33	9.6	6.3	10.4
45 and over	27	13	-	1.2	0.6	-
Not stated	-	-	-			
All ages	**2,303**	**2,331**	**318**	**100.0**	**100.0**	**100.0**

Table 25: Paternal ages, assisted conception pregnancies, 1999

Age group (years)	Number			Per cent		
	IVF	ICSI	GIFT	IVF	ICSI	GIFT
Less than 20	-	-	-	-	-	-
20–24	7	12	4	0.3	0.5	1.3
25–29	227	240	34	9.9	10.3	11.1
30–34	752	700	107	32.9	30.1	35.0
35–39	781	737	103	34.1	31.7	33.7
40–44	349	386	36	15.3	16.6	11.8
45 and over	172	248	22	7.5	10.7	7.2
Not stated/single female	15	8	12			
All ages	**2,303**	**2,331**	**318**	**100.0**	**100.0**	**100.0**

Table 26: Previous pregnancies for pregnant women, assisted conception pregnancies, 1999

Number of previous pregnancies	Number			Per cent		
	IVF	ICSI	GIFT	IVF	ICSI	GIFT
None	1,084	1,365	152	47.1	58.7	47.8
One	619	612	107	26.9	26.3	33.6
Two	316	211	39	13.7	9.1	12.3
Three	153	77	13	6.6	3.3	4.1
Four or more	131	60	7	5.7	2.6	2.2
Not stated	-	6	-			
All women	**2,303**	**2,331**	**318**	**100.0**	**100.0**	**100.0**

Table 27: Duration of infertility, assisted conception pregnancies, 1999

Duration of infertility (years)	Number			Per cent		
	IVF	ICSI	GIFT	IVF	ICSI	GIFT
Less than 2	248	313	39	10.9	13.6	12.3
2–3	932	948	145	40.9	41.1	45.7
4–5	581	554	80	25.5	24.0	25.2
6–7	260	250	21	11.4	10.8	6.6
8–9	122	118	18	5.3	5.1	5.7
10 or more	138	124	14	6.0	5.4	4.4
Not stated/Not applicable	22	24	1			
All pregnancies	**2,303**	**2,331**	**318**	**100.0**	**100.0**	**100.0**

Table 28: Causes of infertility, assisted conception pregnancies, 1979–1999

Causes of infertility and method of assisted conception	Year of conception					
	Number			Per cent		
IVF conceptions	**1979–97**	**1998**	**1999**	**1979–97**	**1998**	**1999**
Tubal	6,049	435	444	33.9	20.4	19.3
Male factor	2,890	217	207	16.2	10.2	9.0
Endometriosis	1,225	209	216	6.9	9.8	9.4
Other stated causes	1,348	318	374	7.6	14.9	16.2
Multiple causes	4,211	502	562	23.6	23.5	24.4
Unexplained infertility	2,118	456	500	11.9	21.3	21.7
Not stated	16	22	-			
All causes	**17,857**	**2,159**	**2,303**	**100.0**	**100.0**	**100.0**
ICSI conceptions	**1990–97**	**1998**	**1999**	**1990–97**	**1998**	**1999**
Tubal	54	43	52	1.2	2.3	2.2
Male factor	2,999	1,176	1,300	66.5	61.8	55.8
Endometriosis	39	31	31	0.9	1.6	1.3
Other stated causes	146	81	182	3.2	4.3	7.8
Multiple causes	1,148	493	653	25.5	25.9	28.0
Unexplained infertility	122	80	112	2.7	4.2	4.8
Not stated	4	1	1			
All causes	**4,512**	**1,905**	**2,331**	**100.0**	**100.0**	**100.0**
GIFT conceptions	**1985–97**	**1998**	**1999**	**1985–97**	**1998**	**1999**
Tubal	403	8	9	4.6	2.0	2.8
Male factor	2,391	62	53	27.2	15.7	16.7
Endometriosis	1,357	71	47	15.4	18.0	14.8
Other stated causes	811	54	44	9.2	13.7	13.9
Multiple causes	1,246	64	49	14.2	16.2	15.5
Unexplained infertility	2,585	136	115	29.4	34.4	36.3
Not stated	11	1	1			
All causes	**8,804**	**396**	**318**	**100.0**	**100.0**	**100.0**
All assisted conceptions	**1979–97**	**1998**	**1999**	**1979–97**	**1998**	**1999**
Tubal	6,506	486	505	20.9	11.0	10.2
Male factor	8,280	1,455	1,560	26.6	32.8	31.5
Endometriosis	2,621	311	294	8.4	7.0	5.9
Other stated causes	2,305	453	600	7.4	10.2	12.1
Multiple causes	6,605	1,059	1,264	21.2	23.9	25.5
Unexplained infertility	4,825	672	727	15.5	15.1	14.7
Not stated	31	24	2			
All causes	**31,173**	**4,460**	**4,952**	**100.0**	**100.0**	**100.0**

Table 29: Outcome of pregnancy by causes of infertility, assisted conception pregnancies, 1999

Outcome of pregnancy	Causes of infertility					
	Tubal	Male	Endometriosis	Multiple	Unexplained	All causes[b]
			Number			
Spontaneous abortion	109	284	45	264	136	966
Termination of pregnancy	1	10	4	8	3	30
Ectopic pregnancy	25	24	2	32	16	107
Stillbirth	5	17	4	17	4	54
Live birth[a]	365	1,225	239	943	568	3,795
All outcomes	**505**	**1,560**	**294**	**1,264**	**727**	**4,952**
			Per cent			
Spontaneous abortion	21.6	18.2	15.3	20.9	18.7	19.5
Termination of pregnancy	0.2	0.6	1.4	0.6	0.4	0.6
Ectopic pregnancy	5.0	1.5	0.7	2.5	2.2	2.2
Stillbirth	1.0	1.1	1.4	1.3	0.6	1.1
Live birth[a]	72.3	78.5	81.3	74.6	78.1	76.6
All outcomes	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Multiple pregnancies with both stillbirths and live births are included only in the live birth category.
(b) Includes 602 pregnancies with 'other' or 'not stated' causes of infertility.

