

# Fertility treatment in 2006

a statistical analysis



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## Executive Summary

The Human Fertilisation and Embryology Authority (HFEA) collects data about nearly 50,000 treatments carried out each year in the UK fertility sector. The main way that this data is published is through our Choose a Fertility Clinic website, which provides details of each licensed clinic and the outcomes of the treatment that it provides. Whilst this information is of great help to patients, who can find a clinic which most suits their needs, it does not provide a national picture of the fertility sector as a whole.

With this in mind, we commissioned the Oxford-based National Perinatal Epidemiology Unit (NPEU) to analyse data gathered in 2006 from all licensed fertility centres. This is the most comprehensive analysis of the outcomes of fertility treatment from HFEA data ever undertaken in the UK and this can now be used by clinics, patients and researchers to provide a greater understanding of the outcomes of fertility treatment.

The NPEU's report allows us to have for the first time an in depth picture of the success rates of various fertility treatments by age group, by type of treatment and whether fresh or frozen embryos were used. We have a clear picture of the impact of age on the live birth rate. And we can show the risk of miscarriage in pregnancies following fertility treatment and the prevalence of low birth weight and preterm babies.

In 2006 37,531 women started fertility treatment licensed by the HFEA and 49,391 cycles of treatment were carried out. As a result of fertility treatment started in 2006, a total of 13,052 babies were born. Of these, around 61% were singleton births, around 38% were twins and around 1% were triplets or higher order multiples.

At the time of commissioning the analysis, 2006 was the most recent year for which we had a full set of live birth data. As a result, some of the more recent changes in the sector, brought about by HFEA policy or other factors, are not reflected in the findings. For example, the multiple birth rate following IVF and ICSI was higher in 2006 than today, largely because of HFEA policy which, in 2007 undertook to reduce the multiple births as a result of fertility treatment and in 2009 set a maximum multiple birth rate which clinics should not exceed. The policy aims, over a period of time, to bring the overall rate down to 10%.

The report also shows how the chance of getting pregnant following IVF treatment is strongly related to the age of the woman being treated. Women who are 37 years old or younger are more likely to conceive than women aged 38 years and older. The same is true for the outcomes of these pregnancies. Women who are 37 years old or younger at the start of their treatment are more likely to have a baby than those who are aged 38 years old and older. This is the case for singleton as well as multiple pregnancies with younger women more likely to deliver all the babies from a multiple pregnancy than older women.

The report shows that just 58% of triplet (or more) pregnancies following fertility treatment resulted in the birth of all the babies. This compares to 84% of twin pregnancies following IVF or ICSI resulting in the birth of both the babies and 88% of singleton pregnancies resulting in the birth of a baby following IVF or ICSI treatment.

The data contained in this report brings together all the information about fertility treatment cycles started in 2006 and presents data on:

- IVF involving fresh embryo transfers for women using their own eggs
- IVF treatment involving frozen embryo transfers for women using their own eggs
- ICSI involving fresh embryo transfers for women using their own eggs

- ICSI involving frozen embryo transfers for women using their own eggs
- IVF & ICSI involving fresh embryo transfers using donor eggs
- IVF & ICIS involving frozen embryo transfers using donor eggs
- Other treatments including those using donor sperm, egg sharing arrangements and preimplantation genetic diagnosis.

Of course, this analysis examines one year of activity in UK fertility clinics. It is therefore not yet possible to show any trends in success rates or other outcomes. However, from the long-term data analysis that we have carried out, ([Long Term Trends](#)) it is clear that the success rate of fertility treatment is increasing year on year and that the multiple birth rate is going down.

The HFEA will continue this kind of in depth analysis of its data on an annual basis, adding to the usefulness of the information over time for the benefit of patients and the fertility sector alike.

## Overview of fertility treatment in 2006

The information we collect about fertility treatment can be analysed in many ways. Here we present key information about the patients treated, the different treatments used and the birth rates for treatment cycles which were carried in 2006.

We will continue to expand the type and depth of analysis we carry out in the future.

### ► How we gathered the data

Clinics are required by law to provide information to the HFEA Register about all licensed fertility treatments they carry out.

The Register started operating in August 1991 and is a rich source of information about fertility treatment, its outcomes and the factors that contribute to the birth of a baby following treatment.

### ► Understanding the 2006 data analysis

This analysis is of treatment cycles which were started at some stage in 2006. While the outcomes of some treatment started in 2006 may not be known until 2007 these treatment outcomes are nevertheless included in this analysis.

Clinics are not always told by every patient the outcome of each treatment cycle, especially if the woman has travelled to the UK for treatment from abroad. A small number of pregnancy outcomes are therefore not included in the Register. However, since most of the pregnancy outcomes are known, it is likely that any underestimate in the outcome rates is very small.

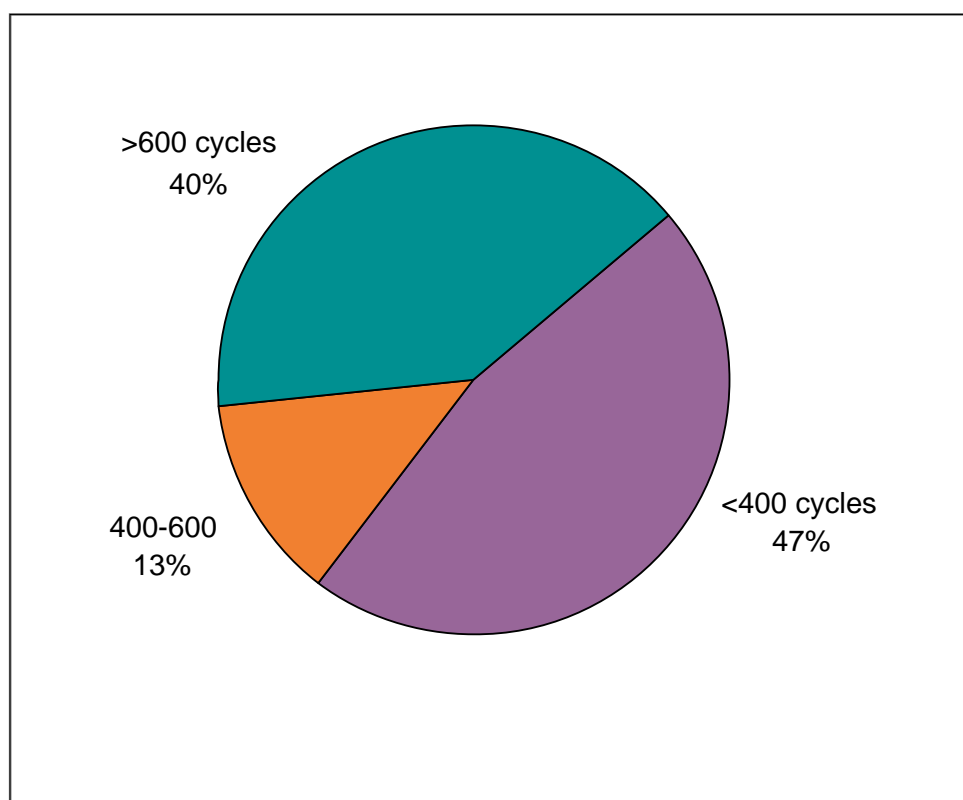
Currently, the number of women receiving treatment is estimated using a count of the unique patient code issued to patients at each clinic. This will give a slight overestimate of the number of patients receiving treatment if a patient receives treatment at more than one clinic in a particular year. This is because each patient would receive a different patient code at each clinic where they receive treatment and so would be counted twice, for example, if they received treatment at 2 different clinics in 2006. The number of patients receiving treatment at more than one clinic in any particular year is likely to be small.

The information that the HFEA publishes is a snapshot of data provided to us by licensed clinics at a particular time. This information may be subject to change as individual centres notify us of amendments. Before publication, the HFEA perform a preliminary checking process on the data, and ask the clinic to confirm the accuracy, for which they remain responsible.

► How many clinics provide treatment?

- In 2006 there were 84 clinics licensed by the HFEA to provide fertility treatment.
- In 2006 the 84 clinics carried out widely different numbers of treatment cycles from less than 50 cycles in some clinics up to 2,397 cycles performed in one clinic (Figure 1).
- Nearly half of all the clinics performed fewer than 400 cycles of treatment in 2006 and two-fifths carried out more than 600.

Figure 1: Clinic size - number of fertility treatment cycles carried out by clinics in 2006

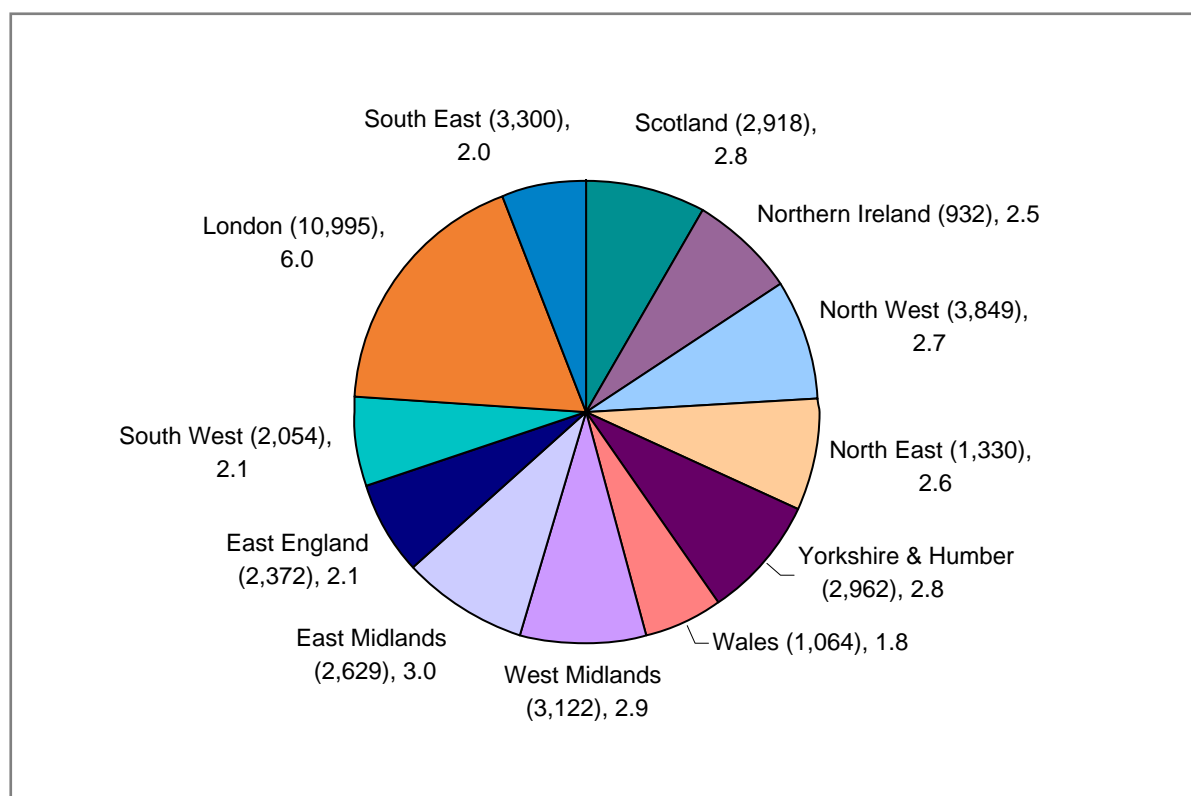


► How many women receive treatment in different areas?

- In 2006 fertility treatment licensed by the HFEA was provided by 84 clinics across the 12 regions of the UK.
- The number of women treated per 1,000 women of reproductive age\* resident in each region ranged from 1.8 in Wales to 6.0 in London (Figure 2).
- For every 1,000 women of reproductive age living in Wales in 2006, nearly two of them received a fertility treatment licensed by the HFEA. Whereas in London six women in every 1,000 received treatment.
- The higher treatment rate in the London area may be explained by the number of women coming from abroad or elsewhere in the UK for treatment.

\*Reproductive age is by convention defined as women aged 15 to 44 years.

**Figure 2: The number of women receiving fertility treatment in 2006 per 1,000 women of reproductive age, by region of residence. The number of women treated is given in brackets**



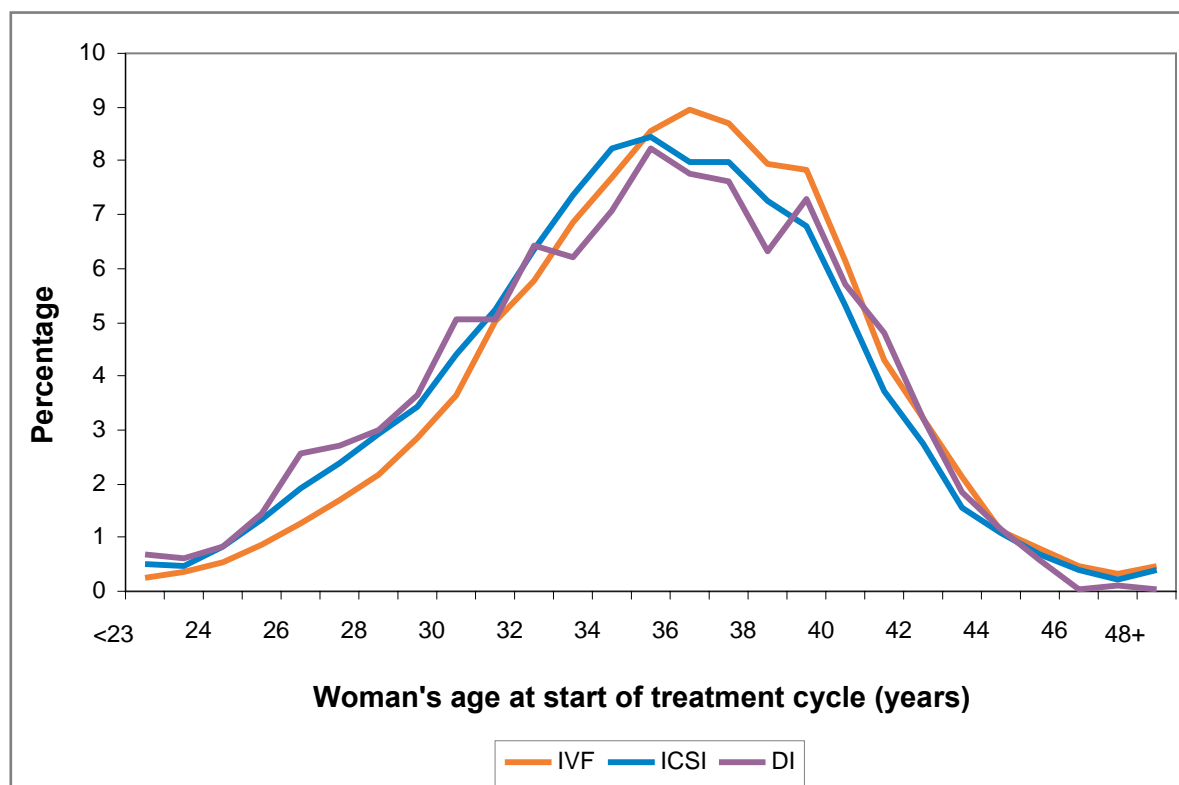
► **How many women had fertility treatment in 2006?**

- In 2006, 37,531 women received fertility treatment which was licensed by the HFEA. Between them they received 49,391 cycles of treatment.
  - 35,452 women had one or more cycles of IVF or ICSI.
  - 2,075 women had one or more cycles of DI.
  - 4 women had one or more cycles of GIFT.
- Of the 35,452 women who had IVF or ICSI:
  - The vast majority (34,672) - 98%, had treatment to try to conceive a baby during that cycle of treatment.
  - During the course of their treatment 606 of these women were involved in egg sharing.
  - 213 women had IVF or ICSI to store eggs or embryos for later use. This treatment was often carried out before the women had treatment for cancer which might affect their fertility. Other women store eggs or embryos for social reasons.
  - 506 women had IVF or ICSI to produce embryos for donation for use by other couples.
  - 61 women had IVF or ICSI as part of a surrogacy arrangement.

► How old were women who had treatment in 2006?

- Figure 3 shows the age at which women received treatment, for treatment cycles started in 2006.

**Figure 3: The age of women receiving IVF, ICSI or DI treatment attempting immediate conception\* in 2006**



\* Excludes women receiving treatment to store eggs or embryos, to create embryos for donation and those taking part in surrogacy

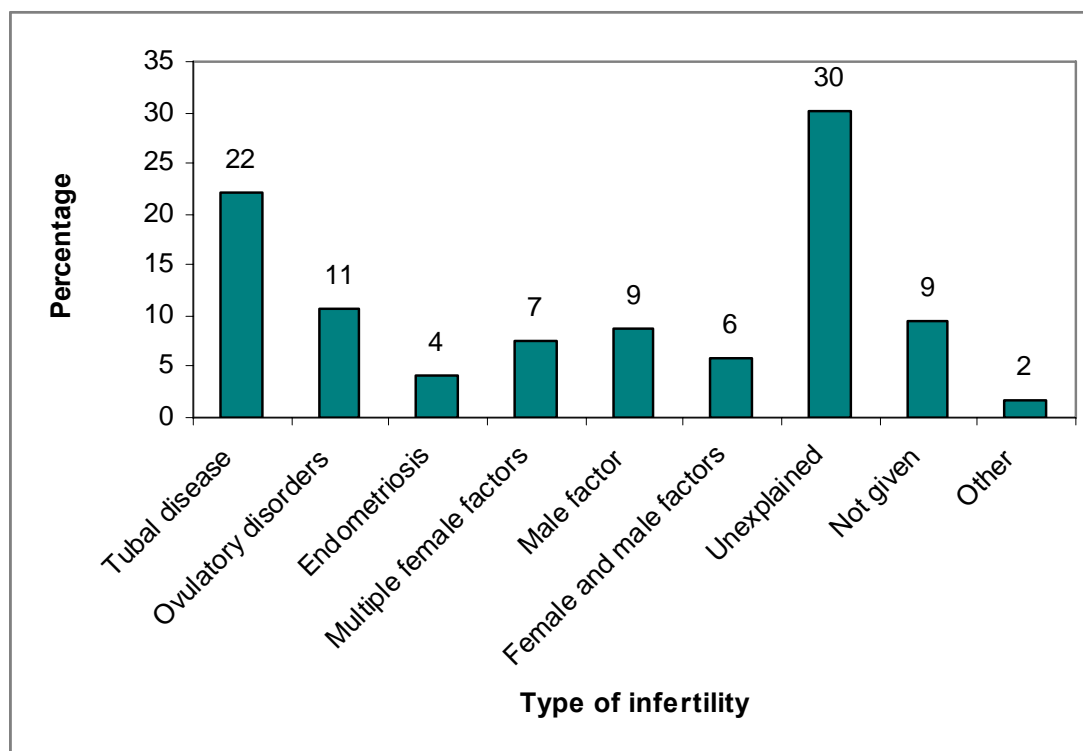
- Women having IVF or ICSI to try to conceive a baby:
  - were on average 35 years old and
  - ranged in age from 17 to 58 years old.
- Women having DI treatment:
  - were on average 35 years old and
  - ranged in age from 20 to 49 years old.
- Women having IVF or ICSI to store eggs or embryos for later use:
  - were on average 35 years old and
  - ranged in age from 19 to 46 years old.



### ► What types of infertility were treated?

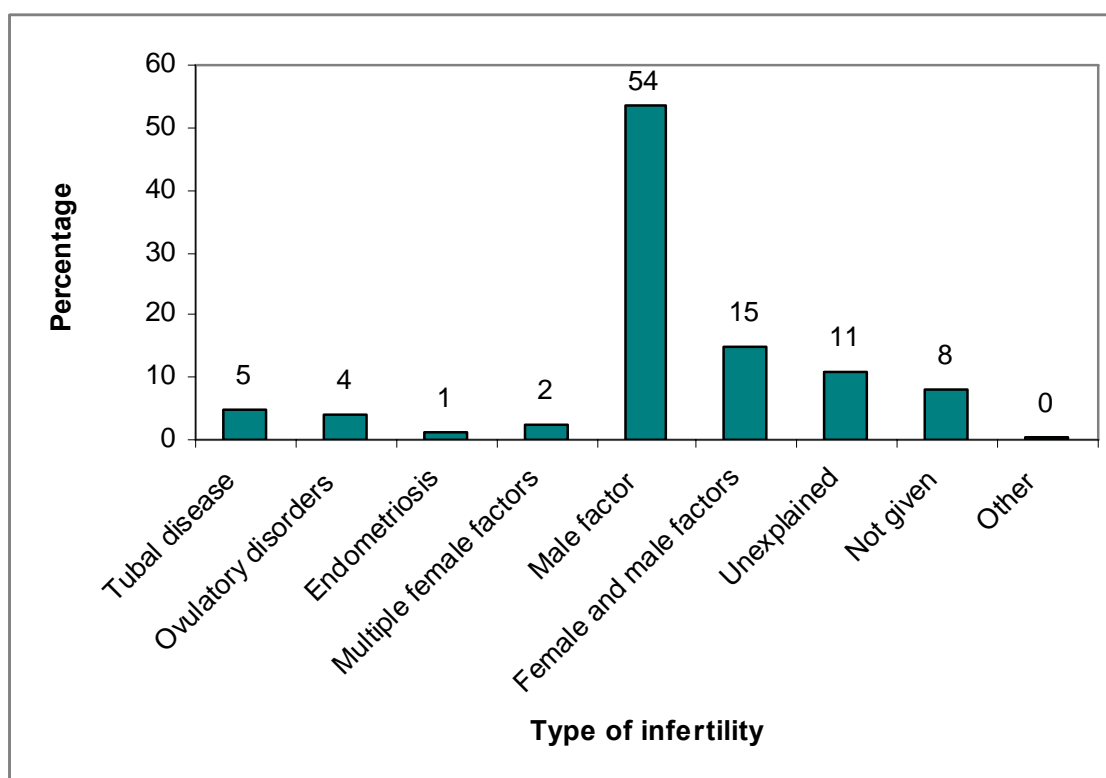
- Information about the types of infertility treated has been collected on the HFEA Register since 1991. The type of infertility is collected when patients are registered with the HFEA as beginning treatment.
- Three in every 10 women treated with IVF had unexplained infertility and just over two in every 10 had tubal disease (Figure 4a).
- Seven in every 10 women treated with ICSI had a partner with male factor infertility (Figure 4b) and just over two of them also had an infertility diagnosis themselves.
- One in every 10 women treated with ICSI had unexplained infertility.
- More than nine in every 10 women treated with DI had a partner with male factor infertility and just less than one of them also had an infertility diagnosis themselves.

Figure 4a: Type of infertility treated with IVF in 2006\*



\* Excludes women receiving treatment to store eggs or embryos, to create embryos for donation, those having PGD or PGS, and those taking part in surrogacy

Figure 4b: Type of infertility treated with ICSI in 2006\*



\* Excludes women receiving treatment to store eggs or embryos, to create embryos for donation, those having PGD or PGS, and those taking part in surrogacy

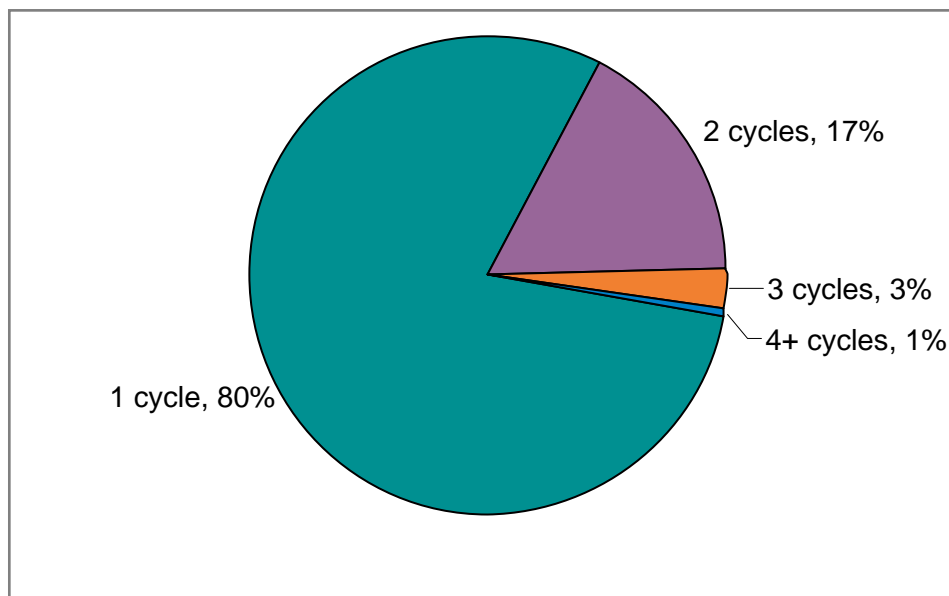
#### ► What types of treatment cycles were carried out?

- Overall 37,531 women received 49,391 cycles of fertility treatment which started in 2006.
- 44,235 (90%) of the 49,391 treatment cycles were for treatment to try to conceive a baby.
- 5,156 (10%) of the cycles were for treatment to store eggs or embryos for later use, to create embryos for donation, and as part of a surrogacy arrangement.

Treatment cycles to try to conceive a baby:

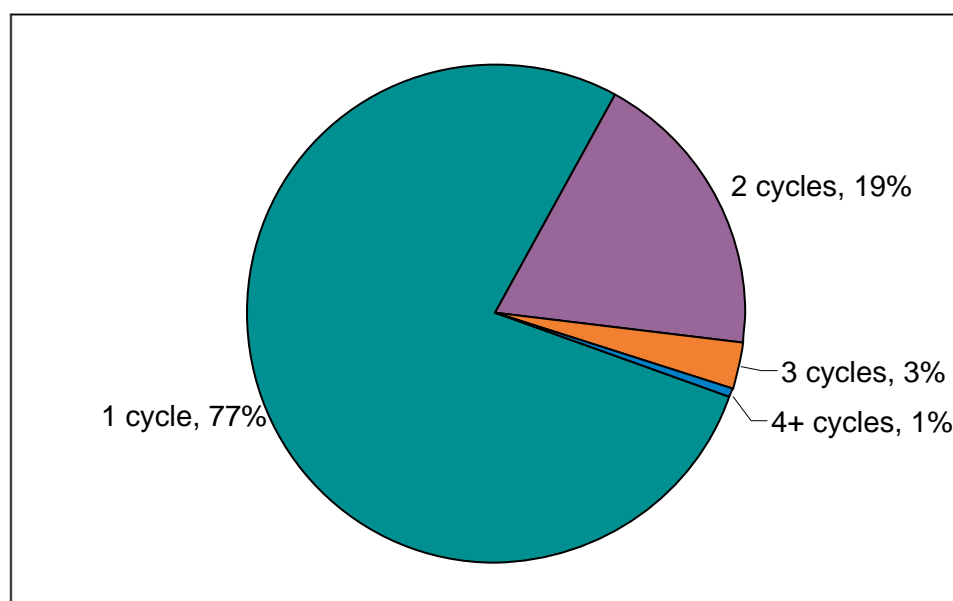
- There were 23,002 IVF cycles carried out during 2006:
  - Eight in every 10 women (80%) had one cycle of treatment; 17% had two cycles; 3% had three cycles; and just less than 1% had four or more cycles of treatment (Figure 5a).
- There were 20,845 ICSI cycles carried out in 2006:
  - Nearly eight in every 10 women (77%) had one cycle of treatment; 19% had two cycles; 3% had three cycles; and just less than 1% had four or more cycles of treatment (Figure 5b).
- There were 4,236 DI cycles carried out in 2006:
  - Five in every 10 women (49%) had one cycle of treatment, over a quarter (27%) had two cycles; 14% had three cycles; and 10% had four or more cycles of treatment (Figure 5c).

**Figure 5a: Number of IVF treatment cycles started in 2006\***



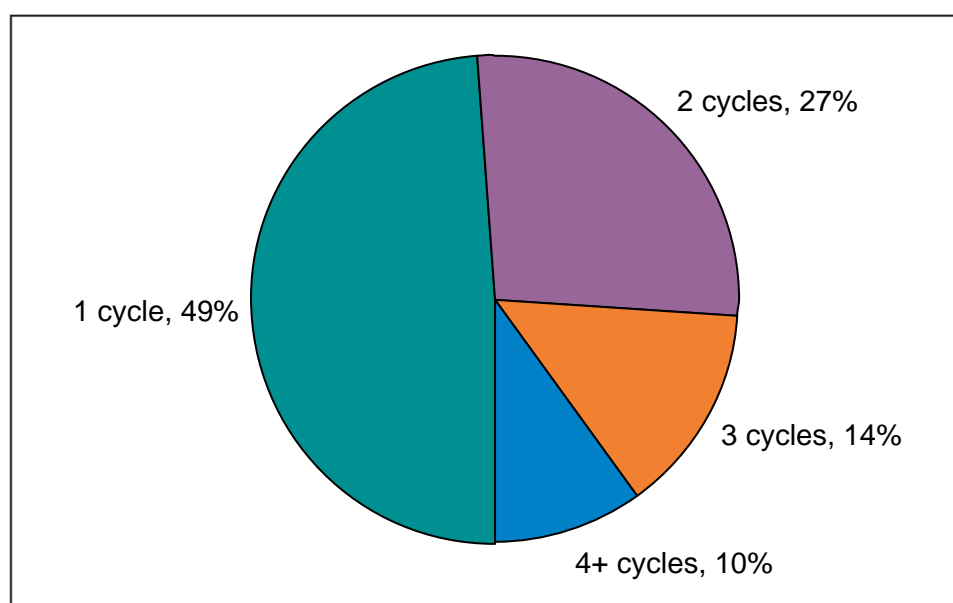
\* Excludes treatment cycles to store eggs or embryos for later use, to create embryos for donation, and those carried out as part of a surrogacy arrangement

Figure 5b: Number of ICSI treatment cycles started in 2006\*



\* Excludes treatment cycles to store eggs or embryos for later use, to create embryos for donation, and those carried out as part of a surrogacy arrangement

Figure 5c: Number of DI treatment cycles started in 2006\*

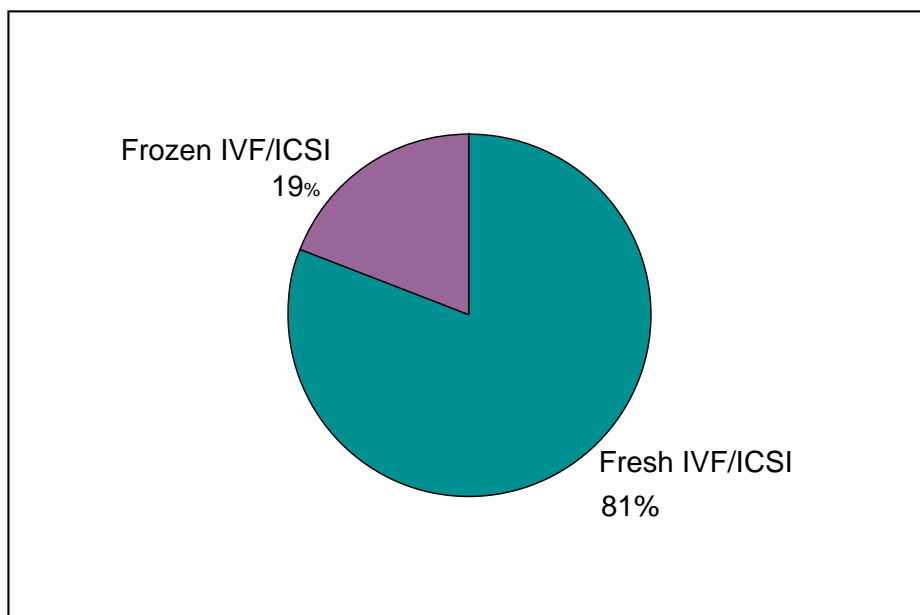


\* Excludes treatment cycles to store eggs or embryos for later use, to create embryos for donation, and those carried out as part of a surrogacy arrangement

► How many fresh and frozen cycles of IVF/ICSI were performed?

- 23,002 cycles of IVF treatment were carried out to attempt conception:
  - Eight in every 10 (18,488) were fresh IVF cycles.
  - Two in every 10 (4,514) were frozen IVF cycles.
- 20,845 cycles of ICSI were performed to attempt conception:
  - Just over eight in every 10 (17,054) were fresh ICSI cycles.
  - Just less than two in every 10 (3,791) were frozen ICSI cycles.

Figure 6: Fresh and frozen cycles of IVF/ICSI started in 2006\*



\* Excludes treatment cycles to store eggs or embryos for later use, to create embryos for donation, those carried out as part of a surrogacy arrangement and the small number of cycles (35) which involved transferring both fresh and frozen embryos in the same cycle

► **How many treatment cycles involved donor eggs, embryos and sperm?**

- A total of 1,829 of the IVF/ICSI cycles started in 2006\* involved the use of donor eggs or donor embryos. This represents 4% of all the IVF/ICSI cycles carried out to attempt immediate conception.
- A total of 1,308 of the IVF/ICSI cycles started in 2006\* involved the use of donor sperm. This represents 3% of all the IVF/ICSI cycles carried out to attempt immediate conception.

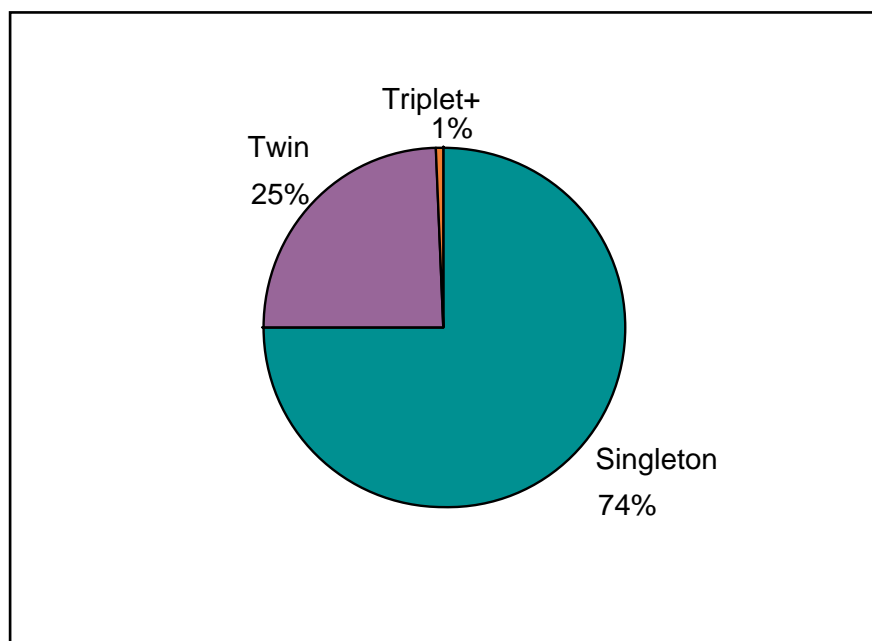
\* Excludes treatment cycles to store eggs or embryos for later use, to create embryos for donation, and those carried out as part of a surrogacy arrangement

► **How many women became pregnant following fertility treatment in 2006?**

- A total of 5,629 women became pregnant\* following IVF which started in 2006:
  - About three-quarters (4,211) of the women were carrying singleton pregnancies.
  - A quarter (1,384) of the women were pregnant with twins.
  - And 34 were pregnant with triplets or a higher order pregnancy.

\* This includes only pregnancies confirmed on ultrasound and excludes positive pregnancy tests which were not confirmed pregnancies on ultrasound examination

**Figure 7a: Type of pregnancies conceived following IVF treatment started in 2006 (5,629 women pregnant)**

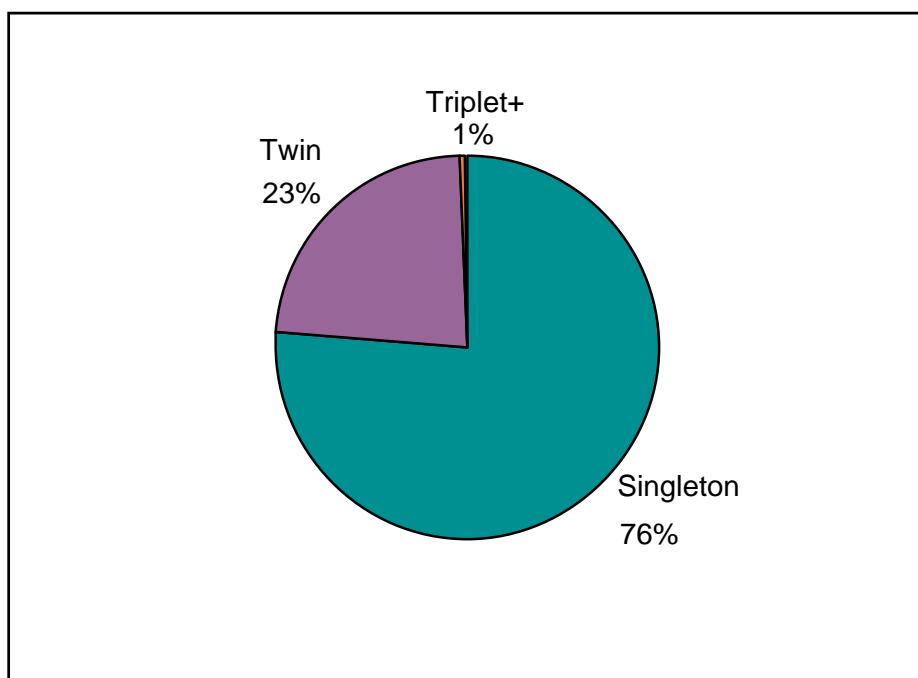


- A total of 5,756 women became pregnant\* following ICSI which started in 2006
  - Just over three-quarters (4,401) of the women were carrying singleton pregnancies.

- Just less than a quarter (1,336) of the women were pregnant with twins.
- And 18 were pregnant with triplets or a higher order pregnancy.

\* This includes only pregnancies confirmed on ultrasound and excludes positive pregnancy tests which were not confirmed pregnancies on ultrasound examination

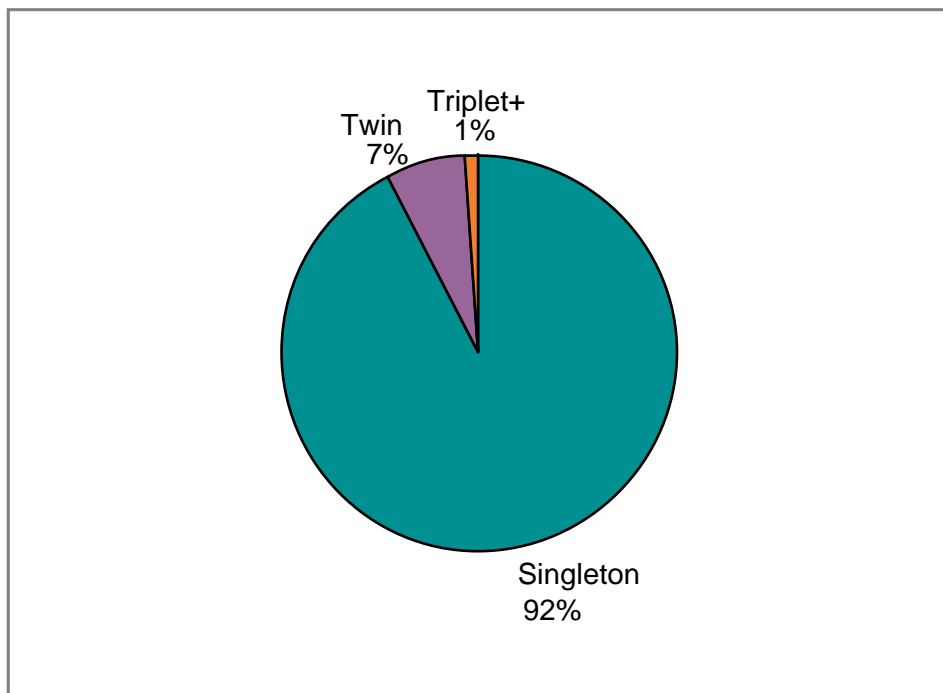
**Figure 7b: Type of pregnancies conceived following ICSI treatment started in 2006 (5,756 women pregnant)**





- A total of 518 women became pregnant\* following DI treatment which started in 2006
  - Just over nine in 10 (479) of the women were carrying singleton pregnancies.
  - Seven in 100 (34) of the women were pregnant with twins.
  - And one in 100 (five) were pregnant with triplets or more.

**Figure 7c: Type of pregnancies conceived following DI treatment started in 2006 (518 women pregnant)**

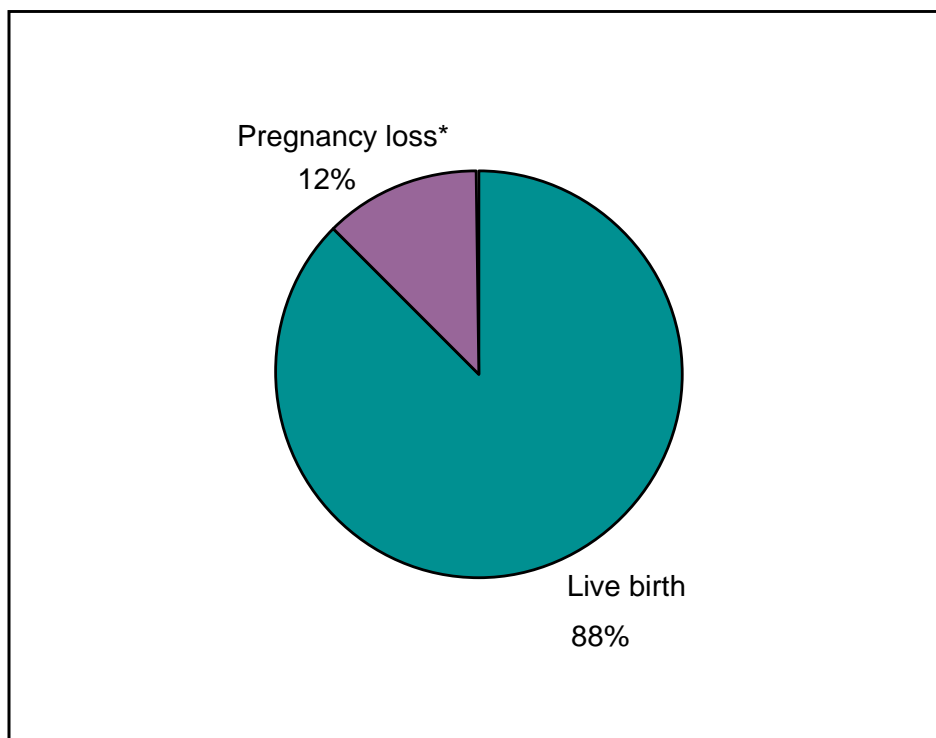


► What were the outcomes of pregnancies following fertility treatment?

The pregnancy outcomes following IVF and ICSI were the same:

- 88% of singleton pregnancies following IVF or ICSI resulted in the birth of a baby and 12% of the pregnancies were lost (Figure 7d).
- 88 in every 100 singleton pregnancies conceived following IVF or ICSI resulted in the birth of a baby.
- Unfortunately, 12 in every 100 IVF or ICSI singleton pregnancies were lost to either miscarriage or termination, or the baby was stillborn.

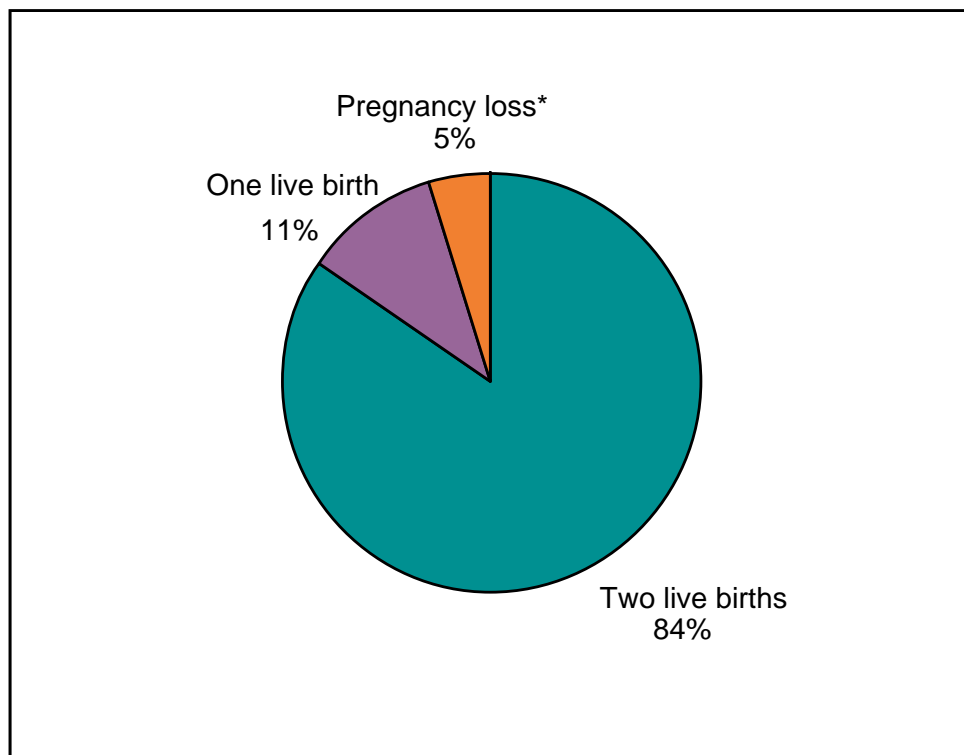
**Figure 7d: Outcomes for singleton pregnancies conceived following IVF/ICSI treatment started in 2006**



\*Pregnancy loss – pregnancy lost to either miscarriage or termination, or the baby was stillborn

- 84% of twin pregnancies conceived following IVF or ICSI resulted in the birth of two babies; 11% of pregnancies resulted in the birth of one baby and the other baby was lost; and 5% resulted in loss of the pregnancy (Figure 7e).
- 84 in every 100 twin pregnancies conceived following IVF/ICSI resulted in the birth of both babies.
- 11 in every 100 twin IVF/ICSI pregnancies results in the birth of just one baby and one baby was lost.
- Unfortunately in five of every 100 IVF/ICSI twin pregnancies, both babies were lost to either miscarriage or termination, or the babies were stillborn.

**Figure 7e: Outcomes for twin pregnancies conceived following IVF/ICSI treatment started in 2006**

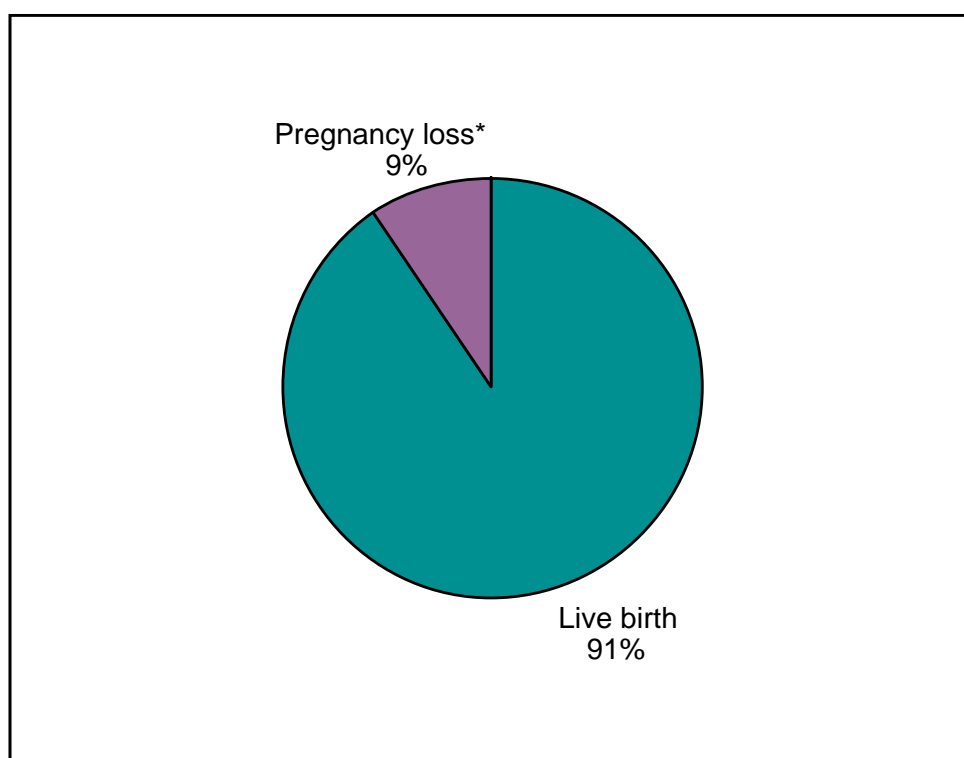


\*Pregnancy loss – pregnancy lost to either miscarriage or termination, or the baby was stillborn

The outcomes of pregnancies following DI treatment:

- 91% of singleton pregnancies conceived following DI resulted in the birth of a baby and 9% of the pregnancies were lost (Figure 7f).
- 91 in every 100 singleton pregnancies conceived following DI resulted in the birth of a baby.
- Unfortunately nine of every 100 DI conceived singleton pregnancies were lost to either miscarriage or termination, or the baby was stillborn.

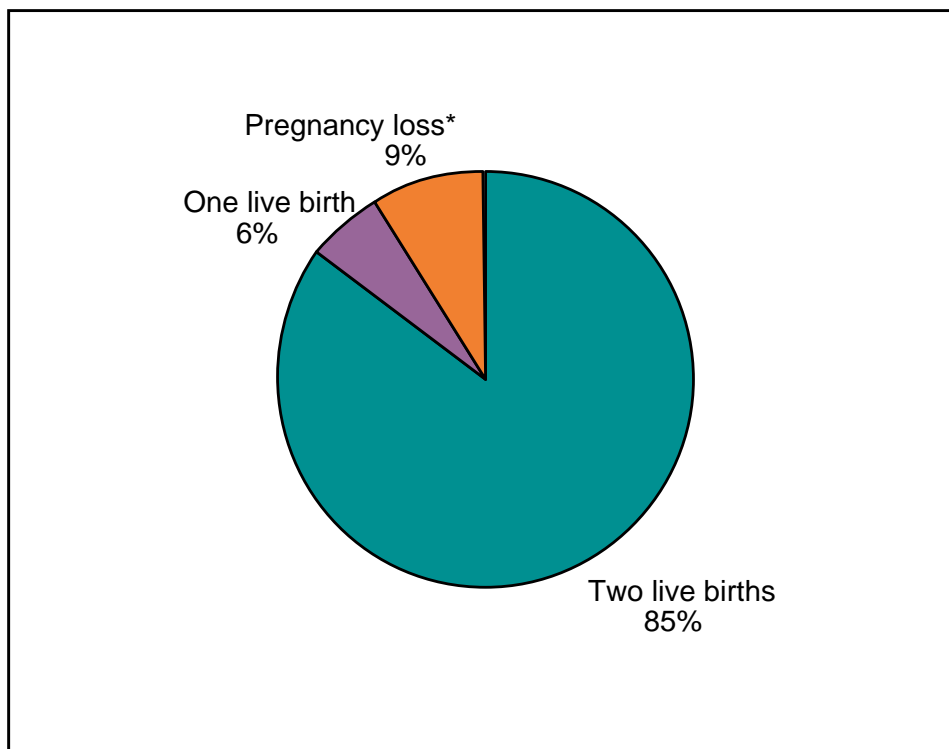
**Figure 7f: Outcomes for singleton pregnancies conceived following DI treatment started in 2006**



\*Pregnancy loss – pregnancy lost to either miscarriage or termination, or the baby was stillborn

- 85% of twin pregnancies conceived following DI resulted in the birth of two babies; 6% of pregnancies resulted in the birth of one baby and the other baby was lost; and 9% resulted in loss of the pregnancy (Figure 7g).
- 85 in every 100 twin pregnancies conceived following DI resulted in the birth of both babies.
- Six in every 100 twin DI pregnancies resulted in the birth of just one baby and one baby was lost.
- Unfortunately in nine of every 100 DI twin pregnancies, both babies were lost to either miscarriage or termination, or the babies were stillborn.