Table 30: Drugs used to stimulate ovulation, assisted conception pregnancies, 1999

Drugs	Number			Per cent		
	IVF	ICSI	GIFT	IVF	ICSI	GIFT
Natural cycles	41	56	5	1.9	2.5	1.6
Clomiphene and hMG or FSH	33	41	12	1.5	1.8	3.8
hMG or FSH	18	12	-	0.8	0.5	-
GnRH analogues and hMG or FSH	2,091	2,139	298	95.8	95.1	94.6
Other	-	2	-	-	0.1	-
Not stated / Donor	120	81	3			
All drugs	**2,303**	**2,331**	**318**	**100.0**	**100.0**	**100.0**

Table 31: Assisted conception treatment cycle in which conception occurred, 1999

Treatment cycle	Number			Per cent		
	IVF	ICSI	GIFT	IVF	ICSI	GIFT
1	1,360	1,028	161	59.1	44.2	50.6
2	479	591	92	20.8	25.4	28.9
3	207	341	30	9.0	14.6	9.4
4	111	147	18	4.8	6.3	5.7
5 or more	144	221	17	6.3	9.5	5.3
Not stated	2	3	-			
All cycles	**2,303**	**2,331**	**318**	**100.0**	**100.0**	**100.0**

Table 32: Number of oocytes collected by laparoscopy or ultrasound guidance, assisted conception pregnancies, 1999

Number of oocytes collected	Number			Per cent		
	IVF	ICSI	GIFT	IVF	ICSI	GIFT
1–2	45	44	20	2.1	2.0	6.3
3–4	152	147	53	7.0	6.5	16.8
5–6	257	202	63	11.8	9.0	20.0
7–8	274	279	50	12.6	12.4	15.9
9–10	314	312	43	14.4	13.9	13.7
11–12	257	287	34	11.8	12.8	10.8
13–14	224	235	24	10.3	10.5	7.6
15 or more	656	741	28	30.1	33.0	8.9
Not stated / Donor	124	84	3			
All pregnancies	**2,303**	**2,331**	**318**	**100.0**	**100.0**	**100.0**
Mean number of oocytes	12.1	12.7	8.1			

Table 33: Women hospitalised for ovarian hyperstimulation syndrome (OHSS) by number of oocytes collected, assisted conception pregnancies, 1999

	Number of oocytes collected[(a)]							
Outcome of pregnancy	**1–2**	**3–4**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**	**15+**
				Number				
No hospitalisation	108	352	516	597	653	561	459	1,374
Hospitalised	1	-	6	6	16	17	24	51
All outcomes	**109**	**352**	**522**	**603**	**669**	**578**	**483**	**1,425**
				Per cent				
No hospitalisation	99.1	100.0	98.9	99.0	97.6	97.1	95.0	96.4
Hospitalised	0.9	-	1.1	1.0	2.4	2.9	5.0	3.6
All outcomes	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Among 211 pregnant women with number of oocytes collected 'not stated' or 'donated', there were 0 (0%) hospitalised for OHSS.

Table 34: Number of embryos or oocytes transferred, assisted conception pregnancies, 1999

Number of embryos or oocytes transferred	Number			Per cent		
	IVF	**ICSI**	**GIFT**	**IVF**	**ICSI**	**GIFT**
1	222	148	5	9.6	6.3	1.6
2	1,652	1,661	137	71.7	71.3	43.1
3	401	488	140	17.4	20.9	44.0
4	26	31	31	1.1	1.3	9.7
5 or more	2	3	5	0.1	0.1	1.6
Not stated	-	-	-			
All pregnancies	**2,303**	**2,331**	**318**	**100.0**	**100.0**	**100.0**
Mean number of oocytes	2.1	2.2	2.7			

Table 35: Outcome of assisted conception pregnancies by number of embryos or oocytes transferred, 1999

Outcome of pregnancy	Number of embryos or oocytes transferred					
	1	2	3	4	5+	All pregnancies
			Number			
Spontaneous abortion	87	621	231	24	3	966
Termination of pregnancy	4	17	8	1	-	30
Ectopic pregnancy	4	67	31	4	1	107
Stillbirth	4	42	7	1	-	54
Live birth[(a)]	276	2,703	752	58	6	3,795
All outcomes	**375**	**3,450**	**1,029**	**88**	**10**	**4,952**
			Per cent			
Spontaneous abortion	23.2	18.0	22.4	27.3	30.0	19.5
Termination of pregnancy	1.1	0.5	0.8	1.1	-	0.6
Ectopic pregnancy	1.1	1.9	3.0	4.5	10.0	2.2
Stillbirth	1.1	1.2	0.7	1.1	-	1.1
Live birth[(a)]	73.6	78.3	73.1	65.9	60.0	76.6
All outcomes	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Multiple pregnancies with both stillbirths and live births are included only in the live birth category.