**Figure 7g: Outcomes for twin pregnancies conceived following DI treatment started in 2006**

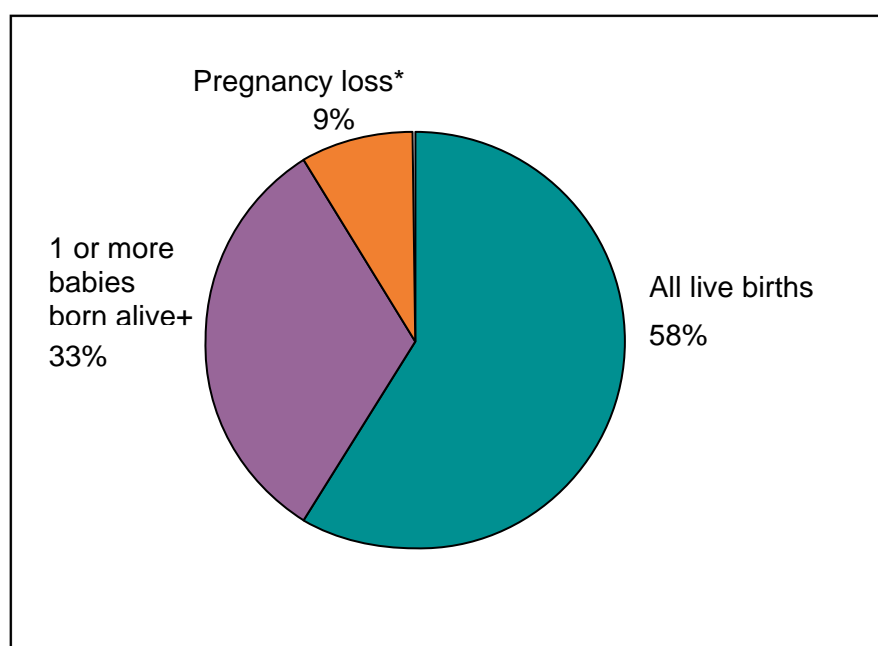


\*Pregnancy loss – pregnancy lost to either miscarriage or termination, or the baby was stillborn

The outcomes of pregnancies following IVF, ICSI and DI treatment were the same for the triplet and higher order multiple pregnancies. These are combined below:

- 58% of triplet and higher order pregnancies conceived following IVF, ICSI or DI resulted in the birth of all the babies; 33% of pregnancies resulted in the birth of one or more (but not all) of the babies and the other babies were lost; and 9% resulted in loss of the pregnancy (Figure 7h).
- 58 in every 100 IVF/ICSI/DI triplet (or more) pregnancies resulted in the birth of all the babies.
- 33 in every 100 triplet (or more) IVF/ICSI/DI pregnancies results in the birth of just one or more, but not all, of the babies and the other babies were lost.
- Unfortunately in nine in every 100 IVF/ICSI/DI triplet (or more) pregnancies, all of the babies were lost to either miscarriage or termination, or the babies were stillborn.

**Figure 7h: Outcomes for triplet and higher order pregnancies conceived following IVF/ICSI/DI treatment started in 2006**



\*Pregnancy loss – pregnancy lost to either miscarriage or termination, or the baby was stillborn  
 + One or more, birth of one or more but not all the babies, ie for triplets 1-2 babies born and for quadruplets 1-3 babies born

► How many babies were born following fertility treatment?

- A total of 6,238 babies were born following IVF which started in 2006:
  - Of these 3,691 (59%) were singletons.
  - 2,467 (40%) were twins\*.
  - 80 (1%) were triplets or high order multiples\*.
- A total of 6,307 babies were born following ICSI which started in 2006:
  - Of these 3,846 (61%) were singletons.
  - 2,426 (39%) were twins\*.
  - 35 (1%) were triplets or high order multiples\*.
- A total of 507 babies were born following DI treatment which started in 2006:
  - Of these 434 (85%) were singletons.
  - 60 (12%) were twins\*.
  - 13 (3%) were triplets or high order multiples\*.

\* Unfortunately not all the co-multiples of the twins, triplets and higher order multiples were born and some were lost to miscarriage or termination, or the baby was stillborn



► **How many treatment cycles involved donated eggs, embryos or sperm?**

Women donating eggs and embryos:

- Of the 35,452 women who started IVF or ICSI in 2006:
  - 648 women donated eggs for use in the treatment of other couples; 606 of these women donated eggs as part of an egg sharing agreement.
  - 518 women donated embryos for use in the treatment of other couples.

Men donating sperm:

- There were 1,386 individual sperm donors whose sperm was used in treatment cycles which started in 2006.

Cycles of treatment in which donations were made:

- Of the 45,149 IVF or ICSI treatment cycles which were started in 2006:
  - 844 cycles involved the donation of eggs for use in the treatment of other couples.
  - 719 of these cycles were carried out under an egg sharing agreement.

Treatment cycles involving the use of donor eggs, embryos and sperm:

- A total of 1,930 IVF or ICSI treatment cycles which were started in 2006 involved the use of donor eggs:
  - 1,107 of the cycles were IVF.
  - 791 of the cycles were ICSI.
  - 32 of the cycles were mixed IVF+ICSI cycles.
- A total of 5,637 treatment cycles involved the use of donor sperm:
  - 884 of the cycles were IVF.
  - 512 of the cycles were ICSI.
  - 5 were mixed IVF and ICSI cycles.
  - 4,236 were cycles of DI.

► **How many babies were born following treatment involving donated eggs, embryos or sperm?**

- A total of 7,307 cycles of fertility treatment involving the donation of either a donated egg, a donated embryo or donated sperm were started in 2006.
- 1,406 pregnancies resulted from the 7,307 cycles of treatment.
  - 19 in every 100 cycles of treatment involving donated eggs, embryos or sperm resulted in an ultrasound confirmed pregnancy (19%).
  - 80 in 100 of these pregnancies (80%) were singleton pregnancies.
  - 20 in 100 of these pregnancies (20%) were multiple pregnancies.
- These pregnancies resulted in a total of 1,500 live births.
  - 1,500 babies were born following egg, embryo or sperm donation.

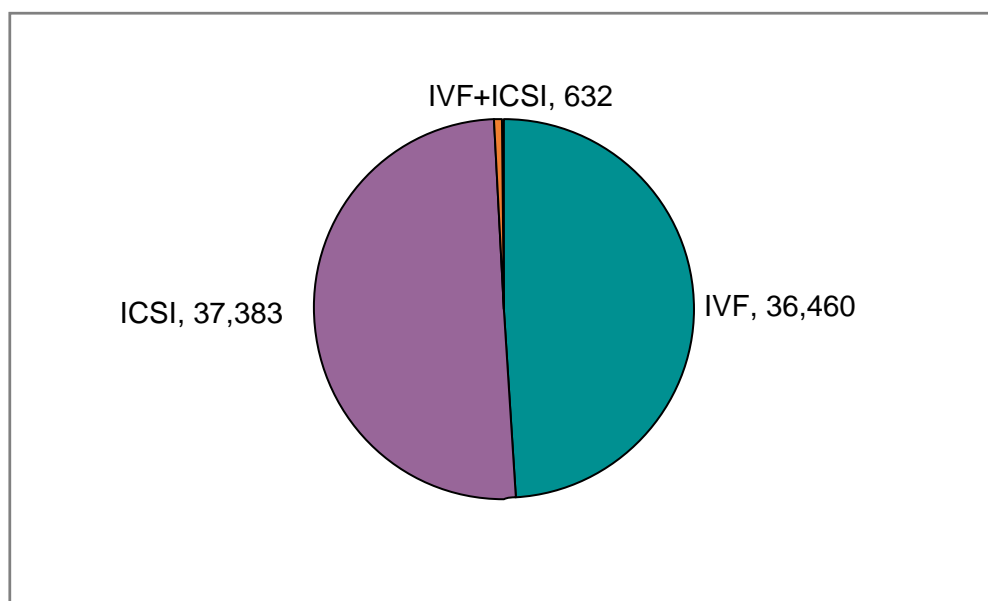
► **How many embryos were created in 2006?**

- A total of 236,581 embryos were created from fertility treatment which started in 2006.
- A total of 120,959 embryos were created following IVF:
  - Most of these embryos (120,082) were created during the course of treatment for women who were attempting to conceive immediately; on average eight embryos were created in each cycle.
  - A further 824 embryos were created to be stored for use in a later cycle with an average of 13 embryos created in each cycle. Embryo storage is used by women who are about to undergo treatment which may affect their later fertility, for example, the treatment of cancer.
  - And a further 53 embryos were created to be donated for the use by other couples.
- A total of 112,662 embryos were created following ICSI:
  - Most of these embryos (112,321) were created during the course of treatment for women who were attempting to conceive immediately; on average seven embryos were created in each cycle.
  - A further 317 embryos were created to be stored for use in a later cycle with an average of nine embryos created in each cycle. Embryo storage is used by women who are about to undergo treatment which may affect their later fertility, for example, the treatment of cancer.
  - And a further 24 embryos were created to be donated for the use by other couples.
- A total of 2,654 embryos were created following treatment which involved both IVF and ICSI:
  - Most of these embryos (2,564) were created during the course of treatment for women who were attempting to conceive immediately; on average 10 embryos were created in each cycle.
  - A further 85 embryos were created to be stored for use in a later cycle with an average of seven embryos created in each cycle. Embryo storage is used by women who are about to undergo treatment which may affect their later fertility, for example, the treatment of cancer.
  - And a further five embryos were created to be donated for the use by other couples.
- A total of 3,300 fresh embryos were created as part of IVF or ICSI treatment for women who were attempting to conceive immediately but were then donated for research purposes. Similarly 42 frozen embryos were also donated for research.
- Finally, 306 embryos were created during the course of 85 cycles of treatment which were carried out as part of a surrogacy arrangement.

► How many embryos were transferred?

- A total of 74,475 embryos were transferred during the course of fertility treatment which started in 2006 (Figure 8a):
  - 36,460 embryos were transferred during IVF.
  - 37,383 were transferred during ICSI.
  - A further 632 were transferred during treatment which involved both IVF and ICSI.

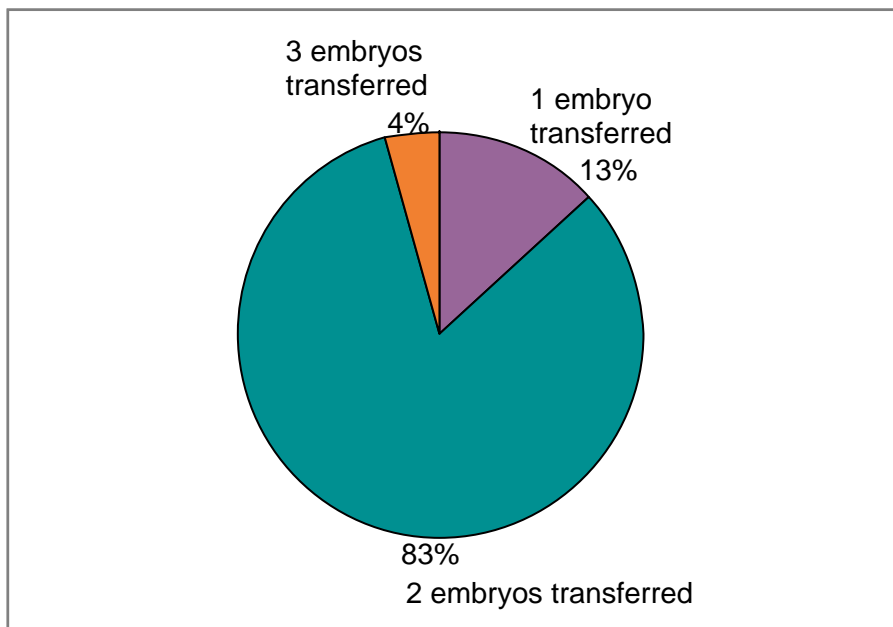
Figure 8a: Total number of embryos transferred during IVF and ICSI treatment cycles started in 2006



► How many embryos were transferred in each treatment cycle?

- There was no difference in the number of embryos transferred during each cycle of IVF and ICSI treatment (Figure 8b).
  - 13 in every 100 cycles involved the transfer of one embryo (1ET).
  - 83 in every 100 cycles of IVF/ICSI treatment involved the transfer of two embryos (2ET).
  - And 4 in every 100 cycles involved three embryos being transferred (3ET).

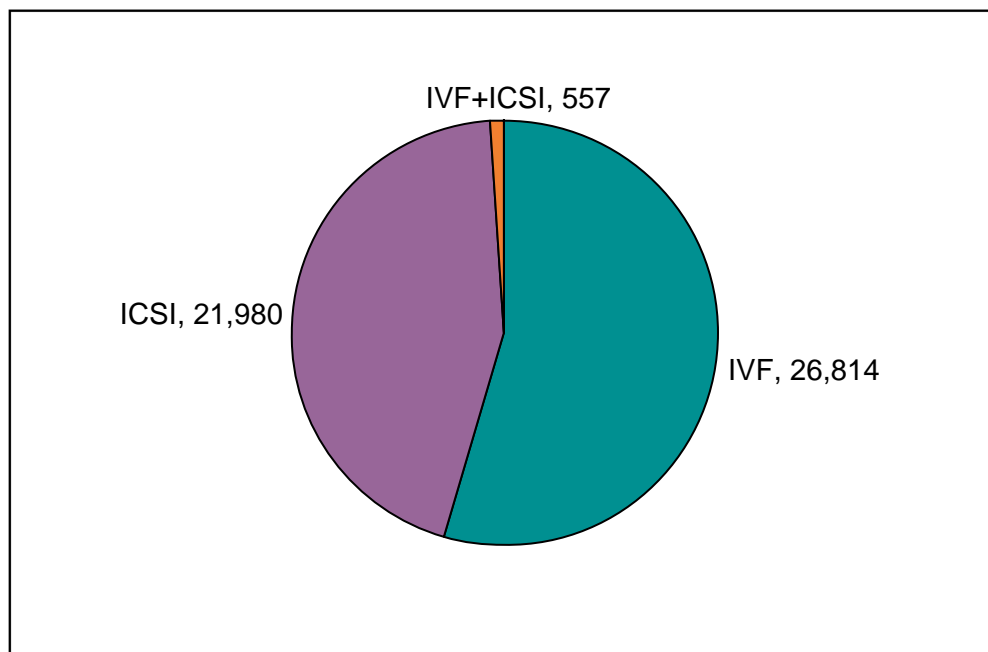
Figure 8b: Number of embryos transferred (ET) in each cycle in IVF/ICSI treatment cycles started in 2006



► How many embryos were stored by women for later use?

- A total of 10,787 cycles of IVF and ICSI started in 2006 produced 49,351 embryos that were stored by women for their own use in later treatment (Figure 9):
  - 26,814 embryos were created and stored following IVF and women stored an average of six embryos.
  - 21,980 embryos were created and stored following ICSI and women stored an average of five embryos.
  - 557 embryos were created and stored following IVF and ICSI combined and women stored an average of nine embryos.

Figure 9: Number of embryos stored by women for their own later use from IVF and ICSI treatment cycles started in 2006



## IVF results – involving fresh embryo transfers for women using their own eggs for treatment cycles started in 2006

### ► Introduction

- The information we collect about fertility treatment can be analysed in many ways. In this report we present key information about those patients having IVF involving fresh embryo transfer:
  - where the embryos were created using the woman's own eggs
  - where women were having treatment with the intention of conceiving immediately rather than storing or donating eggs and embryos; surrogacy treatment is excluded
  - and the treatment cycle started in 2006 resulting in births in either 2006 or 2007.
- This report does not include information about cycles of ICSI, frozen embryo transfer IVF or the small number of cycles that involved transferring fresh and frozen embryos in the same cycle.
- Similar reports are available for treatment with ICSI, IVF and ICSI involving frozen embryo transfer, and treatment involving donor eggs.
- At some points in the report the small numbers involved mean that some of the information cannot be presented for confidentiality reasons.
- Information about how the data for this report was gathered is given in the appendix together with a glossary of terms.

### ► Summary

- In 2006 14,973 women started 17,794 cycles of IVF where the intention was to carry out a fresh embryo transfer using embryos created from the woman's own eggs and treatment was undertaken with the purpose of conceiving immediately rather than storing or donating embryos.
- Of the cycles started 15,668 (88%) resulted in a successful egg collection and 14,289 (80%) of cycles reached the embryo transfer stage.
- The majority (83%) of embryo transfers involved the transfer of two embryos; 12% of cycles involved a single embryo transfer; and 5% were three embryo transfers.
- A total of 4,456 cycles resulted in an ultrasound confirmed pregnancy which represents 25% of treatment cycles started and 3,996 women gave birth to at least one baby (22%).
- The chances of a baby being born following IVF was strongly affected by the age of the woman when she was treated and also by the number of embryos transferred. Women who were 37 years old or younger were more likely to conceive than women 38 years and older.

- Of the 4,456 women who had a confirmed ultrasound pregnancy, 9% had an early miscarriage. Older women were more likely than younger women to miscarry.
- Of the women who conceived following IVF, 74% conceived a singleton pregnancy, 25% conceived a twin pregnancy and 1% conceived triplets. Younger women were more likely to conceive a multiple pregnancy than older women.
- Having conceived a pregnancy following IVF, 90% of women gave birth to at least one baby (a live birth).
- Having conceived a singleton pregnancy, 88% of women gave birth whereas 12% lost their pregnancy to miscarriage, an ectopic pregnancy, termination or the baby was stillborn.
- Having conceived a multiple pregnancy, 84% of women gave birth to all the babies that is both twins or all three triplets were live born; 11% gave birth to at least one baby but fewer babies than originally conceived; whereas 5% of women had a miscarriage, an ectopic pregnancy, a termination or stillbirth and none of the babies were born alive.

### ► How are treatment results calculated?

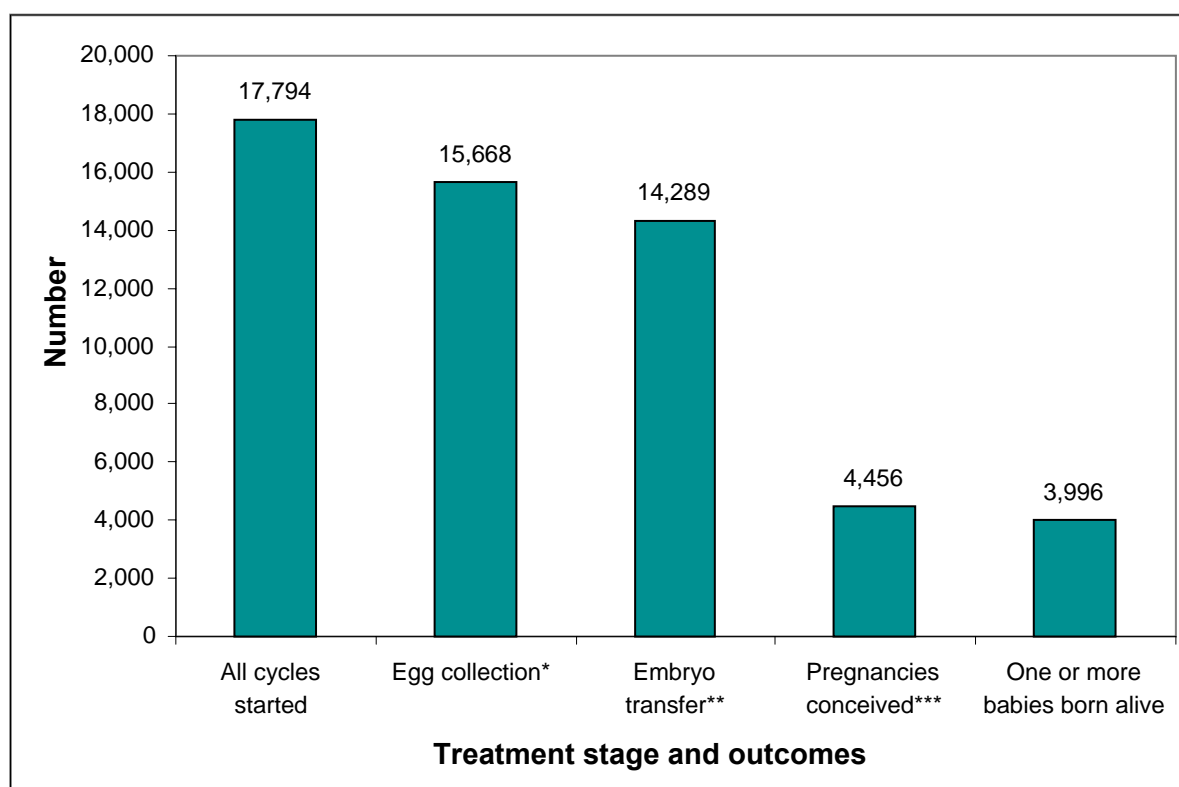
- The results of IVF can be calculated using treatment cycles as the starting point. This gives figures which are useful to help understand what the chances of pregnancy and of having a baby are when a woman starts treatment.
- However, not all treatment cycles which are started reach the embryo transfer stage. The results of treatment can also be calculated from the point that an embryo transfer occurs. This is useful to understand what the chances of pregnancy and of having a baby are once an embryo transfer has taken place.
- In this report we show:
  - Treatment outcomes from the point of view of starting a treatment cycle. These results are given per 100 treatment cycles and
  - Treatment outcomes from the point at which the embryo transfer has been carried out. These results are given as per 100 embryo transfers.



► 1. How many women were treated with IVF and what were the outcomes? [2.1-2.8]

- In 2006 14,973 women started 17,794 cycles of IVF where the intention was to carry out a fresh embryo transfer cycle using embryos created from the woman's own eggs and the treatment was undertaken to try to conceive straight away.
- For a variety of reasons not all cycles of treatment which are started result in successful egg collection and not all cycles in which eggs are collected reach the embryo transfer stage.
- The majority of cycles reaching the embryo transfer stage do not result in the conception of a pregnancy (Figure 1).

Figure 1: Outcome of IVF treatment cycles<sup>+</sup> started in 2006 [2.1]



+ Fresh IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\* Cycles in which eggs were collected

\*\* Cycles in which an embryo transfer took place

\*\*\* Ultrasound confirmed pregnancies

**Results relating to treatment cycles:**

- Of the 17,794 cycles started :
    - 15,668 cycles resulted in a successful egg collection where one or more eggs were collected - 88 in every 100 treatment cycles started resulted in a successful egg collection (88%).
    - 14,289 cycles resulted in an embryo transfer - 80 in every 100 treatment cycles started reached the embryo transfer stage (80%).
    - 4,456 cycles resulted in a pregnancy (confirmed on ultrasound) - 25 in every 100 cycles started resulted in an ultrasound confirmed pregnancy (25%)
- and
- 3,996 cycles led to birth to one or more babies - 22 in 100 cycles started resulted in one or more live births (22%).

**Results relating to embryo transfers:**

- There were 14,289 cycles of fresh IVF using women's own eggs which reached the embryo transfer stage:
    - 4,456 cycles resulted in a pregnancy confirmed by ultrasound - 31 in every 100 embryo transfer procedures resulted in an ultrasound confirmed pregnancy (31%)
- and
- 3,996 cycles led to the birth of one or more babies - 28 in every 100 embryo transfers resulted in one or more live births (28%).

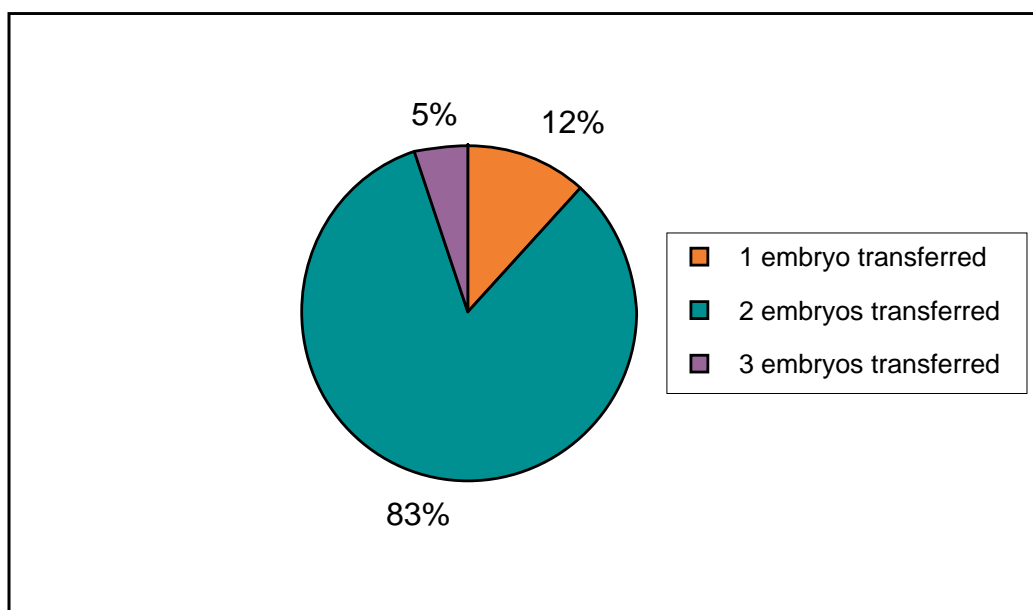
► 2. Why were treatment cycles cancelled? [2.9]

- For a variety of reasons not all cycles of treatment which are started result in a successful egg collection and not all cycles in which eggs were successfully collected reach the embryo transfer stage.
- The reasons why cycles were cancelled before they reach the egg collection or embryo transfer stages include:
  - A poor response to stimulation meaning that no eggs or insufficient eggs were produced and the egg collection could not proceed.
  - There was a high risk of ovarian hyperstimulation syndrome (OHSS).
  - Once eggs were collected and mixed with sperm, fertilisation of the egg did not occur; or the fertilisation was abnormal and the embryo did not develop; or in some cases abnormal embryos developed which were not suitable for transfer.
  - In a small number of cases pre-implantation genetic diagnosis (PGD) or pre-implantation genetic screening (PGS) was carried out, the result was positive and there were no suitable embryos available for transfer.