Table 36: Outcome of assisted conception pregnancies after use of donor gametes, donor or frozen embryos, 1999

Outcome of pregnancy	Number				Per cent			
	Donor sperm	Donor oocytes	Donor embryos	Frozen embryos	Donor sperm	Donor oocytes	Donor embryos	Frozen embryos
Spontaneous abortion	34	47	1	327	16.5	23.3	3.2	21.7
Termination of pregnancy	2	3	-	8	1.0	1.5	-	0.5
Ectopic pregnancy	6	2	-	19	2.9	1.0	-	1.3
Stillbirth	2	3	-	12	1.0	1.5	-	0.8
Live birth[(a)]	162	147	30	1,140	78.6	72.8	96.8	75.7
All outcomes	**206**	**202**	**31**	**1,506**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Multiple pregnancies with both stillbirths and live births are included only in the live birth category.

Table 37: Drugs used in the luteal phase after embryo/oocyte transfer, assisted conception pregnancies, 1999

Drugs	Number			Per cent		
	IVF	ICSI	GIFT	IVF	ICSI	GIFT
Proluton	706	745	79	30.7	32.0	24.8
Human chorionic gonadotrophin (hCG)	879	972	195	38.2	41.7	61.3
Human chorionic gonadotrophin / Proluton	114	110	18	5.0	4.7	5.7
Progestagen	263	216	10	11.4	9.3	3.1
Other drugs	1	3	-	0.0	0.1	-
None	340	285	16	14.8	12.2	5.0
Not stated	-	-	-			
All pregnancies	**2,303**	**2,331**	**318**	**100.0**	**100.0**	**100.0**

Table 38: Outcome of pregnancy by maternal age group, assisted conception pregnancies, 1999

Outcome of pregnancy	Maternal age (years)					
	Less than 25	25–29	30–34	35–39	40 and over	All ages
			Number			
Spontaneous abortion	11	136	327	336	156	966
Termination of pregnancy	-	3	8	12	7	30
Ectopic pregnancy	2	19	35	48	3	107
Stillbirth	1	9	21	17	6	54
Live birth[(a)]	79	701	1,567	1,181	267	3,795
All outcomes	**93**	**868**	**1,958**	**1,594**	**439**	**4,952**
			Per cent			
Spontaneous abortion	11.8	15.7	16.7	21.1	35.5	19.5
Termination of pregnancy	-	0.3	0.4	0.8	1.6	0.6
Ectopic pregnancy	2.2	2.2	1.8	3.0	0.7	2.2
Stillbirth	1.1	1.0	1.1	1.1	1.4	1.1
Live birth[(a)]	84.9	80.8	80.0	74.1	60.8	76.6
All outcomes	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Multiple pregnancies with both stillbirths and live births are included only in the live birth category.

Table 39: Incidence of spontaneous abortions by maternal age group, assisted conception pregnancies, 1999

Maternal age (years)	Number of assisted conception pregnancies[(a)]	Spontaneous abortions	
		Number	Per cent
Less than 25	91	11	12.1
25–29	846	136	16.1
30–34	1,915	327	17.1
35–39	1,534	336	21.9
40–44	389	145	37.3
45 and over	40	11	27.5
Not stated	-	-	
All ages	**4,815**	**966**	**20.1**

(a) Spontaneous abortions and pregnancies of at least 20 weeks' gestation.

Table 40: Ectopic pregnancies after assisted conception, 1999

Outcome of pregnancy	IVF	ICSI	GIFT	All assisted conceptions
Ectopic pregnancies	57	43	7	107
Clinical pregnancies	2,303	2,331	318	4,952
% ectopic pregnancies	2.5	1.8	2.2	2.2
Total abortions and births	2,246	2,288	311	4,845
Ectopic pregnancy ratio[(a)]	1:39.4	1:53.2	1:44.4	1:45.3

(a) Ratio of ectopic pregnancies: total abortions and births.

Table 41: Heterotopic pregnancies after assisted conception, 1979–1999

Outcome of pregnancy	1979–95	1996	1997	1998	1999
			Number		
Heterotopic - abortion	88	9	7	8	4
Heterotopic - birth	56	6	2	2	3
All heterotopic pregnancies	**144**	**15**	**9**	**10**	**7**
Clinical pregnancies	23,419	3,695	4,059	4,460	4,952
			Per cent		
Heterotopic - abortion	0.38	0.24	0.17	0.18	0.08
Heterotopic - birth	0.24	0.16	0.05	0.04	0.06
All heterotopic pregnancies	**0.61**	**0.41**	**0.22**	**0.22**	**0.14**

Table 42: Reported complications of pregnancy, assisted conception pregnancies, 1999

Pregnancy complications	Number			Per cent		
	IVF	ICSI	GIFT	IVF	ICSI	GIFT
None	1,755	1,764	242	76.3	75.9	76.1
Threatened abortion	60	52	13	2.6	2.2	4.1
Antepartum haemorrhage	34	36	6	1.5	1.5	1.9
Pregnancy-induced hypertension	154	169	18	6.7	7.3	5.7
Placenta praevia	39	32	6	1.7	1.4	1.9
Other complications	257	271	33	11.2	11.7	10.4
Not stated	4	7	-			
All pregnancies	**2,303**	**2,331**	**318**	**100.0**	**100.0**	**100.0**

Table 43: Duration of singleton and multiple assisted conception pregnancies of at least 20 weeks' gestation, 1999