► 3a. How many embryos were transferred in each treatment cycle? [2.23]

- Overall in 2006 the vast majority of embryo transfers involved the transfer of two embryos (Figure 2):
  - 12 in every 100 treatment cycles (12%) reaching the embryo transfer stage involved a single embryo transfer (1ET).
  - 83 in every 100 treatment cycles (83%) reaching the embryo transfer stage involved a double embryo transfer (2ET) and
  - 5 in every 100 treatment cycles (5%) reaching embryo transfer involved the transfer of three embryos (3ET).

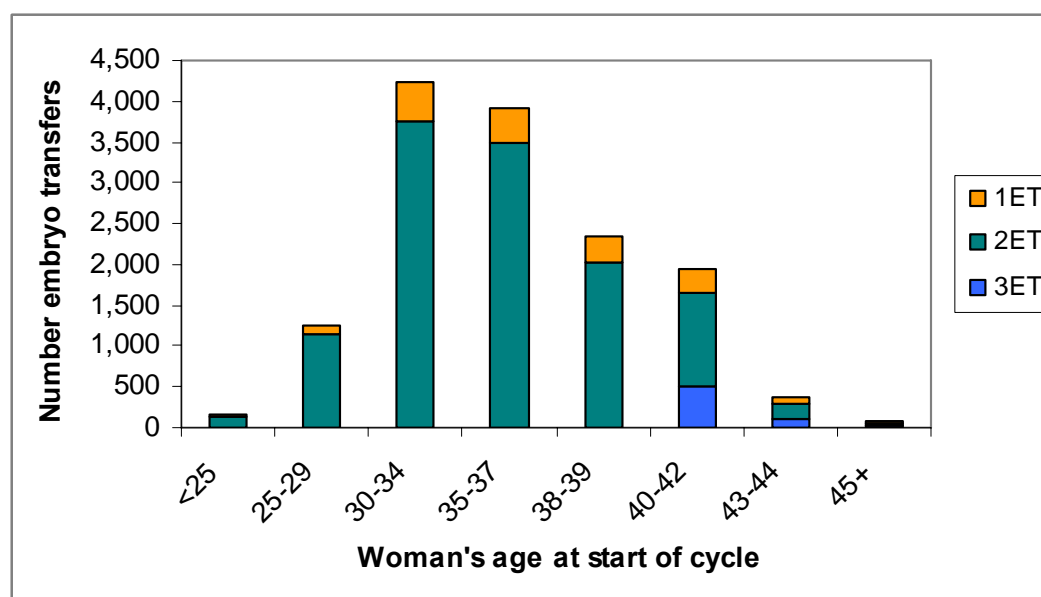
Figure 2: Number of embryos transferred in each cycle of treatment [2.24]



- Transferring a single embryo reduces the risk of a multiple pregnancy, although a small number of twins can result from spontaneous splitting of a single embryo resulting in identical twins.
- Single embryo transfer can be 'elective', where women choose to transfer just one embryo in order to minimise the risk of a multiple pregnancy, even if there is more than one embryo available. Single embryo transfer can also be 'non-elective', where women only have one embryo available to transfer.
- From the information collected on the HFEA register during 2006 it is not possible to separate elective single embryo transfer from single embryo transfer where only one embryo was available; although this will be possible in the future.
- Important: It is likely that the increasing proportion of single embryo transfers seen in older women in 2006 is due to most women only having one embryo available for transfer. This will place these women in a poorer prognosis group, with a lower chance of conception than women who are younger and/or have more embryos available for transfer.

- The data from 2006 does not reflect current practice. Since January 2009 clinics are required by the HFEA to have a strategy setting out how they will minimise the risk of multiple births. Clinics are increasingly encouraging women with the greatest chance of conception (for example, women aged 37 years and younger who have several good quality embryos available for transfer) to have elective single embryo transfer to try and minimise the risk of multiple births.
- The proportion of single embryo transfers increased with increasing age of the women being treated (Figure 3):
  - About 10 in every 100 women under the age of 30 yrs had a single embryo transfer (10%) whereas
  - 28 in 100 women over the age of 45 yrs had a single embryo transfer (28%).
- Transfer of three embryos was performed in 27 of every 100 transfers carried out to treat women aged 40 to 44 yrs (27%).
- 33 in every 100 transfers (33%) carried out in women 45 years and older involved transferring three embryos (33%).
- A total of 10 cycles involving transfer of three embryos were carried out in women under the age of 40.

**Figure 3: Number of embryos transferred by the woman's age [2.23]**



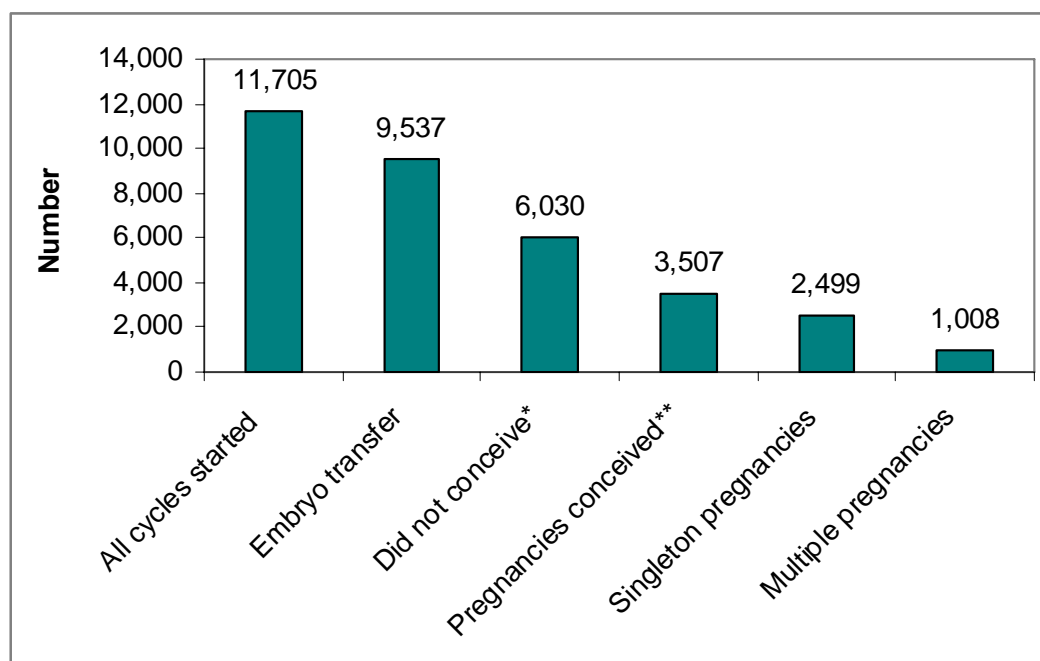
► 3b. At what stage of development were embryos transferred? [2.52-2.58]

- Conventionally, following the mixing of sperm with the eggs, the embryos which develop are allowed to grow in the incubator for between two and three days before the developing embryos are either transferred to the woman's uterus, frozen or donated.
- More recently embryos have been allowed to develop in the incubator for between five and seven days before transfer. This stage of development is called a blastocyst; a blastocyst consists of many more individual cells than a 2-3 day old embryo. A transfer at this stage of development is called blastocyst transfer rather than an embryo transfer.
- In 2006 blastocyst transfer was only just being introduced into clinical practice and in that year only 7 in every 100 transfers involved blastocyst transfer (7%).

► 4a. How does the woman's age affect the chances of pregnancy following IVF? [2.18]

- The outcomes following IVF are strongly affected by the age of the woman when she undergoes treatment. The results of treatment are shown for women of different ages in the following figures (4 to 7).

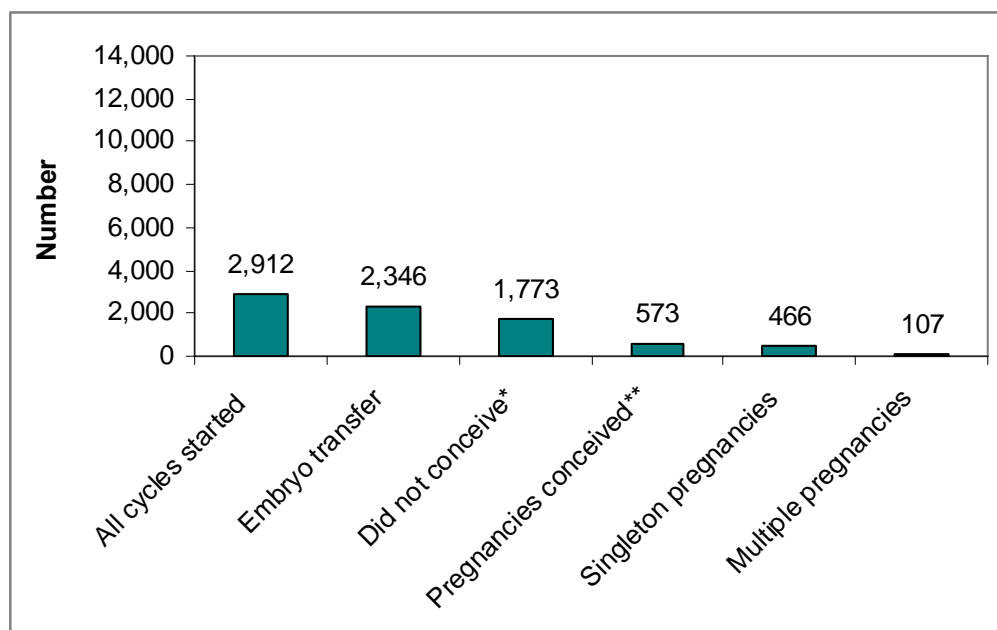
**Figure 4: Treatment outcomes for women age 37 years or younger when they started treatment in 2006 [2.18a]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

\*\*Ultrasound confirmed pregnancies

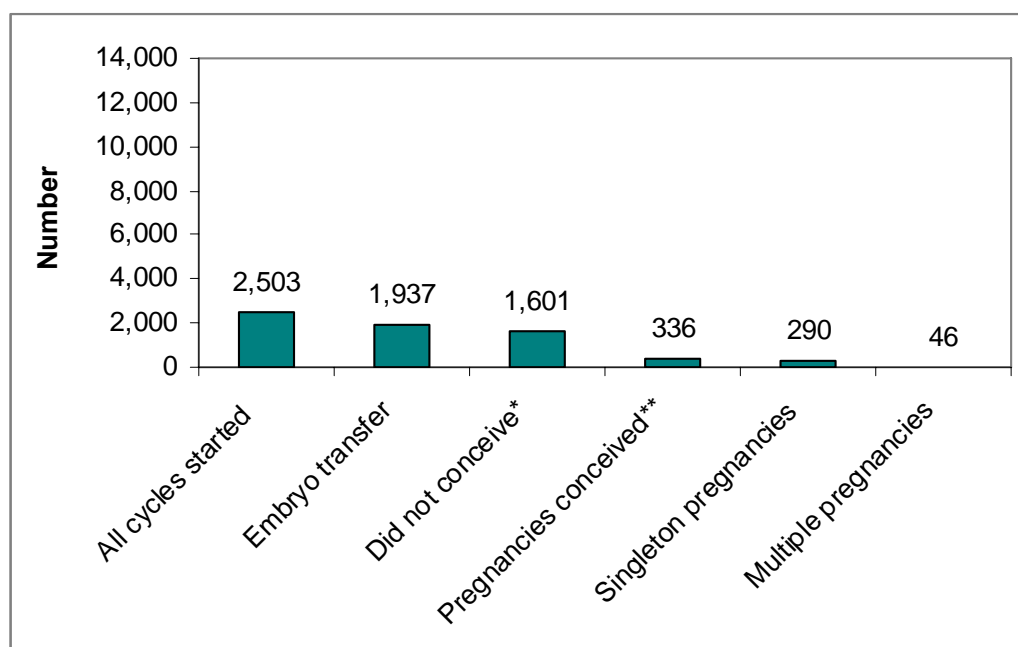
**Figure 5: Treatment outcomes for women aged 38 to 39 years when they started treatment in 2006 [2.18b]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

\*\*Ultrasound confirmed pregnancies

**Figure 6: Treatment outcomes for women aged 40 to 42 years when they started treatment in 2006 [2.18c]**

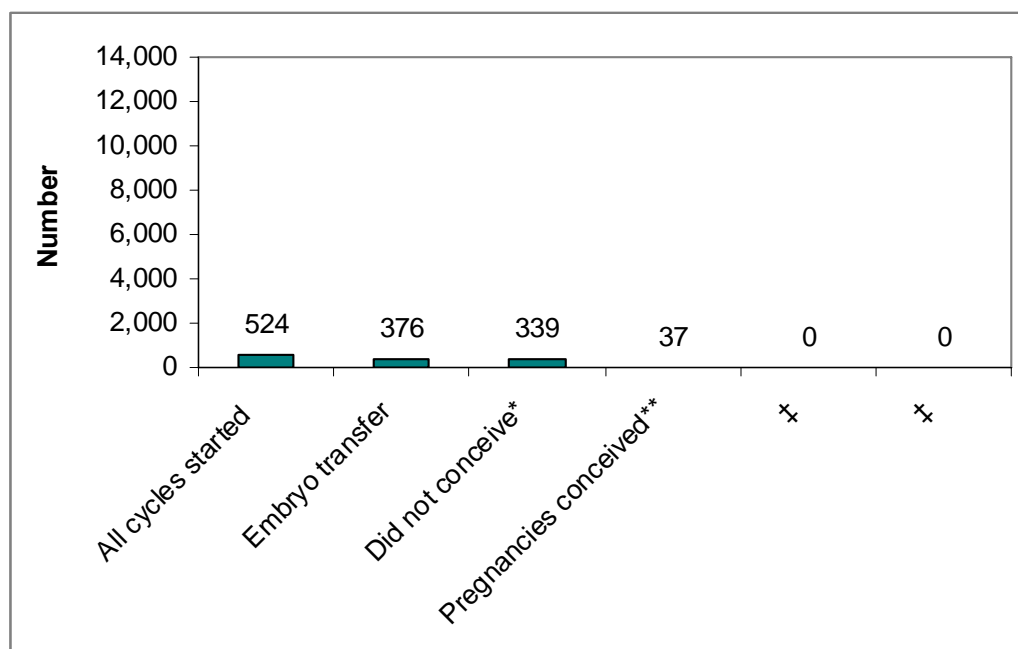


\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

\*\*Ultrasound confirmed pregnancies



**Figure 7: Treatment outcomes for women aged 43 to 44 years when they started treatment in 2006 [2.18d]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

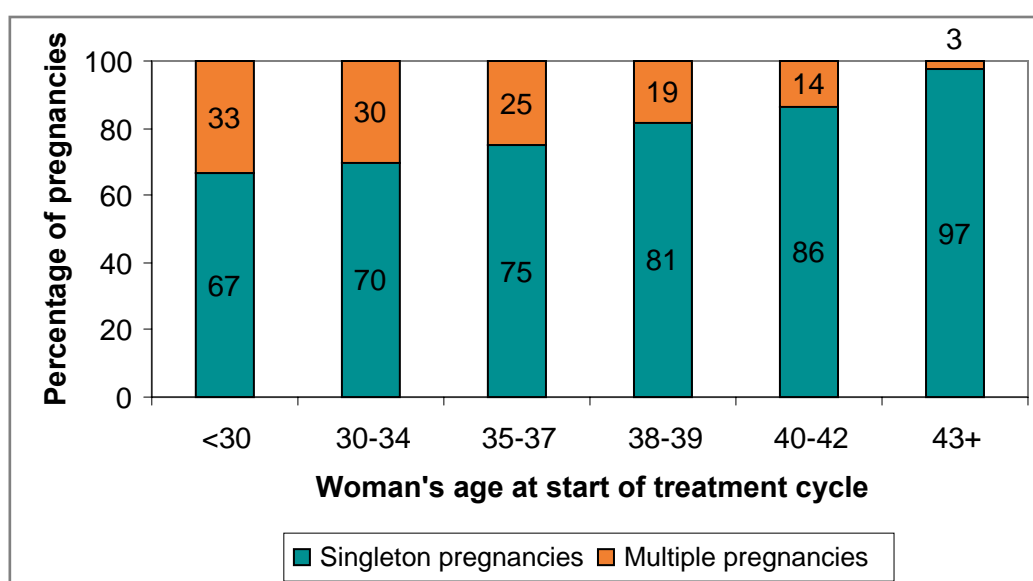
\*\*Ultrasound confirmed pregnancies

† These results are not presented because of confidentiality issues in relation to the small numbers involved

► 4b. Which women are most likely to conceive a multiple pregnancy? [2.21]

- The chance of conceiving a multiple pregnancy is affected by the age of the woman when she starts treatment and the number of embryos transferred.
- Figure 8 shows the split between singleton and multiple pregnancies by the woman's age at the start of her treatment for women who became pregnant following IVF starting in 2006.

**Figure 8: Split between singleton and multiple pregnancies by the women's age at the start of IVF<sup>+</sup> treatment, cycles started in 2006 [2.21]**



+ Fresh IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

The following figures only relate to the women who became pregnant following IVF:

- Two-thirds of the women who were less than 30 years old and conceived following IVF were pregnant with a singleton pregnancy;
  - 67 in every 100 women less than 30 years old who conceived was pregnant with a singleton (67%) and 33 in every 100 conceived a multiple pregnancy (33%).
- The chances of conceiving following IVF decline as the age of the woman increases. At the same time, for those who do conceive, the chance of conceiving a singleton rather than a multiple pregnancy increases as women get older.
- 97 in 100 women who were 43 years and older when they conceived were pregnant with a singleton (97%) and 3 in 100 conceived a multiple pregnancy (3%).

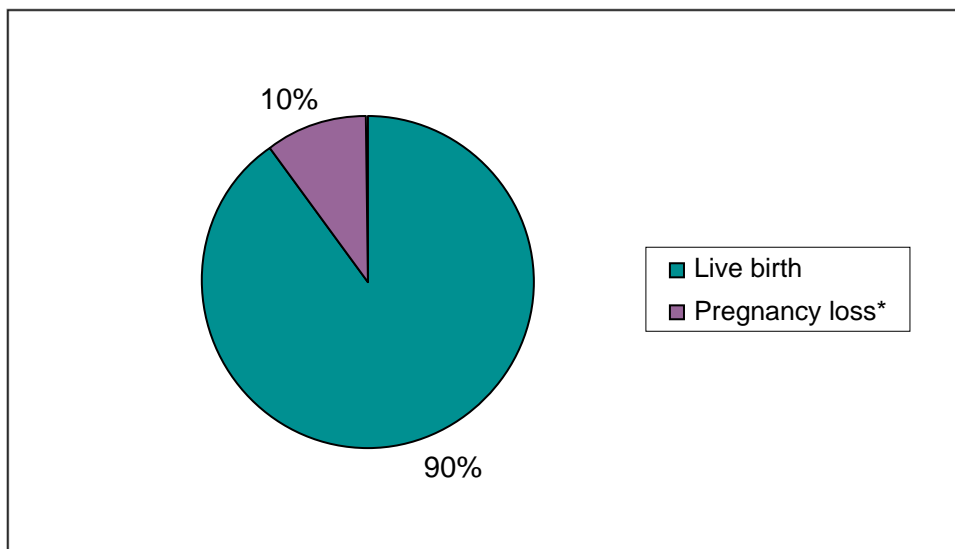
► **5a. What can happen to a pregnancy conceived by IVF – will a baby always be born? [2.10-2.17, 2.19]**

- Overall 4,456 women conceived a pregnancy following IVF which started in 2006:
  - 3996 of these pregnancies resulted in the birth of at least one baby (live birth – see glossary)
    - 90 in every 100 women who conceived an IVF pregnancy gave birth to at least one baby (90%).
  - 3,292 of these women were pregnant with a single pregnancy:
    - 2,892 of these singleton pregnancies resulted in the birth of a baby (live births)
      - 88 in every 100 women who conceived an IVF singleton pregnancy gave birth to a baby (88%)
      - and
      - 12 in every 100 women who conceived an IVF singleton pregnancy had a miscarriage, an ectopic pregnancy, a termination or the baby was stillborn (12%).
  - 1,162 of these women were pregnant with a multiple pregnancy:
    - 976 of the multiple pregnancies resulted in the birth of all the babies (all the babies were born alive; that is both twins or all three triplets)
      - 84 in every 100 women who conceived an IVF multiple pregnancy gave birth to all the babies (84%).
    - 126 of the multiple pregnancies resulted in the birth of at least one baby, that is one of the twins and one or two of the triplets
      - 11 in every 100 women who conceived an IVF multiple pregnancy gave birth to at least one baby but fewer babies than she was originally pregnant with (11%).
    - 60 of the multiple pregnancies resulted in the pregnancy being lost to miscarriage, an ectopic pregnancy, termination or the babies were stillborn
      - 5 in every 100 women who conceived an IVF multiple pregnancy had a miscarriage, an ectopic pregnancy, a termination, or a stillbirth and none of the babies were born alive (5%).
- Pregnancy outcomes are affected by whether the pregnancy is a singleton or a multiple pregnancy and by the age of the woman when she starts the IVF treatment cycle. This is illustrated in Figures 9 and 10 for women pregnant with singleton pregnancies.

### Outcomes for singleton pregnancies

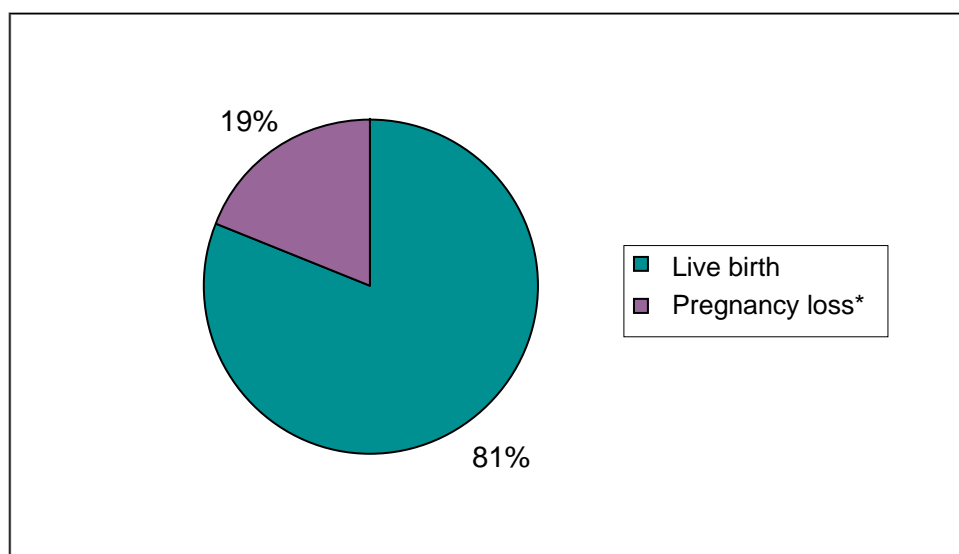
- Women pregnant with a singleton who were aged 37 years or younger at the start of the treatment cycles were more likely to have a baby than women who were aged 38 years and over:
  - 90 in every 100 women **aged 37 years or younger** with a singleton pregnancy following IVF gave birth to a baby (90%). The remaining 10 in 100 women lost the pregnancy to either miscarriage, an ectopic pregnancy, termination of pregnancy or a stillbirth (10%) whereas
  - 81 in every 100 women **aged 38 years or older** with a singleton pregnancy following IVF gave birth to a baby (81%). The remaining 19 in 100 women lost the pregnancy to either miscarriage, an ectopic pregnancy, termination of pregnancy or a stillbirth (19%).