Gestational age (weeks)	Plurality							
	Singleton	Twin	Triplet	All pluralities	Singleton	Twin	Triplet	All pluralities
	Number				Per cent			
IVF conceptions								
20–23	13	9	4	26	0.9	2.5	21.1	1.5
24–27	16	10	1	27	1.1	2.8	5.3	1.5
28–31	21	31	4	57	1.5	8.7	21.1	3.2
32–36	148	172	10	330	10.6	48.2	52.6	18.6
37–41	1,190	135	-	1,325	85.3	37.8	-	74.8
42 or more	7	-	-	7	0.5	-	-	0.4
20–36	198	222	19	440	14.2	62.2	100.0	24.8
Not stated	13	-	1	14				
All gestational ag	**1,408**	**357**	**20**	**1,786**	**100.0**	**100.0**	**100.0**	**100.0**
ICSI conceptions								
20–23	16	8	-	24	1.1	2.1	-	1.3
24–27	11	8	1	20	0.8	2.1	6.3	1.1
28–31	20	20	7	47	1.4	5.2	43.8	2.6
32–36	140	205	8	353	9.9	53.7	50.0	19.4
37–41	1,223	140	-	1,363	86.2	36.6	-	75.1
42 or more	8	1	-	9	0.6	0.3	-	0.5
20–36	187	241	16	444	13.2	63.1	100.0	24.4
Not stated	14	1	1	16				
All gestational ag	**1,432**	**383**	**17**	**1,832**	**100.0**	**100.0**	**100.0**	**100.0**
GIFT conceptions								
20–23	1	-	-	1	0.6	-	-	0.4
24–27	1	1	1	3	0.6	2.0	8.3	1.3
28–31	3	2	2	7	1.8	4.0	16.7	3.0
32–36	22	28	9	59	13.0	56.0	75.0	25.5
37–41	140	19	-	159	82.8	38.0	-	68.8
42 or more	2	-	-	2	1.2	-	-	0.9
20–36	27	31	12	70	16.0	62.0	100.0	30.3
Not stated	-	-	-	-				
All gestational ag	**169**	**50**	**12**	**231**	**100.0**	**100.0**	**100.0**	**100.0**
All assisted conceptions								
20–23	30	17	4	51	1.0	2.2	8.5	1.3
24–27	28	19	3	50	0.9	2.4	6.4	1.3
28–31	44	53	13	111	1.5	6.7	27.7	2.9
32–36	310	405	27	742	10.4	51.3	57.4	19.4
37–41	2,553	294	-	2,847	85.6	37.3	-	74.5
42 or more	17	1	-	18	0.6	0.1	-	0.5
20–36	412	494	47	954	13.8	62.6	100.0	25.0

Table 44: Maternal age and duration of singleton assisted conception pregnancies of at least 20 weeks' gestation, 1999

Gestational age (weeks	Maternal age (years)					
	Less than 25	25–29	30–34	35–39	40 and over	All ages
			Number			
20–27	2	10	23	18	5	58
28–31	1	11	13	13	6	44
32–36	6	51	128	97	28	310
37 or more	48	442	1,058	830	192	2,570
Not stated	1	4	7	11	4	27
All gestational ages	**58**	**518**	**1,229**	**969**	**235**	**3,009**
20–36	9	72	164	128	39	412
			Per cent			
20–27	3.5	1.9	1.9	1.9	2.2	1.9
28–31	1.8	2.1	1.1	1.4	2.6	1.5
32–36	10.5	9.9	10.5	10.1	12.1	10.4
37 or more	84.2	86.0	86.6	86.6	83.1	86.2
All gestational ages	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
20–36	15.8	14.0	13.4	13.4	16.9	13.8

Table 45: Causes of infertility and duration of singleton assisted conception pregnancies of at least 20 weeks' gestation, 1999

Gestational age (weeks	Causes of infertility					
	Tubal	Male	Endometriosis	Multiple	Unexplained	All causes[(a)]
			Number			
20–27	6	16	2	18	5	58
28–31	2	12	2	9	10	44
32–36	36	92	19	88	40	310
37 or more	247	848	167	616	383	2,570
Not stated	4	11	-	8	3	27
All gestational ages	**295**	**979**	**190**	**739**	**441**	**3,009**
20–36	44	120	23	115	55	412
			Per cent			
20–27	2.1	1.7	1.1	2.5	1.1	1.9
28–31	0.7	1.2	1.1	1.2	2.3	1.5
32–36	12.4	9.5	10.0	12.0	9.1	10.4
37–or more	84.9	87.6	87.9	84.3	87.4	86.2
All gestational ages	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
20–36	15.1	12.4	12.1	15.7	12.6	13.8

(a) Includes 365 pregnancies with 'other' or 'not stated' causes of infertility.

Table 46: Plurality of assisted conception pregnancies of at least 20 weeks' gestation, 1979–1999

Plurality and method of assisted conception	Year of conception					
	Number			Per cent		
	1979–97	**1998**	**1999**	**1979–97**	**1998**	**1999**
IVF conceptions						
Singletons	10,610	1,324	1,408	80.3	80.2	78.8
Twins	2,308	316	357	17.5	19.1	20.0
Triplets	284	10	20	2.1	0.6	1.1
Quadruplets	9	1	1	0.1	0.1	0.1
Quintuplets	1	-	-	0.0	-	-
All pregnancies	**13,212**	**1,651**	**1,786**	**100.0**	**100.0**	**100.0**
	1979–97	**1998**	**1999**	**1979–97**	**1998**	**1999**
ICSI conceptions						
Singletons	2,859	1,215	1,432	80.9	81.0	78.2
Twins	624	261	383	17.6	17.4	20.9
Triplets	48	23	17	1.4	1.5	0.9
Quadruplets	5	1	-	0.1	0.1	-
Quintuplets	-	-	-	-	-	-
All pregnancies	**3,536**	**1,500**	**1,832**	**100.0**	**100.0**	**100.0**
	1985–97	**1998**	**1999**	**1985–97**	**1998**	**1999**
GIFT conceptions						
Singletons	4,967	210	169	74.7	72.2	73.2
Twins	1,429	69	50	21.5	23.7	21.6
Triplets	230	11	12	3.5	3.8	5.2
Quadruplets	17	1	-	0.3	0.3	-
Quintuplets	2	-	-	0.0	-	-
All pregnancies	**6,645**	**291**	**231**	**100.0**	**100.0**	**100.0**
	1979–97	**1998**	**1999**	**1979–97**	**1998**	**1999**
All assisted conceptions						
Singletons	18,436	2,749	3,009	78.8	79.9	78.2
Twins	4,361	646	790	18.6	18.8	20.5
Triplets	562	44	49	2.4	1.3	1.3
Quadruplets	31	3	1	0.1	0.1	0.0
Quintuplets	3	-	-	0.0	-	-
All pregnancies	**23,393**	**3,442**	**3,849**	**100.0**	**100.0**	**100.0**

Table 47: Plurality of assisted conception pregnancies of at least 20 weeks' gestation and number of embryos or oocytes transferred, 1999

Number of embryos or oocytes transferred	Plurality							
	Singleton	Twin	Triplet	All pluralities	Singleton	Twin	Triplet	All pluralities
	Number				Per cent			
IVF conceptions								
1	154	7	-	161	98.6	1.4	-	100.0
2	1,030	274	11	1,315	78.4	21.4	0.2	100.0
3	208	73	9	290	78.3	19.8	1.7	100.0
4	14	3	-	18	88.9	11.1	-	100.0
5 or more	2	-	-	2	50.0	-	50.0	100.0
Not stated	-	-	-	-				
All pregnancies	**1,408**	**357**	**20**	**1,786**	**78.8**	**20.0**	**1.1**	**100.0**
ICSI conceptions								
1	112	2	-	114	98.2	1.8	-	100.0
2	1,049	277	2	1,328	79.0	20.9	0.2	100.0
3	258	96	12	366	70.5	26.2	3.3	100.0
4	12	7	3	22	54.5	31.8	13.6	100.0
5 or more	1	1	-	2	50.0	50.0	-	100.0
Not stated	-	-	-	-				
All pregnancies	**1,432**	**383**	**17**	**1,832**	**78.2**	**20.9**	**0.9**	**100.0**
GIFT conceptions								
1	5	-	-	5	100.0	-	-	100.0
2	77	23	2	102	75.5	22.5	2.0	100.0
3	71	24	8	103	68.9	23.3	7.8	100.0
4	15	3	1	19	78.9	15.8	5.3	100.0
5 or more	1	-	1	2	50.0	-	3.3	100.0
Not stated	-	-	-	-				
All pregnancies	**169**	**50**	**12**	**231**	**73.2**	**21.6**	**5.2**	**100.0**
All assisted conceptions								
1	271	9	-	280	96.8	3.2	-	100.0
2	2,156	574	15	2,745	78.5	20.9	0.5	100.0
3	537	193	29	759	70.8	25.4	3.8	100.0
4	41	13	4	59	69.5	22.0	6.8	100.0
5 or more	4	1	1	6	66.7	16.7	16.7	100.0
Not stated	-	-	-	-				
All pregnancies	**3,009**	**790**	**49**	**3,849**	**78.2**	**20.5**	**1.3**	**100.0**

(a) Includes 1quadruplet pregnancies.

Table 48: Multiple assisted conception pregnancies, States and Territories, 1999

Plurality	IVF Unit							
	NSW	Vic	Qld	WA	SA/NT	ACT/Tas	Australia	New Zealand
					Number			
Singletons	961	768	407	279	240	112	2,767	242
Twins	298	158	95	64	73	20	708	82
Triplets	9	14	16	1	2	2	44	5
Quadruplets	-	-	1	-	-	-	1	-
All pregnancies	1,268	940	519	344	315	134	3,520	329
					Per cent of viable pregnancies			
Twins	23.5	16.8	18.3	18.6	23.2	14.9	20.1	24.9
Triplets / Quadruplets	0.7	1.5	3.3	0.3	0.6	1.5	1.3	1.5

Table 49: Multiple assisted conception pregnancies for grouped IVF units, 1997–1999

Plurality	1997–1999				
	Q1	Q2	Q3	Q4	Total
Number of IVF units (n)	9	10	10	9	38
			Number		
Singletons	2,141	1,919	1,727	2,453	8,240
Twins	702	522	380	422	2,026
Triplets	70	20	38	14	142
Quadruplets	1	1	2	1	5
All pregnancies	2,914	2,462	2,147	2,890	10,413
			Per cent		
Twins	24.1	21.2	17.7	14.6	19.5
Triplets/Quadruplets	2.4	0.9	1.9	0.5	1.4
All multiple pregnancies	26.5	22.1	19.6	15.1	20.9
			Range		
Twins	16.8 – 50.0	18.2 – 23.7	13.8 – 21.0	10.5 – 16.9	
Triplets/Quadruplets	0.0 – 8.4	0.0 – 4.7	0.0 – 3.4	0.0 – 2.7	
All multiple pregnancies	25.3 – 50.0	21.0 – 24.8	17.2 – 21.0	10.5 – 16.9	

Table 50: Method of delivery for singleton and multiple assisted conception pregnancies of at least 20 weeks' gestation, 1999

Plurality	Method of delivery				
	Vaginal		Caesarean section		All methods[a]
	Number	Per cent	Number	Per cent	Number
Singleton	1,808	60.3	1,190	39.7	3,009
Twin	290	36.8	498	63.2	790
Triplet	5	10.4	43	89.6	49
Quadruplet	-	-	1	100.0	1
All pregnancies	**2,103**	**54.8**	**1,732**	**45.2**	**3,849**

(a) Includes 14 pregnancies in which the method of delivery was not stated.