**Figure 9: Singleton pregnancy outcomes following IVF treatment for women aged 37yrs or younger at the start of the treatment cycle [2.19a]**



\* Pregnancy lost to miscarriage, ectopic pregnancy, termination or stillbirth

**Figure 10: Singleton pregnancy outcomes following IVF treatment for women aged 38 years or older at the start of the treatment cycle [2.19b]**

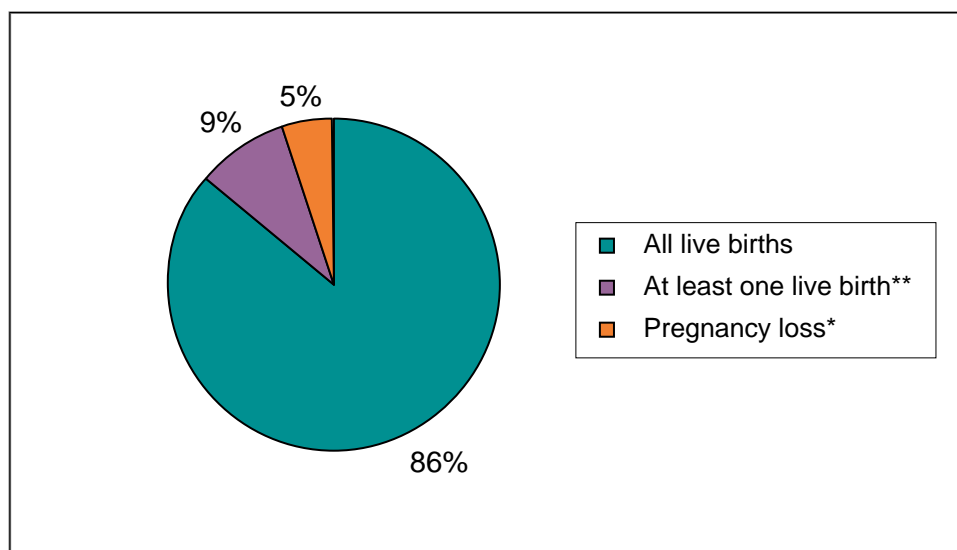


\* Pregnancy lost to miscarriage, ectopic pregnancy, termination or stillbirth

### Outcomes for multiple pregnancies

- Pregnancy outcomes are more complicated for multiple pregnancies. For twins both babies may be born, or one baby may be born and one lost to miscarriage, termination or stillbirth, or both babies may be lost. The situation is even more complicated for triplets where all the babies may be born, or two, or just one with the others being lost during pregnancy.
- As with singleton pregnancies the outcomes are affected by the age of the women when she starts the treatment cycle. This is illustrated in Figures 11 and 12.
- Women pregnant with a multiple pregnancy who were aged 37 years or younger at the start of the treatment cycles were more likely to give birth to more than one of the babies than women who were aged 38 years and over:
  - 86 in every 100 women **aged 37 years or younger** with a multiple pregnancy following IVF gave birth to all the babies (86%). Nine in every 100 women gave birth to at least one, but not all of the multiples (9%). The remaining 5 in 100 women lost the entire pregnancy to either miscarriage, an ectopic pregnancy, termination of pregnancy or a stillbirth (5%) whereas
  - 74 in every 100 women **aged 38 years or older** with a multiple pregnancy following IVF gave birth to all the babies (74%). Twenty in every 100 women gave birth to at least one, but not all of the multiples (20%). The remaining 6 in 100 women lost the entire pregnancy to either miscarriage, an ectopic pregnancy, termination of pregnancy or a stillbirth (6%).

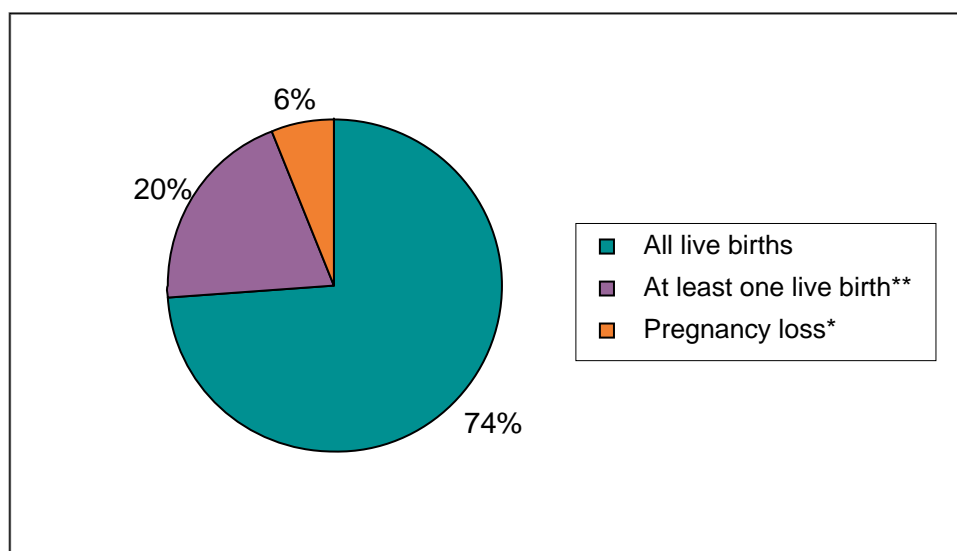
**Figure 11: Multiple pregnancy outcomes following IVF treatment for women aged 37yrs or younger at the start of the treatment cycle [2.19c]**



\*Pregnancy entirely lost to miscarriage, ectopic pregnancy, termination or stillbirth

\*\*At least one baby is born (alive) but the other co-multiples were lost to miscarriage, termination or stillbirth

**Figure 12: Multiple pregnancy outcomes following IVF treatment for women aged 38 years or older at the start of the treatment cycle [2.19d]**



\*Pregnancy entirely lost to miscarriage, ectopic pregnancy, termination or stillbirth

\*\*At least one baby is born (alive) but the other co-multiples were lost to miscarriage, termination or stillbirth

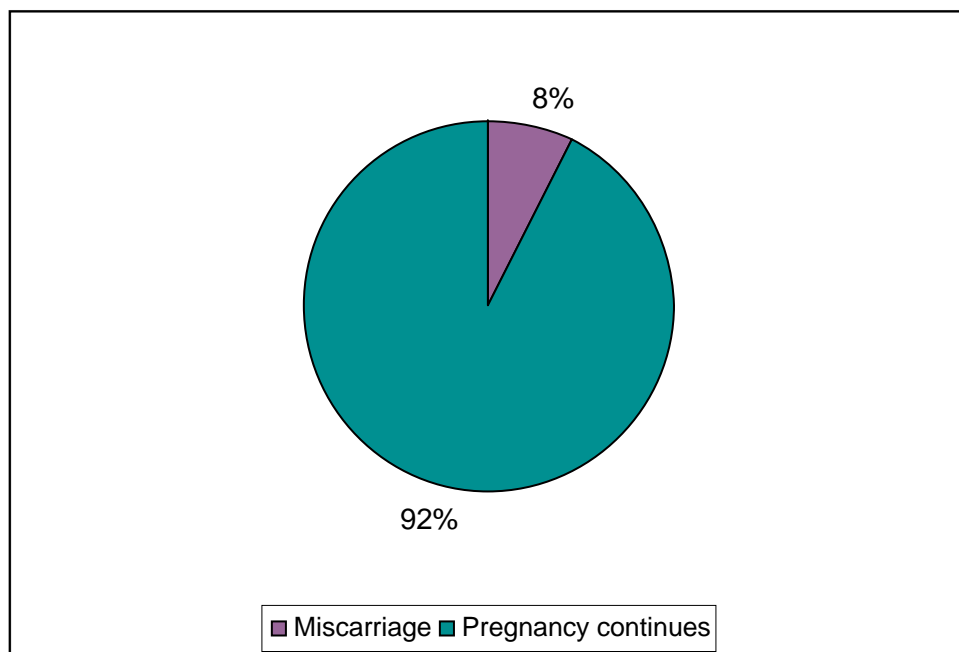
► 5b. What is the risk of miscarriage following IVF? [2.20]

- A total of 4,456 women became pregnant following IVF which started in 2006; this includes only those pregnancies confirmed by an ultrasound scan.
- A total of 417 of these women miscarried the pregnancy - 9 in every 100 women with an ultrasound confirmed pregnancies (9%) experienced a miscarriage in early pregnancy.

**Risk of miscarriage by the woman's age**

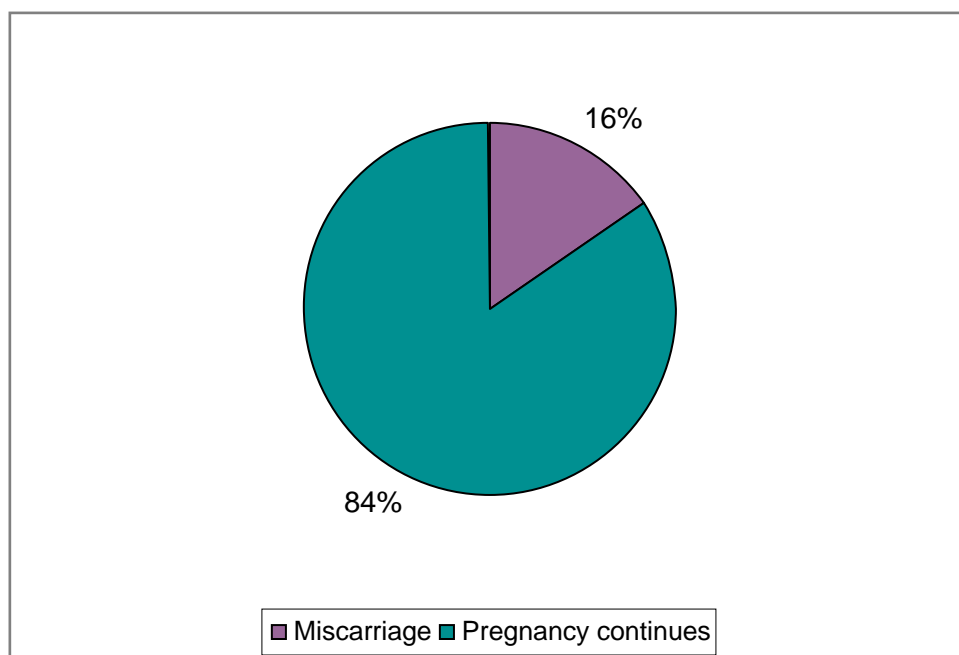
- Women who were older when they were treated were more likely to miscarry than younger women (Figures 13 and 14):
  - Eight in every 100 women who were 37 years old or younger when they started treatment (8%) miscarried the pregnancy whereas
  - Sixteen in every 100 women who were 38 years or older when treated (16%) had a miscarriage.

**Figure 13: Risk of miscarriage for pregnancies\* conceived by women aged 37 years and younger [2.20a]**



\*Ultrasound confirmed pregnancies, excludes those pregnancies with only a positive blood test and not confirmed on ultrasound

**Figure 14: Risk of miscarriage for pregnancies\* conceived by women aged 38 years and older [2.20b]**



\*Ultrasound confirmed pregnancies, excludes those pregnancies with only a positive blood test and not confirmed on ultrasound

#### Risk of miscarriage in singleton and multiple pregnancies

- A total of 4,456 women became pregnant following IVF which started in 2006; this includes only those pregnancies confirmed by an ultrasound scan.
- Of the 4,456 women:
  - 3,294 women were pregnant with a single fetus (74%).
  - 1,136 women were pregnant with twins (25%) and
  - 26 women were pregnant with triplets (1%).
- It is important to know that even though a pregnancy may be conceived as a multiple pregnancy, sometimes one of the fetuses is lost spontaneously (and this may or may not be accompanied by bleeding), resulting in the birth of only one baby from a pregnancy that started as a multiple pregnancy.
- The risk of miscarriage was different for women who were carrying a singleton pregnancy compared with a multiple pregnancy:
  - 11 in every 100 women pregnant with a singleton had a miscarriage (11%) whereas
  - 5 in every 100 women pregnant with twins experienced a miscarriage and lost the pregnancy completely (5%). However, a further 9 in every 100 (9%) of the women pregnant with twins experienced the spontaneous loss of one of the fetuses and delivered a single baby from her pregnancy which was originally conceived as a twin pregnancy.

Please note that because of the small number of triplet pregnancies the results relating to miscarriage are not presented here because of confidentiality issues.

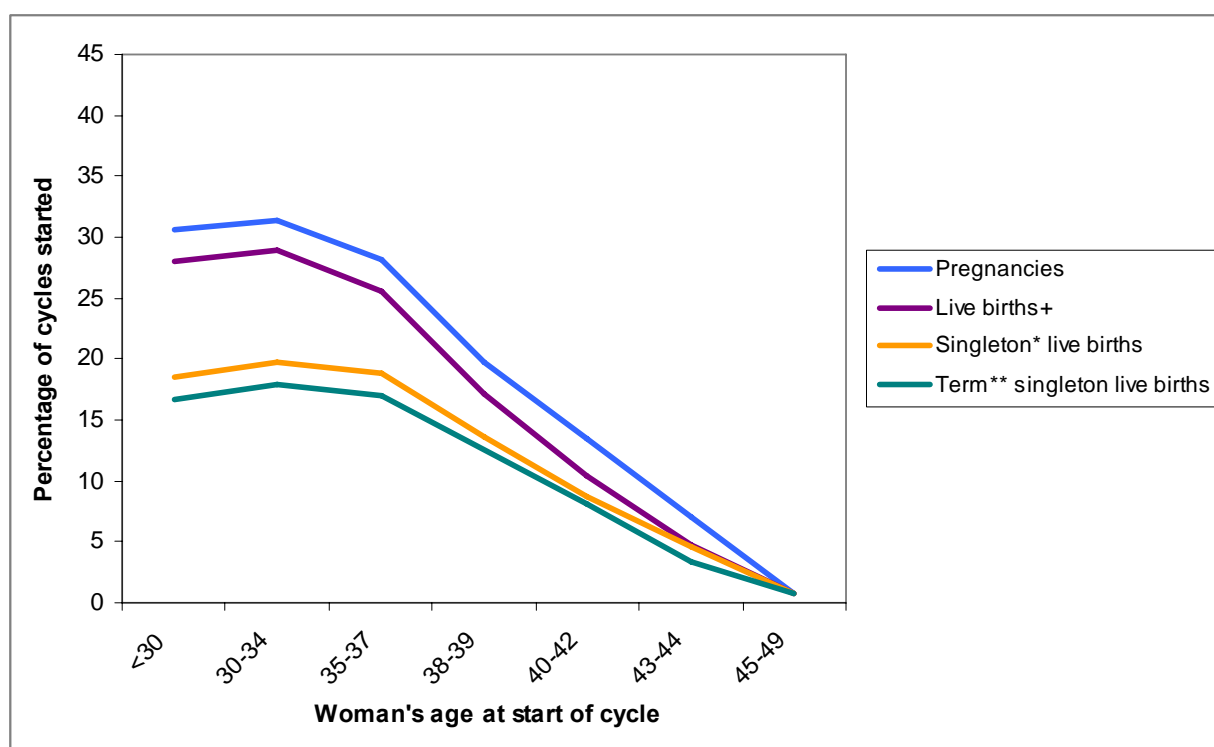


► 6. How does a woman's age affect birth outcomes following IVF?  
[2.10-2.16]

Results starting from the point a treatment cycle begins:

- The effects of the woman's age on the chances of becoming pregnant and delivering a baby are shown in Figure 15 as a proportion of the treatment cycles started in 2006.

**Figure 15: Pregnancy and birth outcomes for treatment cycles started in 2006**  
[2.10-2.16a]



+ Live births - pregnancies resulting in the delivery of one or more live births

\*Singleton live births - live births resulting from singleton pregnancies, excludes multiple pregnancies which result in just one live birth

\*\* Term – refers to a live birth born following a full-term pregnancy at 37 or more weeks gestation of pregnancy

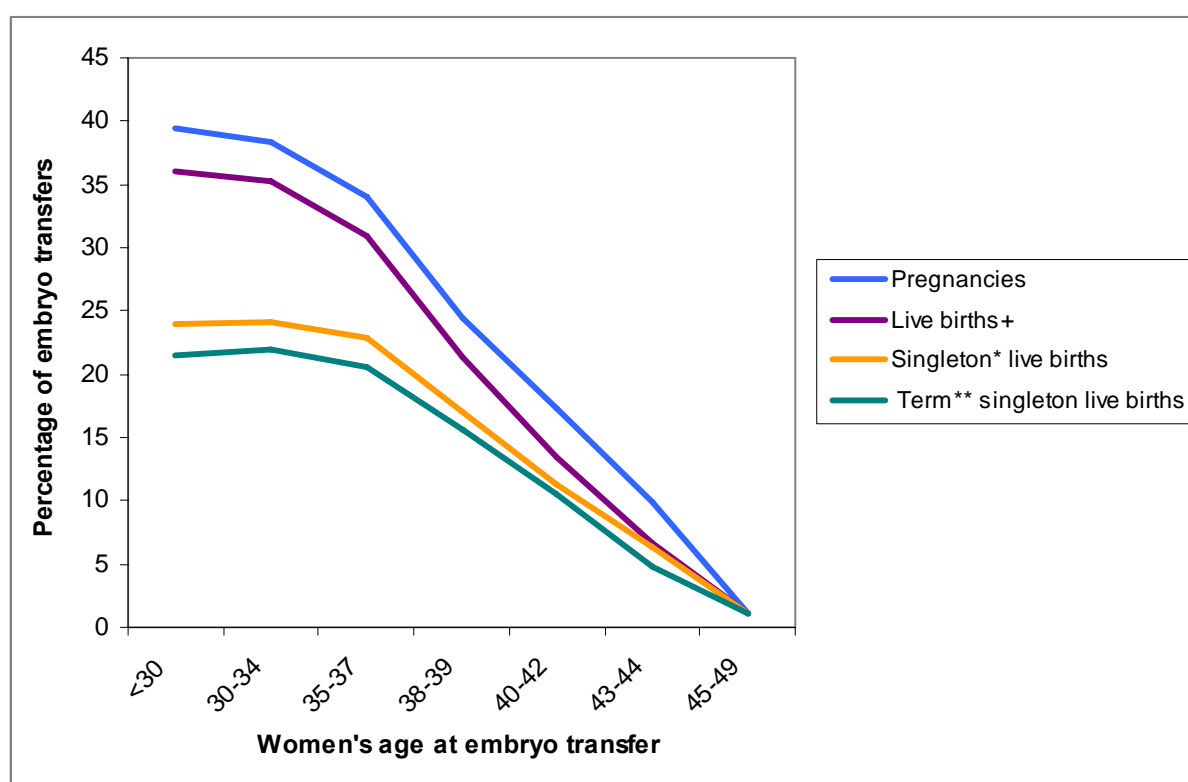
- The results for women less than 38 years of age are broadly similar and so are presented for all women under this age combined. Whereas, the results for women 38 years and older change markedly for every year increase in age. For this reason the results for these women are presented below in more detail.
- Women who were **37 years old or younger** when they started treatment had 11,705 cycles of treatment between them which resulted in:
  - 3,507 ultrasound confirmed pregnancies
    - 30 in every 100 treatment cycles started (30%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 3,207 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets)
    - 27 in every 100 treatment cycles started (27%) resulted in the birth of at least one baby.
  - 2,249 singleton pregnancies which resulted in a live birth
    - 19 in every 100 treatment cycles started (19%) led to a singleton pregnancy which resulted in the birth of a baby.
  - 2,030 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy
    - 17 in every 100 treatment cycles started (17%) resulted in a live birth born at term.
- Women who were **aged 38 to 39** when they started treatment received 2,912 cycles of treatment between them which resulted in:
  - 573 ultrasound confirmed pregnancies
    - 20 in every 100 treatment cycles started (20%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 501 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets)
    - 17 in every 100 treatment cycles started (17%) resulted in the birth of at least one baby.
  - 398 singleton pregnancies which resulted in a live birth
    - 14 in every 100 treatment cycles started (14%) led to a singleton pregnancy which resulted in the birth of a baby.
  - 367 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy
    - 13 in every 100 treatment cycles started (13%) resulted in a live birth born at term.
- Women who were **aged 40 to 42** when they started treatment received 2,503 cycles of treatment between them which resulted in:
  - 336 ultrasound confirmed pregnancies
    - 13 in every 100 treatment cycles started (13%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 260 pregnancies which resulted in the birth of one or more babies (live births of which some were singleton, twins or triplets)
    - 10 in every 100 treatment cycles started (10%) resulted in the birth of at least one baby.
  - 220 singleton pregnancies which resulted in a live birth
    - 9 in every 100 treatment cycles started (9%) led to a singleton pregnancy which resulted in the birth of a baby.

- 203 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy
  - 8 in every 100 treatment cycles started (8%) resulted in a live birth born at term.
- There were 524 treatment cycles received by women who were **aged 43 to 44** when they started treatment; these resulted in 37 pregnancies of which 25 led to the birth of one or more babies.
- There were 139 treatment cycles received by women who were **45 years or older** when they started treatment which resulted in just one pregnancy.

### Results starting from the point of embryo transfer:

- For a variety of reasons (see section 2) not all treatment cycles which are begun reach the stage of embryo transfer. The results of treatment from the point that an embryo transfer has been carried out are shown below. These figures are useful to help understand what the chances of pregnancy and of having a baby are once an embryo transfer has taken place.
- The effects of the woman's age on the chances of becoming pregnant and delivering a baby are shown from the point of embryo transfer as a proportion of the embryo transfers for treatment started in 2006 (Figure 16).

**Figure 16: Pregnancy and birth outcomes for embryo transfers as part of treatment started 2006 [2.10-2.16b]**



+ Live births - pregnancies resulting in the delivery of one or more live births

\*Singleton live births - live births resulting from singleton pregnancies, excludes multiple pregnancies which result in just one live birth

\*\* Term – refers to a live birth born following a full-term pregnancy at 37 or more weeks gestation of pregnancy

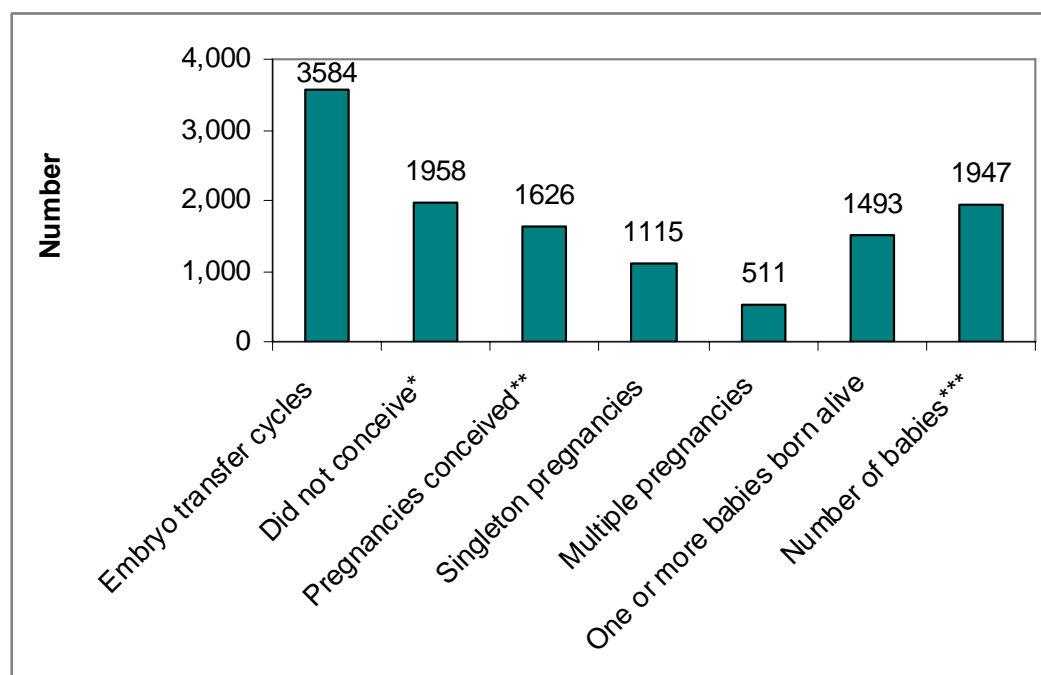
- Women who were **37 years old or younger** when they were treated had 9,537 embryo transfers between them which resulted in:
  - 3,507 ultrasound confirmed pregnancies
    - 36 in every 100 embryo transfers (36%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 3,207 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets)
    - 34 in every 100 embryo transfers (34%) resulted in the birth of at least one baby.
  - 2,249 singleton pregnancies which resulted in a live birth
    - 24 in every 100 (24%) embryo transfers led to a singleton pregnancy which resulted in the birth of a baby.
  - 2,030 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy
    - 21 in every 100 embryo transfers (21%) resulted in a live birth born at term.
  
- Women who were **aged 38 to 39** when they started treatment had 2,346 embryo transfers between them which resulted in:
  - 573 ultrasound confirmed pregnancies
    - 24 in every 100 embryo transfers (24%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 501 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets)
    - 21 in every 100 embryo transfers (21%) resulted in the birth of at least one baby.
  - 398 singleton pregnancies which resulted in a live birth
    - 17 in every 100 embryo transfers (17%) led to a singleton pregnancy which resulted in the birth of a baby.
  - 367 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy
    - 16 in every 100 embryo transfers (16%) resulted in a live birth born at term.
  
- Women who were **aged 40 to 42** when they started treatment had 1,937 embryo transfers between them which resulted in:
  - 336 ultrasound confirmed pregnancies
    - 17 in every 100 embryo transfers (17%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 260 pregnancies which resulted in the birth of one or more babies (live births of which some were singleton, twins or triplets)
    - 13 in every 100 embryo transfers (13%) resulted in the birth of at least one baby.
  - 220 singleton pregnancies which resulted in a live birth
    - 11 in every 100 embryo transfers (11%) led to a singleton pregnancy which resulted in the birth of a baby.
  - 203 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy
    - 11 in every 100 embryo transfers (11%) resulted in a live birth born at term.

- There were 376 embryo transfers carried out for women who were aged **43 to 44** when they started treatment; these resulted in 37 ultrasound confirmed pregnancies of which 25 led to the birth of one or more babies.
- There were 139 treatment cycles received by women who were **45 years or older** when they started treatment this led to 88 embryo transfers which resulted in just one pregnancy.

## ► 7. Good prognosis patient outcomes [2.37-2.39]

- Women aged 37 years and younger who have several good quality embryos available for transfer have the greatest chance of conception.
- The data held on the HFEA register does not include information about embryo quality. As an alternative, results are given here for women aged 37 years and younger who still have embryos available once a transfer has taken place. This section gives the treatment results specifically for that group of women (Figure 17).