Table 51: Sex of infants in singleton and multiple assisted conception births of at least 20 weeks' gestation, 1979–1999

Plurality	Male			Female			Sex ratio (M:F)		
	1979–97	1998	1999	1979–97	1998	1999	1979–97	1998	1999
Singletons	9,528	1,407	1,543	8,838	1,339	1,460	107.8	105.1	105.7
Twins	4,476	688	824	4,218	596	755	106.1	115.4	109.1
Triplets	872	73	74	805	58	70	108.3	125.9	105.7
Quadruplets	68	6	2	55	6	2	123.6	100.0	100.0
Quintuplets	5	-	-	10	-	-	50.0	-	-
All births	**14,949**	**2,174**	**2,443**	**13,926**	**1,999**	**2,287**	**107.3**	**108.8**	**106.8**
All births, all years		**19,566**			**18,212**			**107.4**	

Note: Infant's sex was not stated or indeterminate for 130 births.

Table 52: Birthweight of assisted conception live births and stillbirths, 1999

Birthweight (g)	Number			Per cent		
	Livebirth	Stillbirth	All births [a]	Livebirth	Stillbirth	All births [a]
Less than 500	16	37	53	0.3	53.6	1.1
500–999	83	18	101	1.8	26.1	2.1
1000–1499	167	2	169	3.6	2.9	3.6
1500–1999	321	4	325	6.9	5.8	6.9
2000–2499	647	0	647	13.9	0.0	13.7
2500–2999	1,044	6	1,050	22.5	8.7	22.3
3000–3499	1,234	1	1,236	26.6	1.4	26.2
3500–3999	838	1	839	18.0	1.4	17.8
4000 and over	295	0	295	6.4	0.0	6.3
Not stated	8	10	25			
All birthweights	**4,653**	**79**	**4,740**	**100.0**	**100.0**	**100.0**
Mean birthweight (g)	2,914	811	2,883			

(a) Includes 8 infants with unstated outcome.

Table 53: Birthweight of infants, singleton and multiple assisted conception births of at least 20 weeks' gestation, 1999

Birthweight (g)	Number				Per cent			
	Singleton	Twin	Triplet	All births [a]	Singleton	Twin	Triplet	All births [a]
Less than 500	17	25	11	53	0.6	1.6	7.7	1.1
500–999	37	46	14	101	1.2	2.9	9.8	2.1
1000–1499	30	100	39	169	1.0	6.3	27.3	3.6
1500–1999	59	220	46	325	2.0	13.9	32.2	6.9
2000–2499	153	467	27	647	5.1	29.6	18.9	13.7
2500–2999	531	514	5	1,050	17.8	32.6	3.5	22.3
3000–3499	1,054	181	1	1,236	35.3	11.5	0.7	26.2
3500–3999	814	25	-	839	27.2	1.6	-	17.8
4000 and over	295	-	-	295	9.9	-	-	6.3
Less than 2500	296	858	137	1,295	9.9	54.4	95.8	27.5
Not stated	19	2	4	25				
All birthweights	**3,009**	**1,580**	**147**	**4,740**	**100.0**	**100.0**	**100.0**	**100.0**
Mean birthweight (g)	3,243	2,329	1,543	2,883				

(a) Includes 4 quadruplet births.

Table 54: Outcome of infants in singleton and multiple assisted conception births of at least 20 weeks' gestation, 1999

Outcome	Singleton	Twin	Triplet	Quadruplet	All births
Live births[(a)]	2,967	1,551	139	4	4,661
Stillbirths	42	29	8	-	79
All births	**3,009**	**1,580**	**147**	**4**	**4,740**
Neonatal deaths	10	22	6	-	38
Perinatal deaths	52	51	14	-	117
Stillbirth rate per 1,000 total births	14.0	18.4	54.4	-	16.7
Neonatal death rate per 1,000 live births	3.4	14.2	43.2	-	8.2
Perinatal mortality rate per 1,000 total births	17.3	32.3	95.2	-	24.7

(a) Live births include births for which birth status was not recorded.

Table 55: Major congenital malformations in singleton and multiple assisted conception births of at least 20 weeks' gestation, 1999

Outcome	Singleton	Multiple	All births[(a)]
Total births			
IVF	1,408	778	2,197
ICSI	1,432	817	2,260
GIFT	169	136	306
All assisted conception births	**3,009**	**1,731**	**4,763**
Congenital malformations			
— number			
IVF	17	8	36
ICSI	34	7	52
GIFT	5	1	7
All assisted conception births	**56**	**16**	**95**
— rate (per cent)			
IVF	1.2	1.0	1.6
ICSI	2.4	0.9	2.3
GIFT	3.0	0.7	2.3
All assisted conception births	**1.9**	**0.9**	**2.0**

(a) Includes 23 induced abortions for fetal abnormality.

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Appendix 1 Definitions and glossary

Artificial insemination (AI): Insemination, or injection of semen or prepared spermatozoa, into the vagina, cervix, uterus, or fallopian tube, to aid fertility. The male partner's sperm (AIH) or donated sperm (DI) can be used.

Assisted hatching: An in-vitro fertilisation micromanipulation in which a small opening is made in the zona pellucida of the embryo to help the blastocyst emerge prior to implantation.

Biochemical pregnancy: The evidence of pregnancy is derived only from raised levels of serum β human chorionic gonadotrophin (βhCG), but without any sign of a gestational sac on ultrasound and in the absence of chorionic villi if curettage is done.

Blastocyst: Stage of development of the embryo about 5–6 days after fertilisation.

Clinical pregnancy: Any type of pregnancy except that diagnosed only by measuring levels of human chorionic gonadotrophin. This definition includes ectopic pregnancy, blighted ovum and spontaneous abortion.

Clinical pregnancy rate: The percentage of treatment cycles that result in a clinical pregnancy, including ectopic pregnancies, spontaneous and induced abortions, and viable pregnancies of at least 20 weeks' gestation but excluding biochemical pregnancies. Pregnancy rates are usually expressed per 100 treatment cycles commenced, or per 100 cycles reaching the stage of attempted oocyte retrieval or embryo transfer.

Conception cohort: A designated group of pregnancies resulting from conception in a specified period of time (usually either a single year or several years combined).

Cryopreservation: Embryo freezing.

Donor embryo: A fertilised egg where the sperm and oocyte used do not belong to the couple attempting to conceive. A donor embryo may be donated from a couple, or may be made up from a donated oocyte and donated sperm.

Donor oocyte: An unfertilised egg (oocyte) not belonging to the female member of the couple attempting to conceive. The donor may or may not be known to the couple.

Donor sperm: Sperm not belonging to the male member of the couple attempting to conceive. The donor may or may not be known to the couple.

Ectopic pregnancy: Pregnancy occurring outside the uterus.

Embryo: Fertilised egg.

Embryo transfer: Procedure by which the embryo (usually aged 1 to 2 days but may be more if developed to blastocyst stage) is placed into the uterus or the fallopian tube after IVF or ICSI.

Embryo transfer cycle: The transfer of embryos to the uterus or fallopian tube, that were either donated, frozen and thawed, or both.

Fetal death (stillbirth): Death prior to the complete expulsion or extraction from its mother of a product of conception of 20 or more completed weeks of gestation or of 400g or more birthweight; the death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles.

Fresh embryo: Fresh embryos result from fertilisation in the laboratory of oocytes collected by aspiration from ovarian follicles. These embryos are subsequently transferred within several days to the uterus or fallopian tube.

Frozen embryo: Freezing (cryopreservation) of fresh embryos produces frozen embryos which are subsequently thawed prior to transfer to the uterus or fallopian tube.

Gamete intrafallopian transfer (**GIFT):** An assisted conception procedure in which unfertilised eggs plus sperm (i.e. gametes) are transferred to the fallopian tube, so that fertilisation occurs in the normal place.

Heterotopic pregnancy: Heterotopic pregnancies are those in which there is both a uterine and tubal (ectopic) pregnancy simultaneously. The uterine pregnancy may abort or may continue on to a birth.

In-vitro fertilisation (IVF): Fertilisation of the egg by a sperm in-vitro, i.e. in the laboratory. In this report, IVF excludes ICSI.

Induced abortion: Termination of pregnancy of less than 20 weeks' gestation.

IVF unit: An infertility treatment unit where the assisted conception techniques of IVF, ICSI and GIFT are used.

Intracytoplasmic sperm injection (**ICSI):** An in-vitro fertilisation technique for overcoming infertility due to oligospermia (reduced number of sperm in the ejaculate) or azoospermia (complete absence of sperm in the semen) involving sperm microinjection, in which one or more sperm are injected through the zona pellucida, across the perivitelline space, through the vitelline membrane (the egg cell's membrane), and into the substance (or cytoplasm) of the egg itself.

Live birth: Infant with signs of life after pregnancy of at least 20 weeks' gestation.

Live-birth pregnancy: A pregnancy resulting in one or more live births.

Low birthweight: A liveborn or stillborn infant weighing less than 2500g at birth.

Microepididymal sperm aspiration (**MESA):** Use of microsurgery to dissect the epididymis to find motile sperm cells suitable to be aspirated, isolated and prepared for ICSI.

Neonatal death: A death of a liveborn infant within 28 days of birth (expressed as a rate per 1,000 live births).

Oocyte: An unfertilised egg (ovum).

Perinatal death: Includes both stillbirths and neonatal deaths (expressed as a rate per 1,000 total births).

Postneonatal death: A death of a liveborn infant more than 28 days after birth but within the first year (expressed as a rate per 1,000 live births).

Pregnancy rate: See 'clinical pregnancy rate' and 'viable pregnancy rate'.

Preterm birth: A liveborn or stillborn infant of less than 37 weeks' gestation.

Spontaneous abortion: Loss of an intrauterine pregnancy detected clinically or by ultrasound, and less than 20 weeks' gestation (from the first day of the last menstrual period).

Stillbirth: See fetal death.

Subzonal insemination (SUZI): An IVF technique involving sperm microinjection, in which one or more sperm are injected through the zona pellucida into the perivitelline space of the oocyte.

Testicular sperm extraction (**TESE):** Dissection into the testis itself to recover immature sperm cells from the (often small) fraction of testicular tubules there which still contain such cells, for use with ICSI.

Thawed embryo: See frozen embryo.

Treatment cycle: procedure for collecting eggs (oocytes), usually after ovarian stimulation, involving the passing of a needle into a mature follicle either directly at laparoscopy or (more usually) via the vagina guided by transvaginal ultrasound.

Viable pregnancy: A pregnancy of at least 20 weeks' gestation.