**Figure 17: Treatment outcomes for women age 37 years or younger who had extra embryos available, for treatment started in 2006 [2.37a]**



\*Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

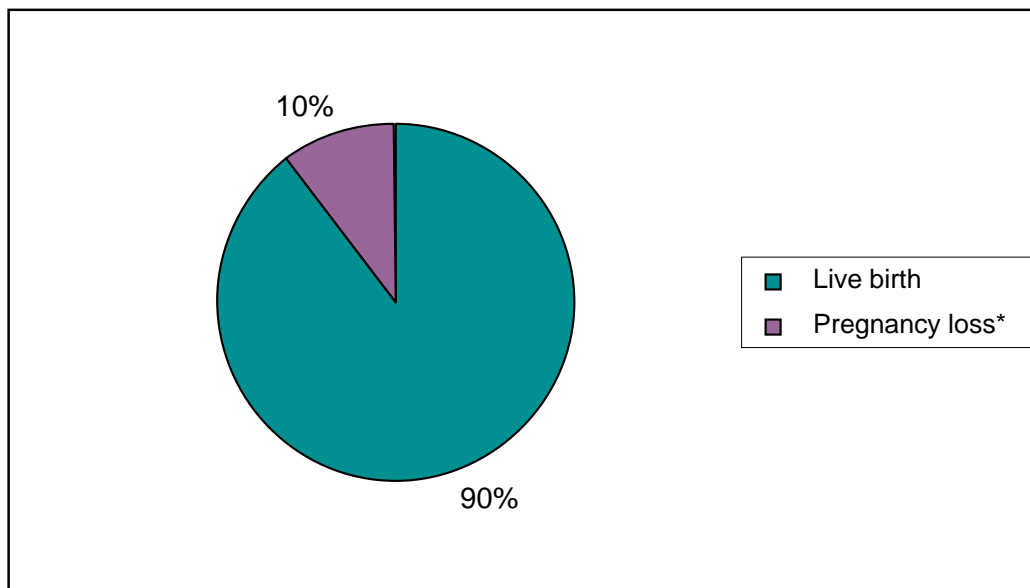
\*\* Ultrasound confirmed pregnancies

\*\*\*Total number of babies born alive – includes multiple births

- In 2006 there were 3,959 cycles of IVF that resulted in a successful egg collection and the creation of more embryos than required for immediate embryo transfer in women 37 years or younger.
- These cycles led to a total of 3,584 embryo transfer procedures from which:
  - 1,958 of the women did not conceive - following 55 in 100 embryo transfer procedures conception did not result (55%).
  - 1,626 ultrasound confirmed pregnancies were conceived - in 45 in 100 embryo transfer procedures conception resulted (45%).
  - 1,493 pregnancies resulted in the birth of at least one baby:
    - 41 in every 100 embryo transfer resulted in at least one birth, some of which were multiple births (41%)

- a total of 1,947 babies were born (alive).
- Of the 1,626 pregnancies conceived:
  - 1,115 were single pregnancies - 69 in 100 pregnancies were singletons (69%).
  - 511 were multiple pregnancies - 31 in 100 pregnancies were multiple pregnancies (31%).
- Of the 1,115 women pregnant with a singleton pregnancy 1,000 gave birth to a baby (Figure 18):
  - 90 in every 100 women gave birth to a baby (90%).
  - 10 in every 100 women lost the pregnancy to either miscarriage, an ectopic pregnancy, termination of pregnancy or the baby was stillborn (10%).

**Figure 18: Singleton pregnancy outcomes following IVF for women age 37 years or younger who had extra embryos available, for treatment started in 2006 [2.37b]**

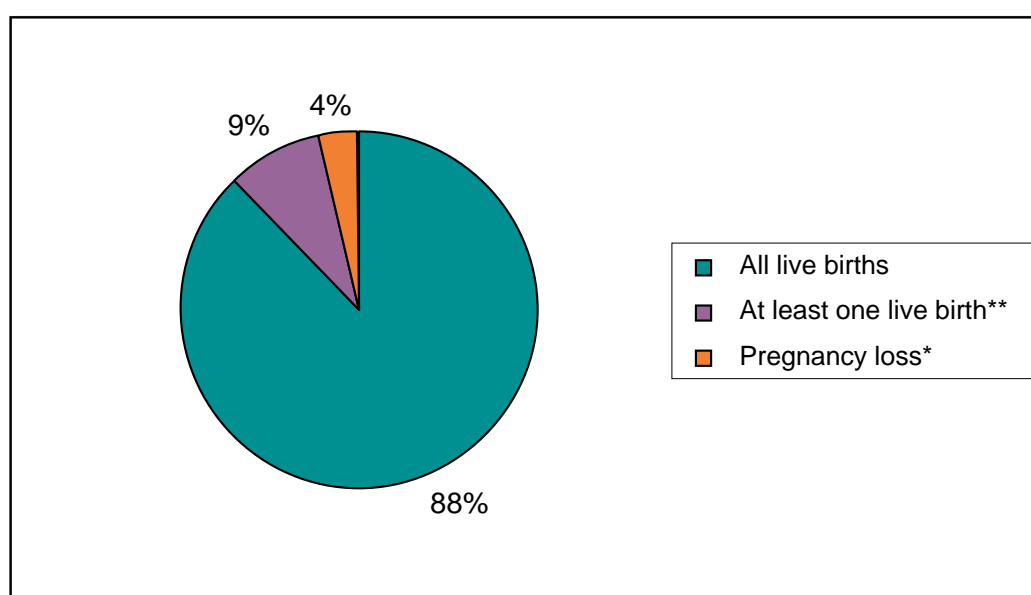


\*Pregnancy lost to miscarriage, ectopic pregnancy, termination or stillbirth



- Of the 511 women pregnant with a multiple pregnancy, 448 give birth to all the babies, 45 gave birth to at least one, but not all of the multiples, and 18 women lost the pregnancy (Figure 19):
  - 88 in every 100 women pregnant with a multiple pregnancy gave birth to all the babies (88%).
  - nine in every 100 women pregnant with a multiple pregnancy gave birth to at least one, but not all of the multiples (9%) with at least one baby lost to miscarriage, ectopic pregnancy, termination or stillbirth.
  - four in every 100 women pregnant with a multiple pregnancy lost the entire pregnancy to miscarriage, ectopic pregnancy, termination or stillbirth.

**Figure 19: Singleton pregnancy outcomes following IVF for women age 37 years or younger who had extra embryos available, for treatment started in 2006 [2.37b]**



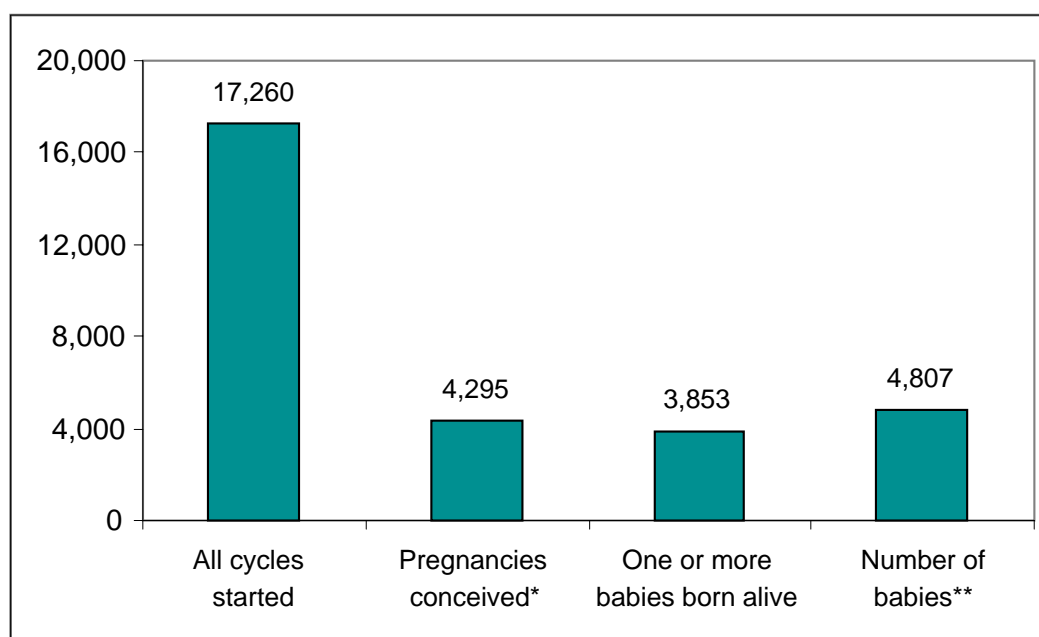
\*Pregnancy entirely lost to miscarriage, ectopic pregnancy, termination or stillbirth

\*\*At least one baby born (alive) but the other co-multiples, are lost to miscarriage, termination of pregnancy or stillbirth

► **8. Are the outcomes of treatment affected by whether the sperm used comes from the woman's partner or a donor? [2.43]**

- 17,794 IVF treatment cycles were started in 2006 of these:
  - in 17,260 the intention was to use the woman's partner's sperm - 97 in every 100 cycles started involved partner sperm (97%).
  - in 534 donor sperm was used - only three in every 100 cycles started involved donor sperm (3%).
- Of the 17,260 cycles involving partner sperm 4,295 women became pregnant (Figure 20):
  - 25 in every 100 cycles started led to a pregnancy being conceived (25%).
  - 3,853 of these pregnancies resulted in the birth of at least one baby (live birth) - 22 in every 100 cycles started led to the birth of at least one baby (22%)
  - and
  - a total of 4,807 babies were born.

**Figure 20: Outcome of IVF<sup>+</sup> treatment cycles using partner sperm, cycles started in 2006 [2.43a]**



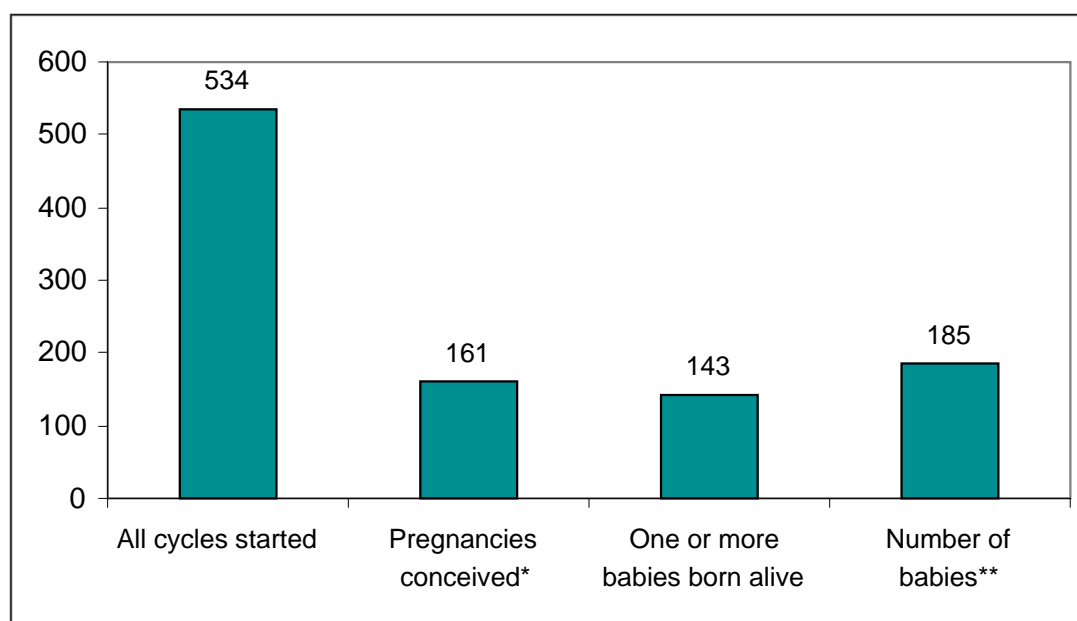
+ Fresh IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Ultrasound confirmed pregnancies

\*\* Total number of babies born alive – includes multiple births

- Of the 534 cycles involving donor sperm 161 women became pregnant (Figure 21);
  - 30 in every 100 cycles started led to a pregnancy being conceived (30%).
  - 143 of these pregnancies resulted in the birth of at least one baby (live birth) - 27 in every 100 cycles started led to the birth of at least one baby (27%) and
  - a total of 185 babies were born.

**Figure 21: Outcome of IVF<sup>+</sup> treatment cycles using donor sperm, cycles started in 2006 [2.43b]**



+ Fresh IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

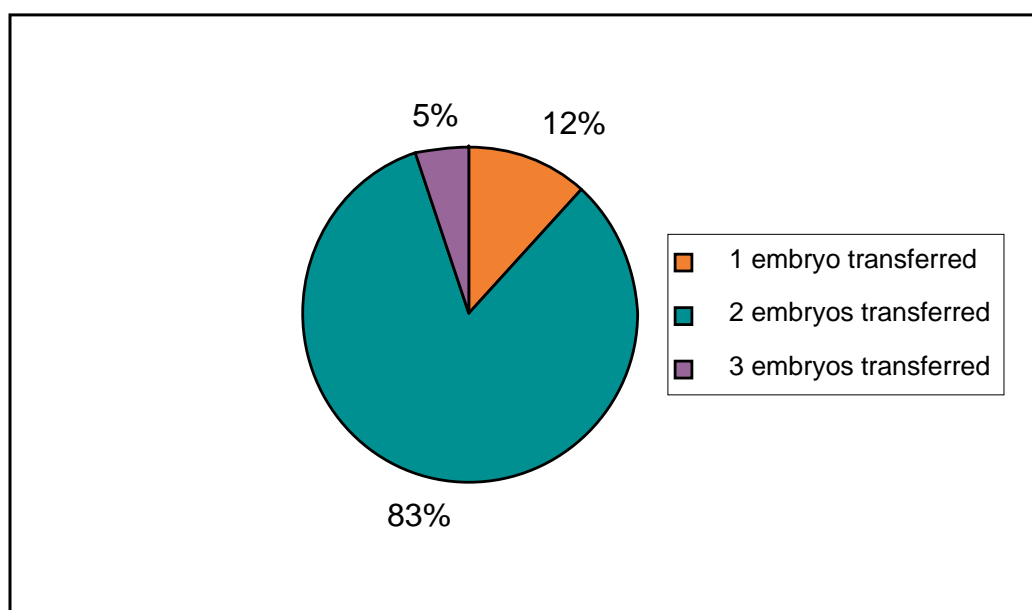
\*Ultrasound confirmed pregnancies

\*\* Total number of babies born alive – includes multiple births

► 9. What is the effect of the number of embryos transferred on the number of babies born? [2.24]

- 14,289 cycles of IVF which started in 2006 reached the embryo transfer stage, of these (Figure 22):
  - 12% involved the transfer of a single embryo (SET).
  - 83% involved the transfer of two embryos (DET) – a double embryo transfer.
  - 5% involved the transfer of three embryos (these were in women aged 40 years and over).

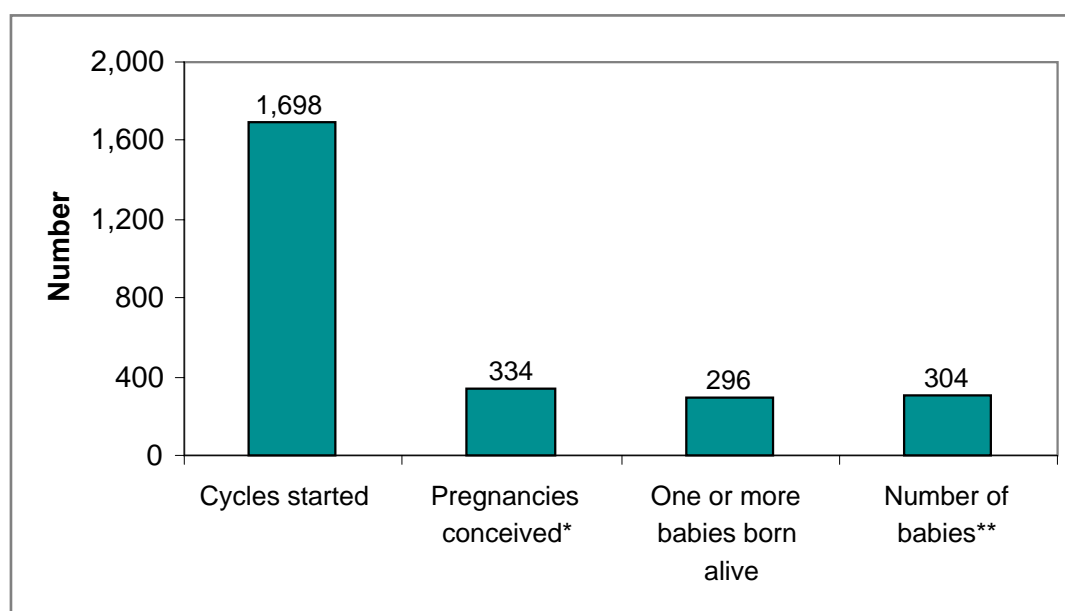
Figure 22: Number of embryos transferred in each cycle of treatment [2.24]



- The 1,698 single embryos transfers (SET) led to 334 pregnancies and 296 women gave birth to at least one baby (live birth) and in total 304 babies were born (live births) (Figure 23):
  - 80 in every 100 single embryo transfer procedure did not lead to an ultrasound confirmed pregnancy (80%)  
whereas
  - 20 in every 100 single embryo transfers led to a pregnancy (20%).
  - 17 in every 100 women who had a single embryo transfer gave birth to at least one baby (17%).
  - a small number of these women gave birth to twins which would have resulted from the spontaneous splitting of the single embryo transferred resulting in identical twins.
- Single embryo transfer can be 'elective', where women choose to transfer just one embryo in order to minimise the risk of a multiple pregnancy, even if there is more than one embryo available. Single embryo transfer can also be 'non-elective', where women only have one embryo available to transfer.
- From the information collected on the HFEA register during 2006 it is not possible to separate elective single embryo transfer from single embryo transfer where only one embryo was available; although this will be possible in the future.

- Important: It is likely that the majority of women who had single embryo transfer in 2006 only had one embryo available for transfer. This will place these women in a poorer prognosis group, with a lower chance of conception than women who are younger and/or have more embryos available for transfer.
- The data from 2006 does not reflect current practice. Since January 2009, clinics are required by the HFEA to have a strategy setting out how they will minimise the risk of multiple births. Clinics are increasingly encouraging women with the greatest chance of conception (for example, women aged 37 years and younger who have several good quality embryos available for transfer) to have elective single embryo transfer to try and minimise the risk of multiple births.

**Figure 23: Outcome of IVF treatment cycles<sup>+</sup> involving single embryo transfer (SET) started in 2006 [2.24b]**



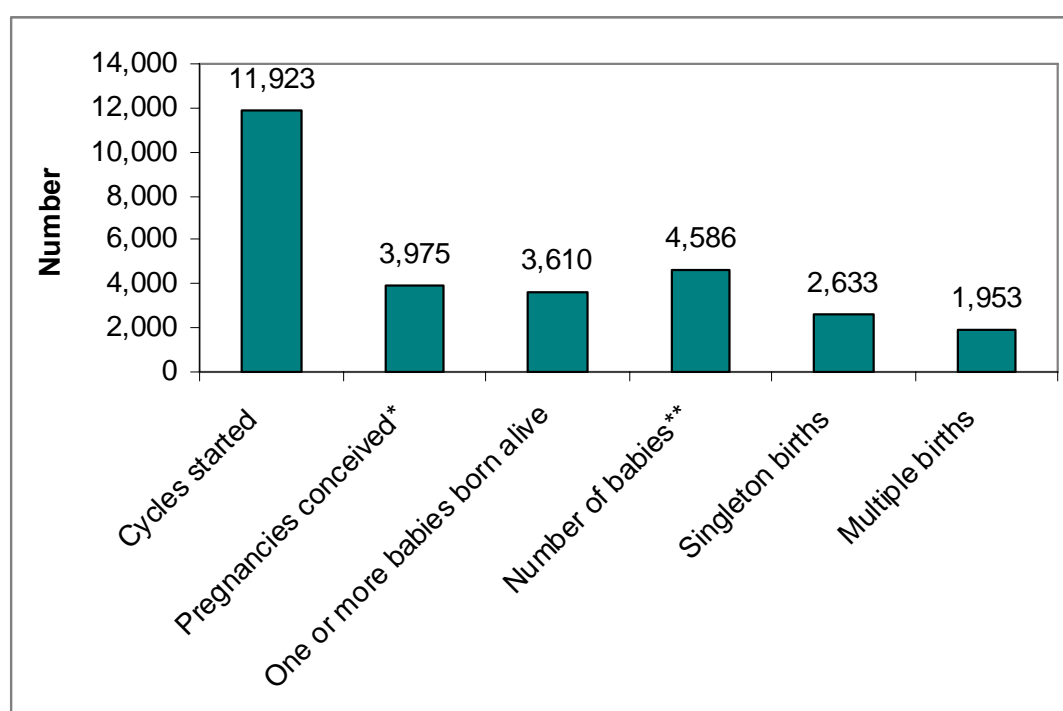
+ Fresh IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Ultrasound confirmed pregnancies

\*\* The total number of babies born alive – which include a small number of multiples

- 11,923 double embryo transfers (DET) led to 3,975 pregnancies and 3,610 women gave birth to at least one baby. In total 4,586 babies were born (live births) and 1,953 of them were multiple births (Figure 24):
  - 33 in every 100 double embryo transfers led to a pregnancy (33%).
  - 30 in every 100 women who had a double embryo transfer gave birth to at least one baby (30%).
  - 30 in every 100 of the pregnancies following double embryo transfer were multiple pregnancies (30%).
  - 43 in every 100 of the babies born following double embryo transfer were born as one of a multiple birth (43%).

**Figure 24: Outcome of IVF treatment cycles\* involving double embryo transfer (DET) started in 2006 [2.24c]**



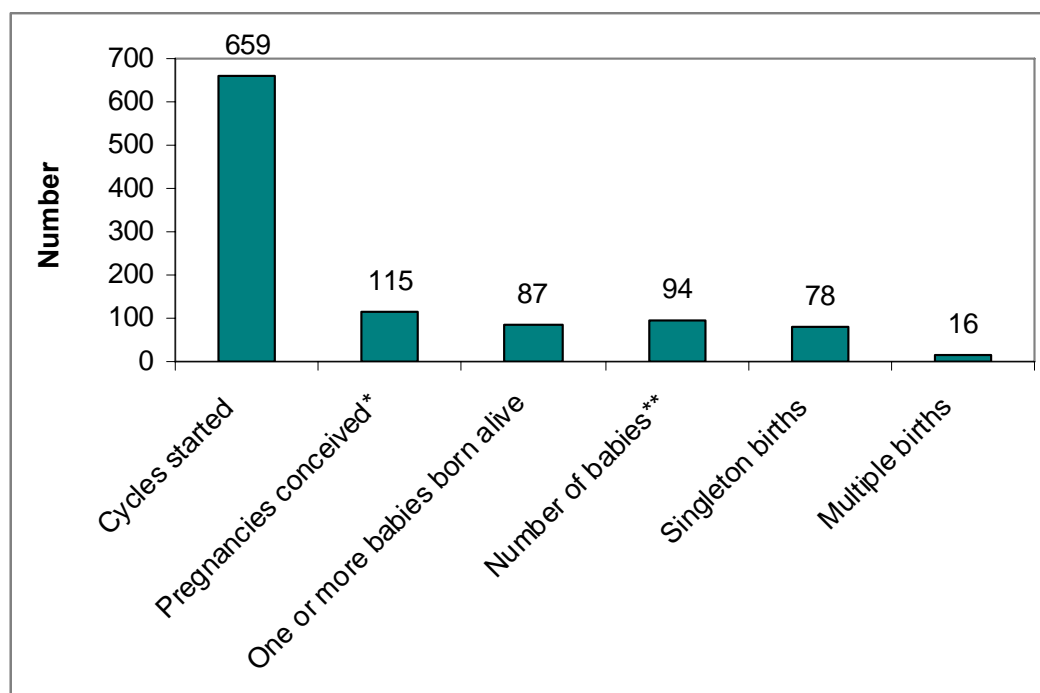
+ Fresh IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Ultrasound confirmed pregnancies

\*\* The total number of babies born alive

- 659 three embryo transfers (3ET) led to 115 pregnancies and 87 women gave birth to at least one baby. In total 94 babies were born (live births) and 16 of them were multiple births (Figure 24):
  - 17 in every 100 three embryo transfers led to a pregnancy (17%).
  - 13 in every 100 women who had a three embryo transfer gave birth to at least one baby (13%).
  - 15 in every 100 of the pregnancies following three embryo transfers were multiple pregnancies (15%).
  - 17 in every 100 of the babies born following three embryo transfer were born as one of a multiple birth (17%).

**Figure 25: Outcome of IVF treatment cycles<sup>+</sup> involving three embryo transfers started in 2006 [2.24d]**



+ Fresh IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

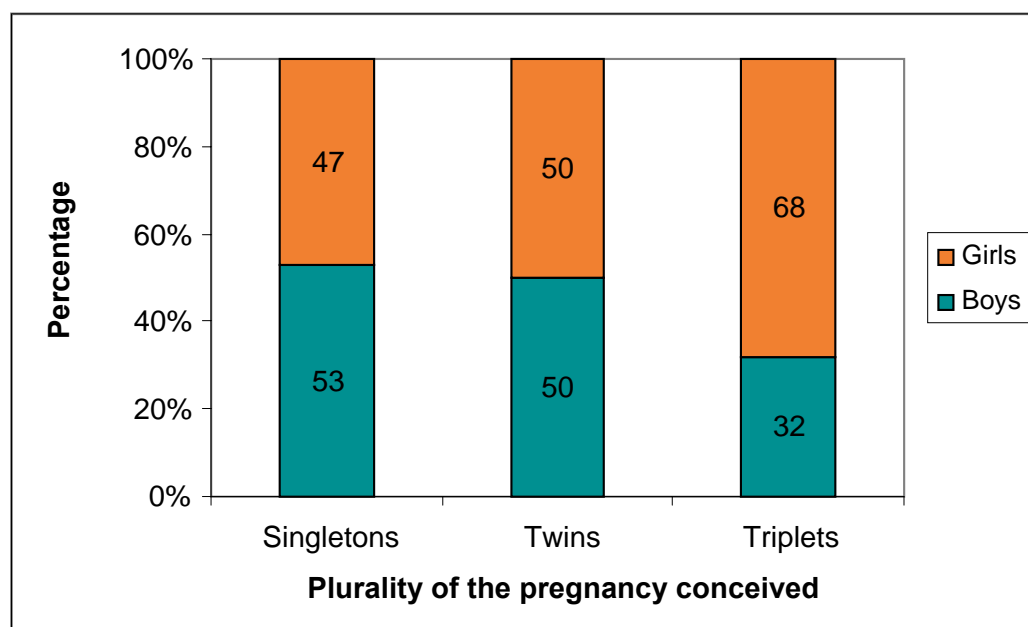
\*Ultrasound confirmed pregnancies

\*\* The total number of babies born alive

► 10. How many boys and girls are born following IVF? [2.51]

- Following IVF which started in 2006 4,992 babies were born alive and of these just over half (51%) were boys and just less than half (49%) were girls.
- Just over half of the babies were born to women carrying a singleton pregnancy and of these 1,531 (53%) were boys and 1,362 (47%) were girls (Figure 26).
- For the babies born from a twin pregnancy, the split between boys and girls was even at 50% in each group with 1,009 boys and 1,025 girls.
- For the babies born from a triplet pregnancy, girls predominated with 43 girls outnumbering the 20 boys (68% versus 32%).

Figure 26: Sex of the babies\* born following IVF<sup>+</sup> started in 2006 [2.51]



+ Fresh IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Includes only babies born alive



► 11a. How did babies born following IVF in 2006 fare? [2.26-2.29]

- The majority of babies born as a result of IVF are born following a full-term pregnancy (37 weeks gestation or greater) and with a normal birthweight (greater than 2.5Kg or 5½lbs):
  - 79 in every 100 women giving birth following an IVF in 2006 delivered after a full term pregnancy (79%) and
  - 71 in every 100 babies were born with a normal birthweight (71%).
- Babies who are born preterm (before the pregnancy has reached full-term which is 37 or greater weeks gestation) and babies who are born with a low birthweight (less than 2.5kg or about 5½lbs) have an increased chance of developing problems during the first few days and weeks after birth. These problems include difficulties with breathing and feeding, having an abnormal level of consciousness and an increased risk of infection. Because multiples are more likely to be born preterm and with a low birthweight they have an increased chance of experiencing these types of problems compared with singletons. Preterm and low birthweight babies also tend to have a small, but increased chance of developing problems in the long-term such as cerebral palsy.
- Importantly, there is a large but not complete overlap between preterm birth and low birthweight; some babies who are born at term are low birthweight and some babies born preterm have a normal birthweight.
- Using information collected on the HFEA register it is possible to look at the chances of prematurity and low birthweight for babies born following IVF and to compare these to national figures collected by the Office for National Statistics on all babies born in England and Wales; the results are similar for Scotland and Northern Ireland.
- As the results shown below indicate, IVF multiples tend to have slightly better outcomes in terms of prematurity, low birthweight, stillbirth and neonatal death, compared with the national figures overall. This is thought to be mainly due to the fact that very few IVF multiples are identical. Identical twins who share a single placenta and amniotic sac tend to have poorer outcomes than non-identical twins who have their own placenta and amniotic sac. Most IVF twins result from the transfer of two embryos with less than 5% due to a single embryo dividing into two. Whereas about a third of spontaneously conceived twins in the UK are identical and result from the division of a single embryo.

► 11b. Chances of being born preterm (<37 weeks gestation): [2.26-2.27]

**The outcome of pregnancies:**

- Of the 2,894 singleton pregnancies resulting in a live birth 2,621 were delivered following a full-term pregnancy and 267 were delivered preterm (gestational age was missing for six pregnancies):
  - 91 in 100 women delivered at the end of a full-term pregnancy (91%)  
and
  - nine in 100 delivered preterm (9%).
- Of the 1,102 multiple pregnancies resulting in at least one live birth 549 delivered following a full-term pregnancy and 533 delivered preterm:
  - 50 in 100 of the women delivered at the end of a full-term pregnancy (50%)  
and
  - 50 in 100 delivered preterm (50%).

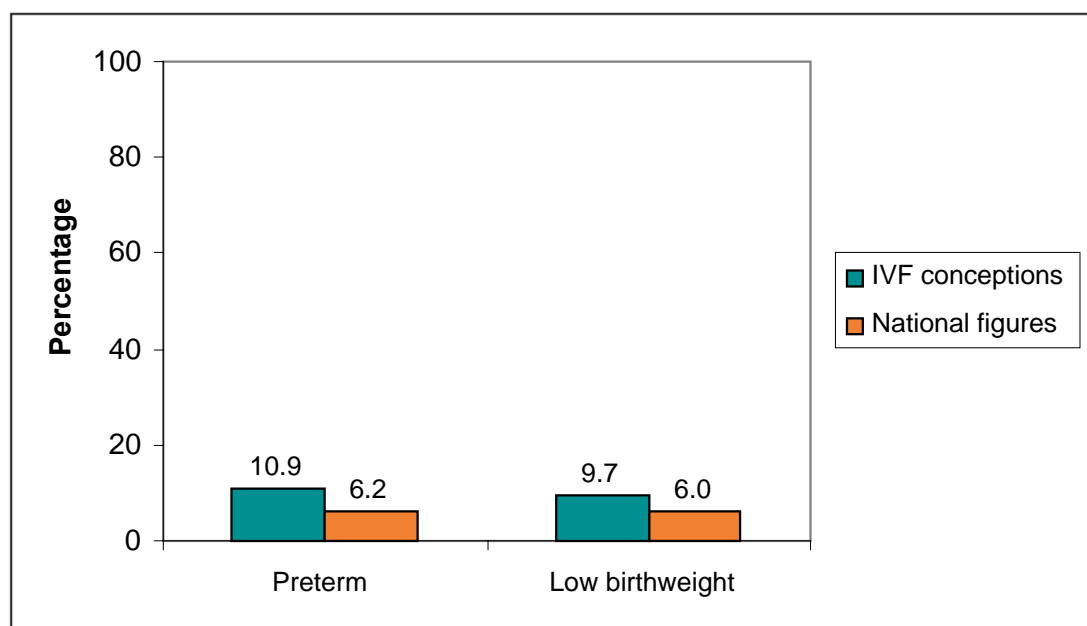
**The outcome of births:**

- To compare the preterm birth rate with national figures for England and Wales, those babies born as singletons from multiple pregnancies are included as singleton births.
- 10.9% of singleton live births following IVF in 2006 were born preterm compared with 6.2% of all live singleton births in England and Wales (Moser et al, 2007)<sup>1</sup> (Figure 27).
- 51% of multiple live births following IVF in 2006 were born preterm compared with 53% of all live multiple births in England and Wales (Moser et al, 2007)<sup>2</sup> (Figure 28).

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<sup>1</sup> Moser K, Macfarlane A, Huang Chow Y, Hilder L, Dattani N. Introducing new data on gestation-specific infant mortality among babies born in 2005 in England and Wales. Health Statistics Quarterly 2007; 35: 13-27.

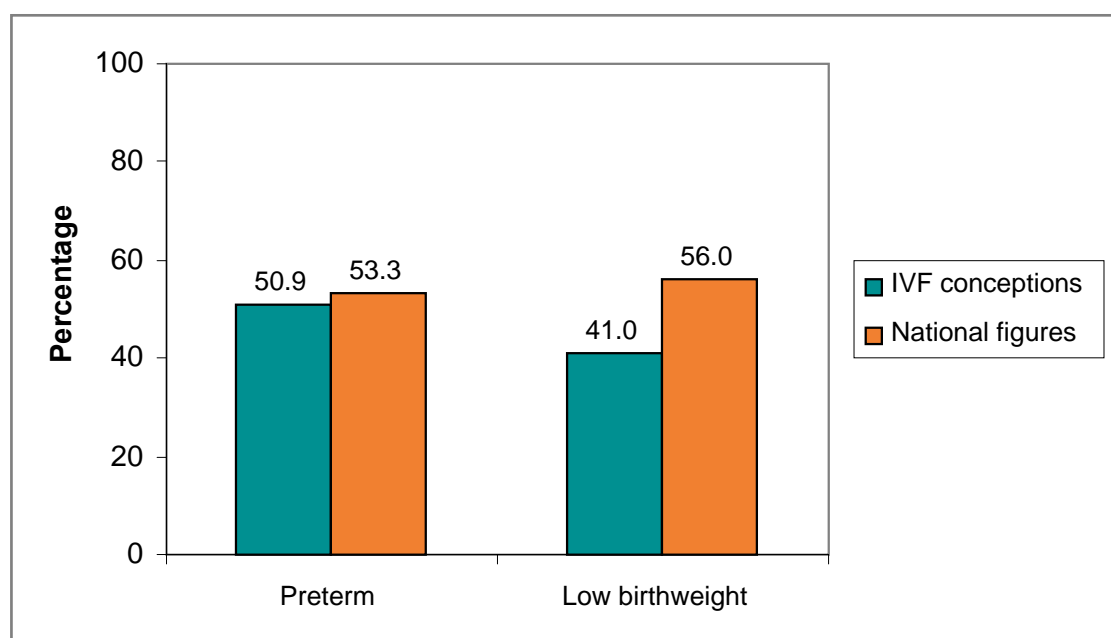
**Figure 27: Preterm and low birthweight rate for singleton births comparing IVF<sup>+</sup> conceptions and England & Wales rates [2.28a]**



+ Fresh IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Low birthweight <2.5kg or <5½lbs; preterm <37 weeks gestation

**Figure 28: Preterm and low birthweight rate for multiple births comparing IVF<sup>+</sup> conceptions and England & Wales rates [2.28b]**



+ Fresh IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Low birthweight <2.5kg or <5½lbs; preterm <37 weeks gestation

► 11c. Chances of being born low birthweight (<2.5kg or 5½lbs): [2.28 & 2.29]

**The outcome of pregnancies:**

- Of the 2,894 singleton pregnancies resulting in a live birth, 2630 delivered a normal birthweight baby and 264 resulted in a low birthweight baby:
  - 91 in 100 of the women delivered a baby with a normal birthweight (91%) and
  - nine in 100 of them delivered a low birthweight baby (9%).
- Calculating the figures for a low birthweight multiple is more complicated than calculating the figures for a preterm birth. This is because, in general, all the babies in a multiple birth will be born at the same gestation of pregnancy whereas it's possible in a set of twins for one baby to have a normal birthweight and one to have a low birthweight.
- Of the 1,102 multiple pregnancies resulting in the birth of at least one live birth, 726 resulted in the delivery of at least one low birthweight baby and 365 resulted in babies all of whom had a normal birthweight (the birthweight of 11 babies was missing):
  - 67 in 100 of resulted in the birth of at least one low birthweight baby (67% and
  - 33 in 100 delivered babies, all of whom had a normal birthweight (33%).

**The outcome of births:**

- To compare the low birthweight (<2.5kg or 5½lbs) rate with national figures for England and Wales, those babies born as singletons from multiple pregnancies are included as singleton births.
- 9.7% of singleton live births born following IVF in 2006 were born with a low birthweight compared with 6.0% of all live singleton births in England and Wales<sup>2</sup> (Figure 27).
- 41% of multiple live births born following IVF in 2006 were born with a low birthweight compared with 56% of all live multiple births in England and Wales<sup>3</sup> (Figure 28).

<sup>2</sup> Office for National Statistics. Mortality statistics. Childhood, infant and perinatal. Review of the National Statistician on deaths in England and Wales, 2007. Series DH3 No. 40. Surrey: Office for National Statistics, 2009. ISSN 1469-2783. (Table 26)

► 11d. How many IVF babies were stillborn and how many died in the first month after birth? [2.30-2.31]

### Stillbirths

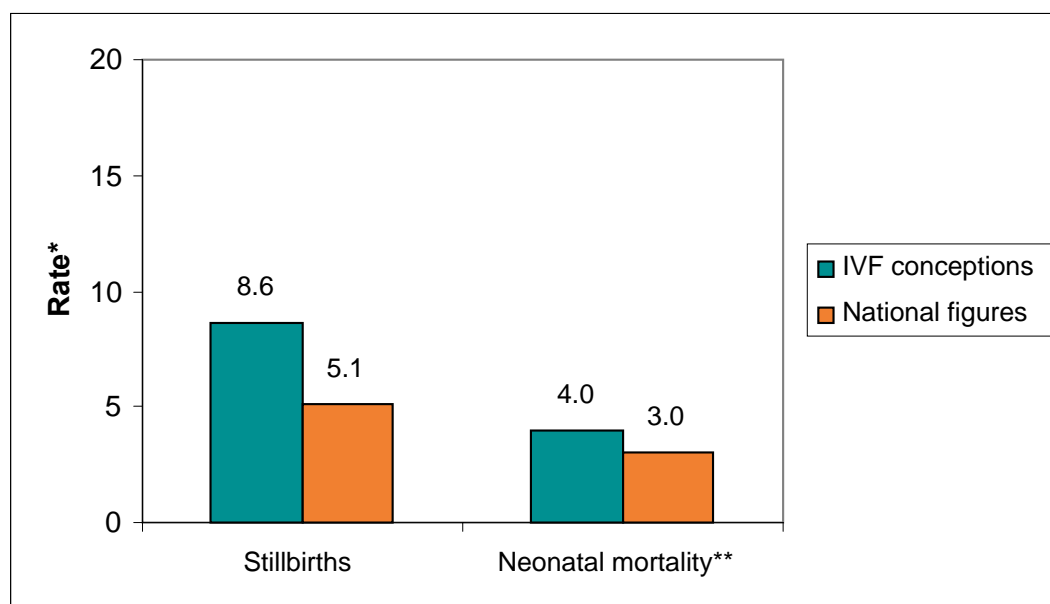
- As with any pregnancy, a small proportion of IVF pregnancies end with the delivery of a baby who is stillborn.
- The stillbirth rate is calculated as the number of babies born after 23 weeks gestation of pregnancy who did not show any signs of life after birth expressed per 1,000 total births (stillbirths + live births).
- The stillbirth rate for singletons born following IVF was 8.6 per 1,000 total births compared with the England and Wales figure of 5.1 per 1,000 total births<sup>3</sup> (Figure 29).
- The stillbirth rate for multiples born following IVF was 10.2 per 1,000 total births compared with the England and Wales figure of 11.8 per 1,000 total births (Figure 30).

### Neonatal deaths

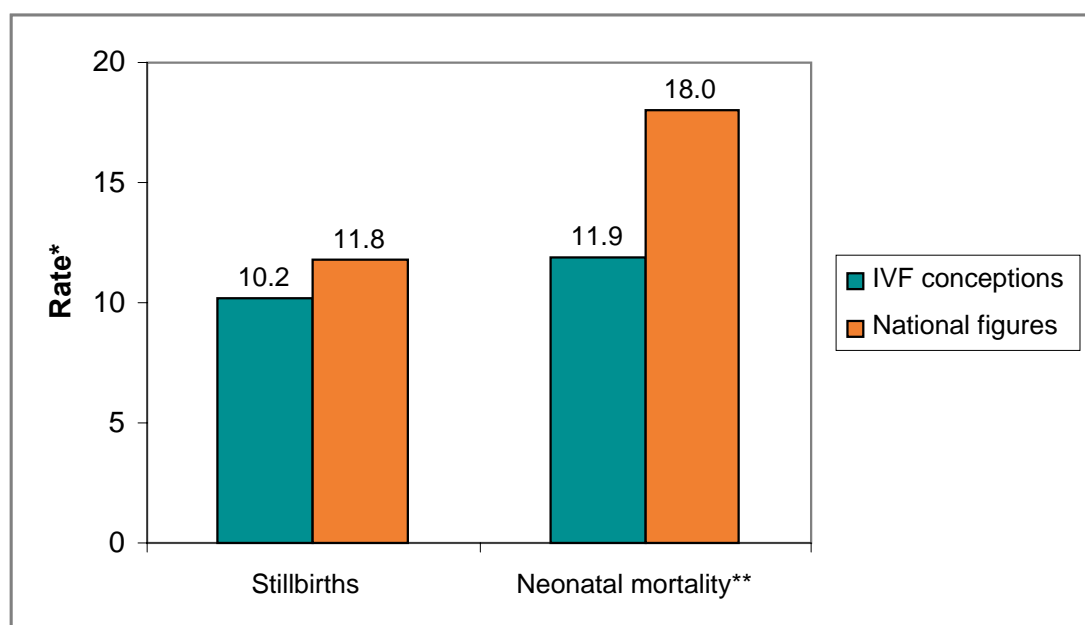
- Again as with any babies born a small proportion of babies born following IVF die during the first month after birth and these are called neonatal deaths.
- The neonatal death rate is calculated as the number of babies who die in the first four weeks after birth expressed per 1,000 live births.
- The neonatal death rate for singletons born following IVF was 4.0 per 1,000 live births compared with the England and Wales figure of 3.0 per 1,000 live births<sup>1</sup> (Figure 29).
- The neonatal death rate for multiples born following IVF was 11.9 per 1,000 live births compared with the England and Wales figure of 18.0 per 1,000 live births<sup>1</sup> (Figure 30).

<sup>3</sup> Office for National Statistics. Mortality statistics. Childhood, infant and perinatal. Review of the National Statistician on deaths in England and Wales, 2007. Series DH3 No. 40. Surrey: Office for National Statistics, 2009. ISSN 1469-2783. (Table 25)

**Figure 29: Stillbirth and neonatal death rates for singleton births comparing IVF<sup>+</sup> conceptions and England & Wales rates [2.30a]**



**Figure 30: Stillbirth and neonatal death rate for multiple births comparing IVF<sup>+</sup> conceptions and England & Wales rates [2.30b]**



+ Fresh IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Rate – per 1,000 total births for stillbirths and per 1,000 live births for the neonatal deaths

\*\*Neonatal mortality refers to deaths in the first four weeks after birth

## Appendix A

### ► How we gathered the data

- Clinics are required by law to provide information to the HFEA Register about all licensed fertility treatments they carry out. The Register started operating in August 1991 and is a rich source of information about fertility treatment, its outcomes and the factors that contribute to the birth of a baby following treatment.

### ► Understanding the results presented

- This analysis is of just IVF treatment cycles involving fresh embryo transfers using embryos created from women's own eggs in treatment cycles started at some stage during 2006. While the outcomes of some treatment started in 2006 may not be known until 2007 these treatment outcomes are nevertheless included in this analysis.
- Clinics are not always told by every patient the outcome of each treatment cycle, especially if the woman has travelled to the UK for treatment from abroad. A small number of pregnancy outcomes are therefore not included in the Register. However, since most of the pregnancy outcomes are known, it is likely that any underestimate in the outcome rates is very small.
- The information that the HFEA publishes is a snapshot of data provided to us by licensed clinics at a particular time. This information may be subject to change as individual centres notify us of amendments. Before publication, we perform a preliminary checking process on the data, and ask the clinic to confirm the accuracy, for which they remain responsible.

## IVF results – involving frozen embryo transfers for women using their own eggs for treatment cycles started in 2006

### ► Introduction

- The information we collect about fertility treatment can be analysed in many ways. In this report we present key information about those patients having IVF involving frozen embryo transfer:
  - where the embryos were created using the woman's own eggs
  - where women were having treatment with the intention of conceiving immediately rather than storing or donating eggs and embryos; surrogacy treatment is excluded
  - and the treatment cycle started in 2006 resulting in births in either 2006 or 2007.
- This report does not include information about cycles of ICSI, fresh embryo transfer IVF or the small number of cycles that involved transferring fresh and frozen embryos in the same cycle.
- Similar reports are available for fresh embryo transfer in IVF and ICSI, ICSI involving frozen embryo transfer, and treatment involving donor eggs.
- At some points in the report the small numbers involved mean that some of the information cannot be presented for confidentiality reasons.
- Information about how the data for this report were gathered is given in the appendix together with a glossary of terms.

### ► Summary

- In 2006 2,426 women started 4,173 cycles of IVF where the intention was to carry out a frozen embryo transfer using embryos created from the woman's own eggs and treatment was undertaken with the purpose of conceiving immediately.
- Of the 4,173 cycles of frozen embryo IVF started 3,871 cycles resulted in an embryo transfer (93%).
- The majority (78%) of embryo transfers involved the transfer of two embryos; 19% of cycles involved a single embryo transfer; and 3% were three embryo transfers.
- A total of 846 cycles resulted in an ultrasound confirmed pregnancy which represents 20% of treatment cycles started and 748 women gave birth to at least one baby (18%).
- The chances of a baby being born following frozen embryo IVF treatment was strongly affected by the age of the woman when she was treated and also by the number of embryos transferred. Women who were 39 years old or younger were more likely to conceive than women 40 years and older.
- Of the 846 women who had a confirmed ultrasound pregnancy 11% had a miscarriage. Older women were more likely than younger women to miscarry.



- Of the women who conceived following frozen embryo IVF 82% conceived a singleton pregnancy, 18% conceived a twin pregnancy and <1% conceived triplets. Younger women were more likely to conceive a multiple pregnancy than older women.
- Having conceived a pregnancy following IVF 88% of women gave birth to at least one baby (a live birth).
- Having conceived a singleton pregnancy 87% of women gave birth whereas 13% lost their pregnancy to miscarriage, an ectopic pregnancy, termination or the baby was stillborn.
- Having conceived a multiple pregnancy 80% of women gave birth to all the babies, that is both twins or all three triplets were live born; 14% gave birth to at least one baby but fewer babies than she originally conceived; whereas 6% of women had a miscarriage, an ectopic pregnancy, a termination or stillbirth and none of the babies were born alive.

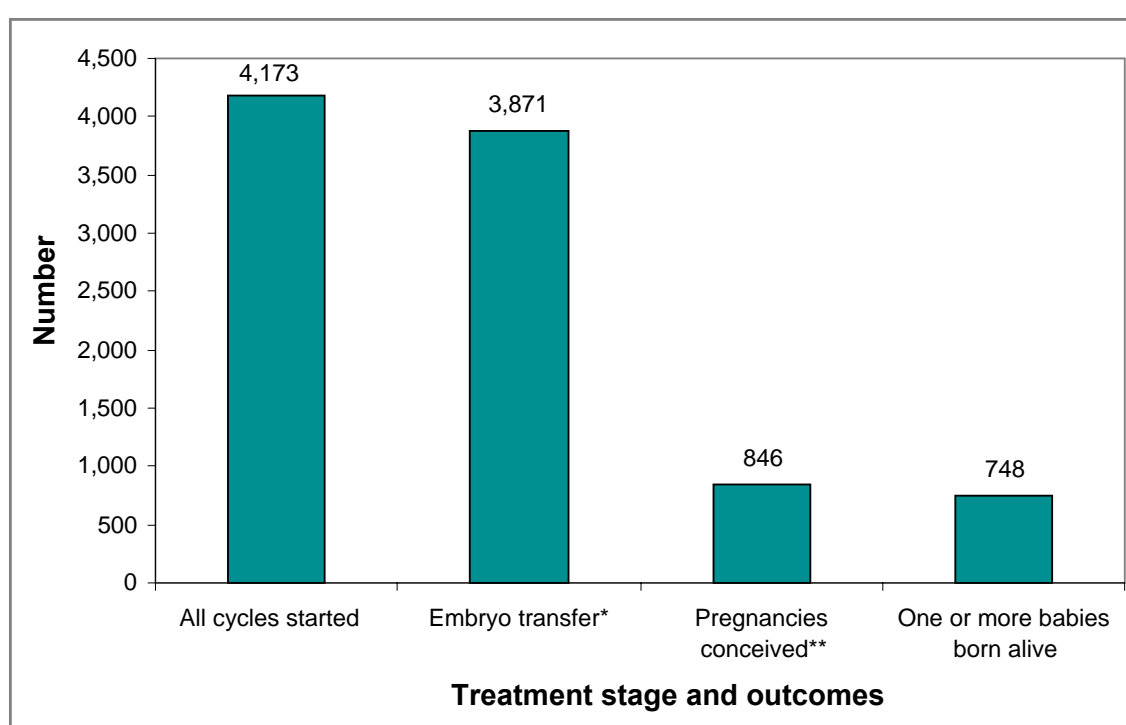
### ► How are treatment results calculated?

- The results of IVF treatment (both fresh and frozen) can be calculated using treatment cycles as the starting point. This gives figures which are useful to help understand what the chances of pregnancy and of having a baby are when a woman starts treatment.
- However, not all treatment cycles which are started reach the embryo transfer stage. The results of treatment can also be calculated from the point that an embryo transfer occurs. This is useful to understand what the chances of pregnancy and of having a baby are once an embryo transfer has taken place.
- In this report we show:
  - Treatment outcomes from the point of view of starting a treatment cycle and these results are given per 100 treatment cycles
 and
  - Treatment outcomes from the point at which the embryo transfer has been carried out and these results are given as per 100 embryo transfers.

► 1. How many women were treated with frozen embryo IVF and what were the outcomes? [3.1-3.8]

- In 2006 2,426 women started 4,173 cycles of IVF where the intention was to carry out a frozen embryo transfer cycle using embryos created from the woman's own eggs and the treatment was undertaken to try to conceive straight away.
- For a variety of reasons not all cycles of treatment which are started reach the embryo transfer stage.
- The majority of cycles reaching the embryo transfer stage do not result in the conception of a pregnancy (Figure 1).

Figure 1: Outcome of frozen embryo IVF treatment cycles<sup>+</sup> started in 2006 [3.1]



+ Frozen IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\* Cycles in which an embryo transfer took place

\*\* Ultrasound confirmed pregnancies

**Results relating to treatment cycles:**

- Of the 4,173 cycles started :
  - 3,871 cycles resulted in a frozen embryo transfer - 93 in every 100 treatment cycles started reached the frozen embryo transfer stage (93%).
  - 846 cycles resulted in a pregnancy (confirmed on ultrasound) - 20 in every 100 cycles started resulted in an ultrasound confirmed pregnancy (20%) and
  - 748 cycles led to birth to one or more babies - 18 in 100 cycles started resulted in one or more live births (18%).