Viable pregnancy rate: The percentage of treatment cycles that result in a viable pregnancy of at least 20 weeks' gestation, most commonly expressed per 100 attempted oocyte retrievals (egg collections). A multiple pregnancy is counted as one pregnancy. Pregnancies resulting in live births and/or stillbirths are included.

Appendix 2 Notification form

AIHW NATIONAL PERINATAL STATISTICS UNIT / FERTILITY SOCIETY OF AUSTRALIA

REGISTER OF PREGNANCIES AFTER IVF OR RELATED PROCEDURES

Please complete all data items by ticking relevant boxes

IVF Unit/Hospital: _____ Identification number: _____

Usual home address	Marital status	Date of birth	Age
Suburb/Town _____	[ ] Married/De facto	Mother __/__/__	___ yrs
State _____ Postcode _____	[ ] Single [ ] Other	Father __/__/__	___ yrs

NUMBER OF PREVIOUS PREGNANCIES: Current marriage	Previous marriages	TYPE OF CONCEPTION IN CURRENT PREGNANCY:
Livebirths _____	Mother:livebirths _____	[ ] IVF [ ] PROST/ZIFT [ ] TEST
Abortions _____	other _____	[ ] GIFT [ ] ICSI [ ] SUZI
Other _____	Father:livebirths _____	[ ] Epididymal sperm [ ] Assisted hatching
	other _____	[ ] Other (specify) _____

Did this pregnancy result from use of:

[ ] Donor sperm [ ] Donor oocyte [ ] Frozen embryo

[ ] Donor embryos [ ] Frozen oocytes

What was the date of embryo freezing? ---/---/---

What was the date of embryo transfer? ___/___/___

If donor oocyte or embryo, what was the age of the donor? _____ yrs

CAUSE OF INFERTILITY PRIOR TO THIS PREGNANCY [ ] Unknown cause

Tubal [ ] Tubal obstruction [ ] Previous ectopic [ ] Salpingectomy

[ ] Sterilization [ ] Pelvic adhesions [ ] Pelvic inflammatory disease

[ ] Other tubal (specify)_____

Male factor [ ] Azoospermia [ ] Oligospermia

[ ] Increased abnormal sperm [ ] Male sperm antibodies

[ ] Decreased motility [ ] Other male (specify)_____

[ ] Endometriosis [ ] Ovulation defects [ ] Maternal sperm antibodies

[ ] 'Hostile' cervical mucus [ ] Other cause (specify)_____

DURATION OF INFERTILITY (before first IVF/GIFT pregnancy) _____ years

DRUGS USED TO INDUCE OVULATION IN <u>OOCYTE RETRIEVAL CYCLE</u> (specify each separately)

[ ] Clomiphene [ ] hMG [ ] hCG [ ] Endogenous LH surge

[ ] FSH [ ] Recomb DNA FSH [ ] Recomb DNA LH

[ ] GnRH-agonist (specify)_____ [ ] short protocol [ ] long protocol (previous luteal phase)

[ ] None [ ] Other (specify) _____

<u>DRUGS USED DURING CYCLE IN WHICH FROZEN EMBRYOS WERE TRANSFERRED</u>(specify each separately)

[ ] None [ ] Oestrogen/progesterone [ ] Other (specify) _____

SPECIFY IN WHICH OOCYTE RETRIEVAL CYCLE THE PREGNANCY OCCURRED _____

Number of oocytes collected _____

IF DONOR OOCYTES WERE USED, IN WHICH INDUCTION CYCLE DID PREGNANCY OCCUR _____

METHOD OF COLLECTING OOCYTES

[ ] Laparoscopy

[ ] Ultrasound-guided transvaginal

[ ] Other (specify) _____

Date of fertilization (or GIFT, etc) --/--/--:

Number of embryos/ova transferred ____

Was the patient hospitalised for ovarian hyperstimulation syndrome? [ ] Yes [ ] No

DRUGS USED IN LUTEAL PHASE

[ ] hCG: specify dose and duration _____

[ ] Progesterone: specify dose and duration _____

[ ] Oestrogen/progesterone (frozen embryo transfer) _____

[ ] Other (specify)_____

[ ] None

OBSTETRIC COMPLICATIONS

[ ] None [ ] Pregnancy-induced hypertension

[ ] Threatened abortion

[ ] Placenta praevia

[ ] Antepartum haemorrhage

[ ] Embryo reduction

[ ] Other _____

NUMBER OF SACS SEEN IN EARLY PREGNANCY ON ULTRASOUND EXAMINATION _____

[ ] Ultrasound not done

PREGNANCY OUTCOME

[ ] Spontaneous abortion (date __/__/__)

[ ] Missed abortion (date of curette --/--/--)

[ ] Induced abortion (date __/__/__, specify malformations_____)

[ ] Other (e.g. combined pregnancy) _____

[ ] Pregnancy of 20 weeks or more Date of birth __/__/__

[ ] Multiple births (number _____)

[ ] Ectopic pregnancy

[ ] Ovarian pregnancy

[ ] Blighted ovum

METHOD OF DELIVERY [ ] Vaginal [ ] Caesarean section

LIVEBIRTHS AND STILLBIRTHS	1	2	3
Sex	M F	M F	M F
Birthweight	_____g	_____g	_____g
Condition at birth (delete one)	Live birth/ Stillbirth	Live birth/ Stillbirth	Live birth/ Stillbirth
If baby died, date of death	__/__/__	__/__/__	__/__/__
Any congenital malformations?	[ ] Yes [ ] No	[ ] Yes [ ] No	[ ] Yes [ ] No
Specify malformations or other abnormalities			