**Results relating to frozen embryo transfers:**

- There were 3,871 cycles of frozen embryo IVF using women's own eggs which reached the embryo transfer stage:
  - 846 cycles resulted in a pregnancy (confirmed by ultrasound) - 22 in every 100 frozen embryo transfer procedures resulted in an ultrasound confirmed pregnancy (22%) and
  - 748 cycles led to the birth of one or more babies - 19 in every 100 frozen embryo transfers resulted in one or more live births (19%).

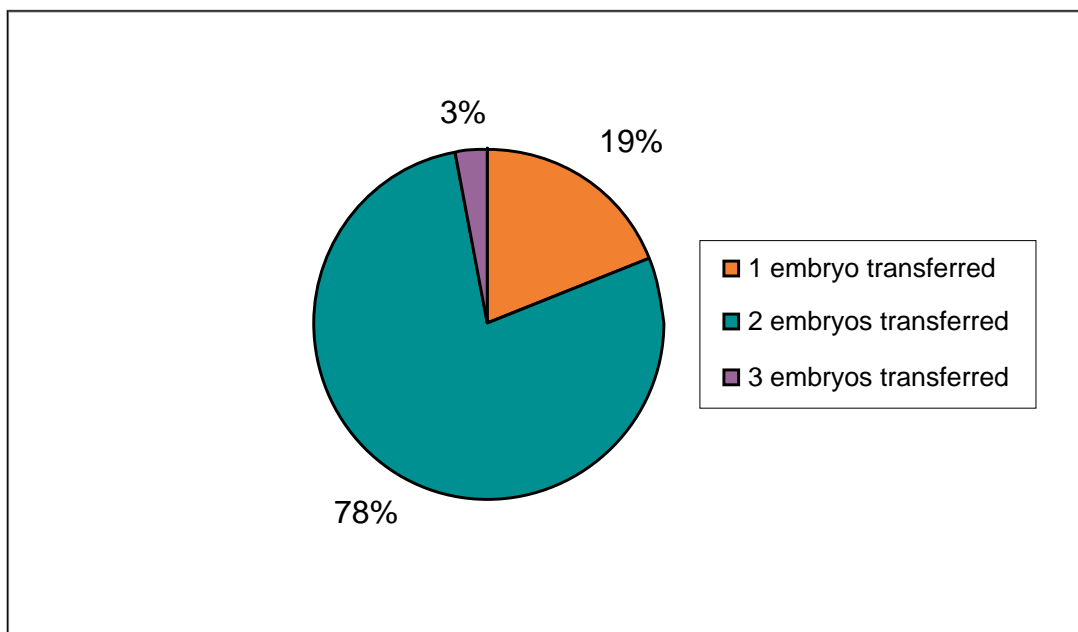
► 2. Why were treatment cycles cancelled? [3.9]

- For a variety of reasons not all cycles of frozen embryo transfer treatment reach the embryo transfer stage.
- The main reason why frozen embryo transfer cycles of IVF were cancelled is that when the frozen embryos were taken out of storage they were damaged during the thawing process and were not of sufficiently good quality to be transferred.

► 3. How many embryos were transferred in each treatment cycle? [3.23]

- Overall in 2006 the majority of frozen embryo transfers involved the transfer of two embryos (Figure 2):
  - 19 in every 100 treatment cycles (19%) reaching the embryo transfer stage involved a single embryo transfer (1ET).
  - 78 in every 100 treatment cycles (78%) reaching the embryo transfer stage involved a double embryo transfer (2ET) and
  - 3 in every 100 treatment cycles (3%) reaching embryo transfer involved the transfer of three embryos (3ET).

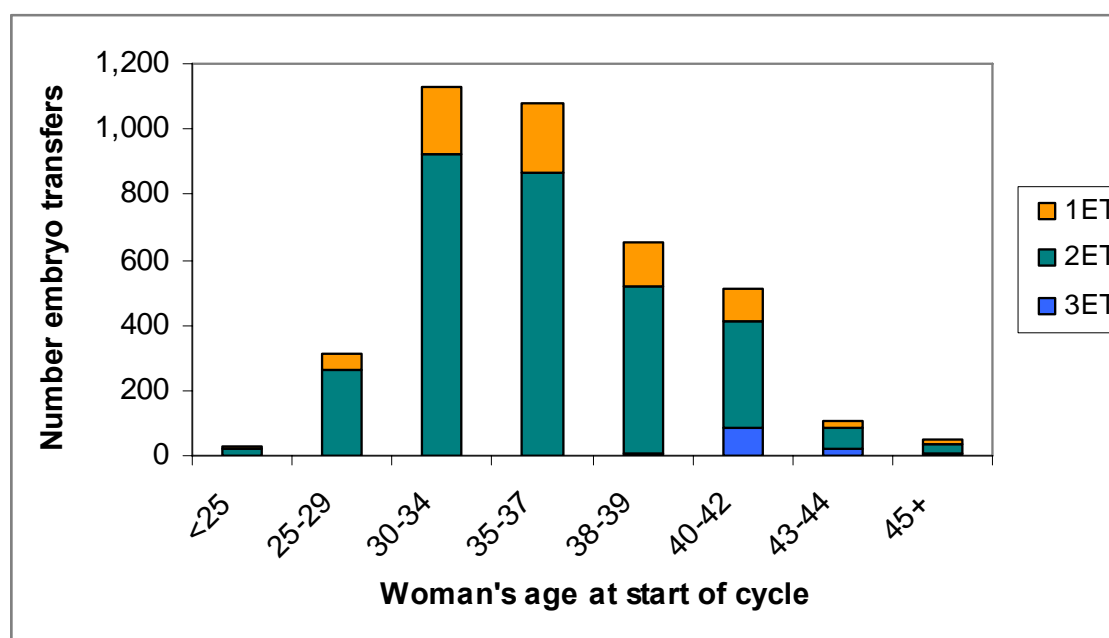
Figure 2: Number of embryos transferred in each cycle of treatment [3.24]



- Transferring a single embryo reduces the risk of a multiple pregnancy, although a small number of twins can result from spontaneous splitting of a single embryo resulting in identical twins.
- Single embryo transfer can be 'elective', where women choose to transfer just one embryo in order to minimise the risk of a multiple pregnancy, even if there is more than one embryo available. Single embryo transfer can also be 'non-elective', where women only have one embryo available to transfer.
- From the information collected on the HFEA register during 2006 it is not possible to separate elective single embryo transfer from single embryo transfer where only one embryo was available; although this will be possible in the future.
- Important: It is likely that the small increase in the proportion of single embryo transfers seen in older women in 2006 is due to most women only having one frozen embryo available for transfer. This will place these women in a poorer prognosis group, with a lower chance of conception than women who are younger and/or have more embryos available for transfer.
- The data from 2006 does not reflect current practice. Since January 2009 clinics are required by the HFEA to have a strategy setting out how they will minimise the risk of multiple births. Clinics are increasingly encouraging women with the greatest chance of conception (for example, women aged 37 years and younger who have several good quality embryos available for transfer) to have elective single embryo transfer to try and minimise the risk of multiple births.

- The proportion of single frozen embryo transfer increased with increasing age of the women being treated (Figure 3):
  - About 15 in every 100 women under the age of 30 yrs had a single embryo transfer (15%) whereas
  - 24 in 100 women over the age of 45 yrs had a single embryo transfer (24%).
- Transfer of three embryos was performed in 17 of every 100 transfers carried out to treat women aged 40 years and older.
- A total of 8 cycles involving transfer of three embryos were carried out in women under the age of 40.

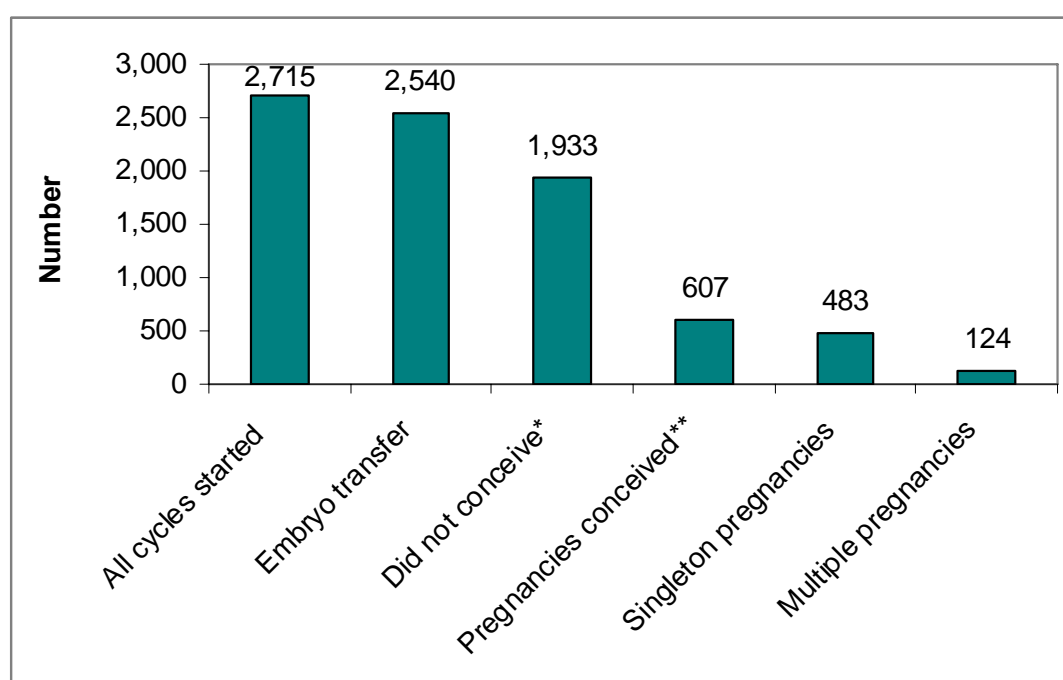
**Figure 3: Number of embryos transferred by the woman's age [3.23]**



► 4a. How does the woman's age affect the chances of pregnancy following IVF? [3.18]

- The outcomes following frozen embryo IVF are strongly affected by the age of the women when she undergoes treatment. The results of treatment are shown for women in two different age groups (Figures 4 and 5). Women 37 years and younger have similar treatment outcomes. The treatment outcomes for women 38 years and older are different for the different age groups of women. However, the number of women 38 years and older having frozen embryo transfer treatment are too few to report by smaller age groups.

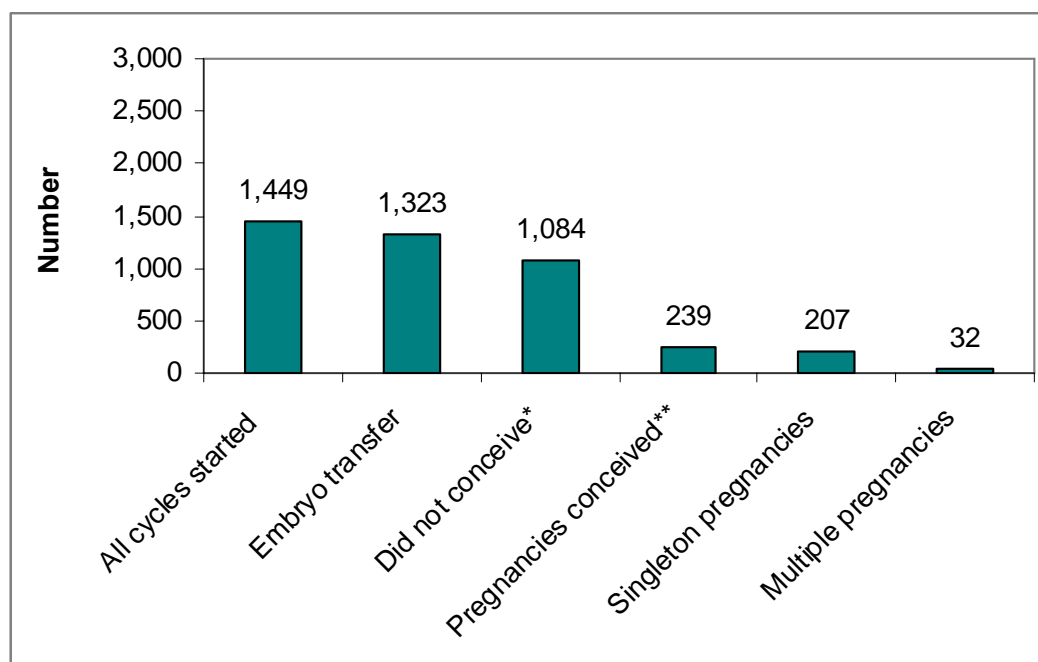
**Figure 4: Treatment outcomes for women aged 37 years or younger when they started treatment in 2006 [3.18a]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

\*\*Ultrasound confirmed pregnancies

**Figure 5: Treatment outcomes for women aged 38 years and older when they started treatment in 2006 [3.18b]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

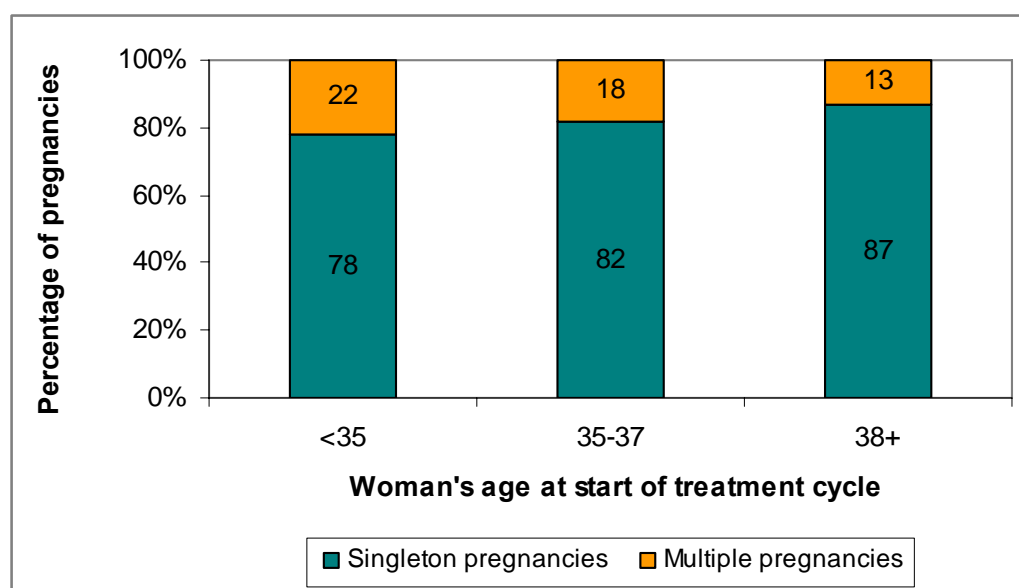
\*\*Ultrasound confirmed pregnancies



► **4b. Which women are most likely to conceive a multiple pregnancy? [3.21]**

- The chance of conceiving a multiple pregnancy is affected by the age of the woman when she starts treatment and the number of embryos transferred.
- Figure 6 shows the split between singleton and multiple pregnancies by the woman's age at the start of her treatment for women who became pregnant following frozen embryo IVF treatment starting in 2006.

**Figure 6: Split between singleton and multiple pregnancies by the women's age at the start of frozen embryo IVF<sup>+</sup> treatment, cycles started in 2006 [3.21]**



+ Frozen IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

The following figures only relate to the women who became pregnant following frozen embryo IVF:

- Nearly four-fifths of the women who were younger than 35 years old and conceived following frozen embryo IVF were pregnant with a singleton pregnancy;
  - 78 in every 100 women less than 35 years old who conceived were pregnant with a singleton (78%) and 22 in every 100 conceived a multiple pregnancy (22%).
- The chances of conceiving following frozen embryo IVF decline as the age of the woman increases. At the same time, for those who do conceive, the chance of conceiving a singleton rather than a multiple pregnancy increases as women get older.
- 87 in 100 women who were 38 years or older when they conceived were pregnant with a singleton (87%) and 13 in 100 conceived a multiple pregnancy (13%).

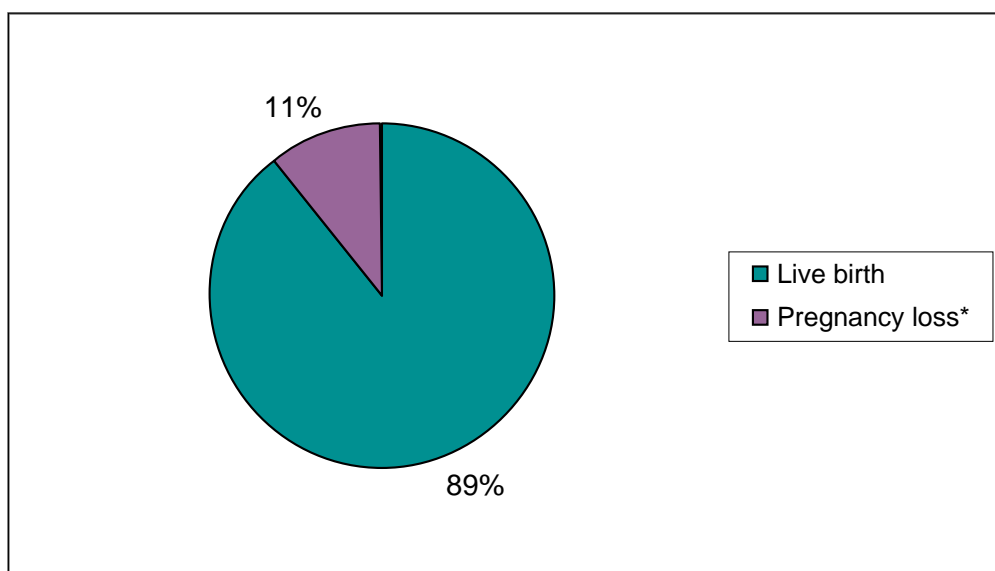
► **5a. What can happen to a pregnancy conceived by frozen embryo IVF – will a baby always be born? [3.10-3.17, 3.19]**

- Overall 846 women conceived a pregnancy following frozen embryo IVF treatment which started in 2006:
  - 748 of these pregnancies resulted in the birth of at least one baby (live birth – see glossary);
    - 88 in every 100 women who conceived a frozen embryo IVF pregnancy gave birth to at least one baby (88%).
  - 690 of these women were pregnant with a single pregnancy:
    - 601 of these singleton pregnancies resulted in the birth of a baby (live births);
      - 87 in every 100 women who conceived a frozen embryo IVF singleton pregnancy gave birth to a baby (87%) and
      - 13 in every 100 women who conceived a frozen embryo IVF singleton pregnancy had a miscarriage, an ectopic pregnancy, a termination or the baby was stillborn (13%).
  - 156 of these women were pregnant with a multiple pregnancy:
    - 125 of the multiple pregnancies resulted in the birth of all the babies (all the babies were born alive; that is both twins or all three triplets);
      - 80 in every 100 women who conceived a frozen embryo IVF multiple pregnancy gave birth to all the babies (80%).
    - 22 of the multiple pregnancies resulted in the birth of at least one baby, that is one of the twins and one or two of the triplets;
      - 14 in every 100 women who conceived a frozen embryo IVF multiple pregnancy gave birth to at least one baby but fewer babies than she was originally pregnant with (14%).
    - 9 of the multiple pregnancies resulted in the pregnancy being lost to miscarriage, an ectopic pregnancy, termination or the babies were stillborn;
      - 6 in every 100 women who conceived a frozen embryo IVF multiple pregnancy had a miscarriage, an ectopic pregnancy, a termination, or a stillbirth and none of the babies were born alive (6%).
- Pregnancy outcomes are affected by whether the pregnancy is a singleton or a multiple pregnancy and by the age of the woman when she starts the frozen embryo IVF treatment cycle. This is illustrated in Figures 7 and 8 for women pregnant with singleton pregnancies.

### Outcomes for singleton pregnancies

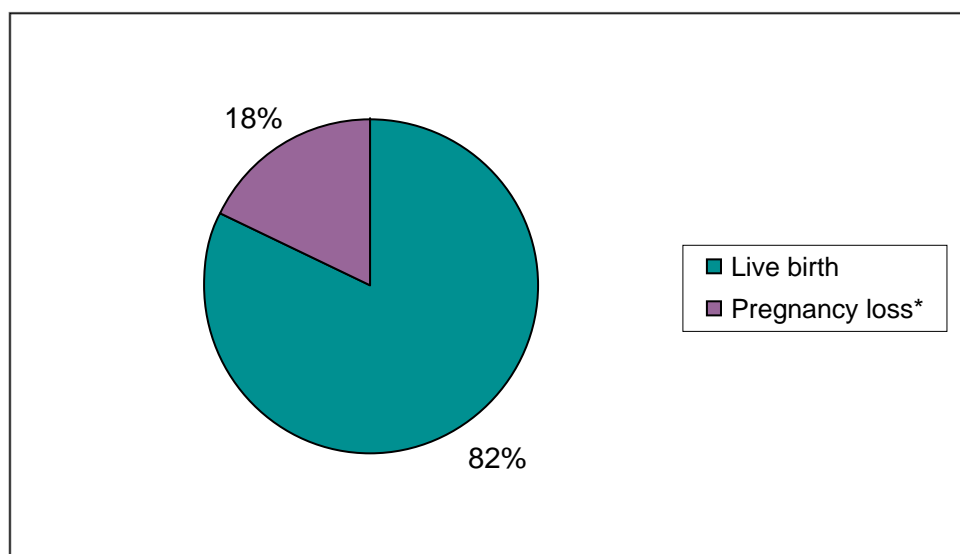
- Women pregnant with a singleton who were aged 37 years or younger at the start of the treatment cycles were more likely to have a baby than women who were aged 38 years and over:
  - 89 in every 100 women **aged 37 years or younger** with a singleton pregnancy following frozen embryo IVF gave birth to a baby (89%). The remaining 11 in 100 women lost the pregnancy to either miscarriage, an ectopic pregnancy, termination of pregnancy or a stillbirth (11%) whereas
  - 82 in every 100 women **aged 38 years or older** with a singleton pregnancy following frozen embryo IVF gave birth to a baby (82%). The remaining 18 in 100 women lost the pregnancy to either miscarriage, an ectopic pregnancy, termination of pregnancy or a stillbirth (18%).

**Figure 7: Singleton pregnancy outcomes following frozen embryo IVF treatment for women aged 37yrs of younger at the start of the treatment cycle [3.19a]**



\* Pregnancy lost to miscarriage, ectopic pregnancy, termination or stillbirth

**Figure 8: Singleton pregnancy outcomes following frozen embryo IVF treatment for women aged 38 years or older at the start of the treatment cycle [3.19b]**

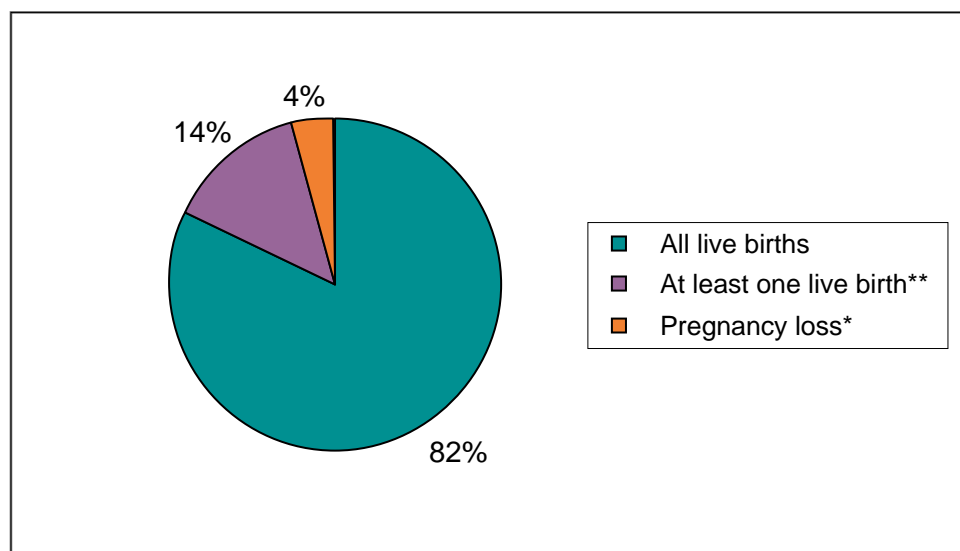


\* Pregnancy lost to miscarriage, ectopic pregnancy, termination or stillbirth

### Outcomes for multiple pregnancies

- Pregnancy outcomes are more complicated for multiple pregnancies. For twins both babies may be born, or one baby may be born and one lost to miscarriage, termination or stillbirth, or both babies may be lost. The situation is even more complicated for triplets where all the babies may be born, or two, or just one with the others being lost during pregnancy, or all the babies may be lost.
- As with singleton pregnancies the outcomes are affected by the age of the women when she starts the treatment cycle. This is illustrated in Figures 9 and 10.
- Women pregnant with a multiple pregnancy who were aged 37 years or younger at the start of their treatment cycle were more likely to give birth to more than one of the babies than women who were aged 38 years and over:
  - 82 in every 100 women **aged 37 years or younger** with a multiple pregnancy following frozen embryo IVF gave birth to all the babies (82%). Fourteen in every 100 women gave birth to at least one, but not all of the babies (14%). The remaining 4 in 100 women lost the entire pregnancy to either miscarriage, an ectopic pregnancy, termination of pregnancy or a stillbirth (4%) whereas
  - 72 in every 100 women **aged 38 years or older** with a multiple pregnancy following frozen embryo IVF gave birth to all the babies (72%). Sixteen in every 100 women gave birth to at least one, but not all of the babies (16%). The remaining 12 in 100 women lost the entire pregnancy to either miscarriage, an ectopic pregnancy, termination of pregnancy or a stillbirth (12%).

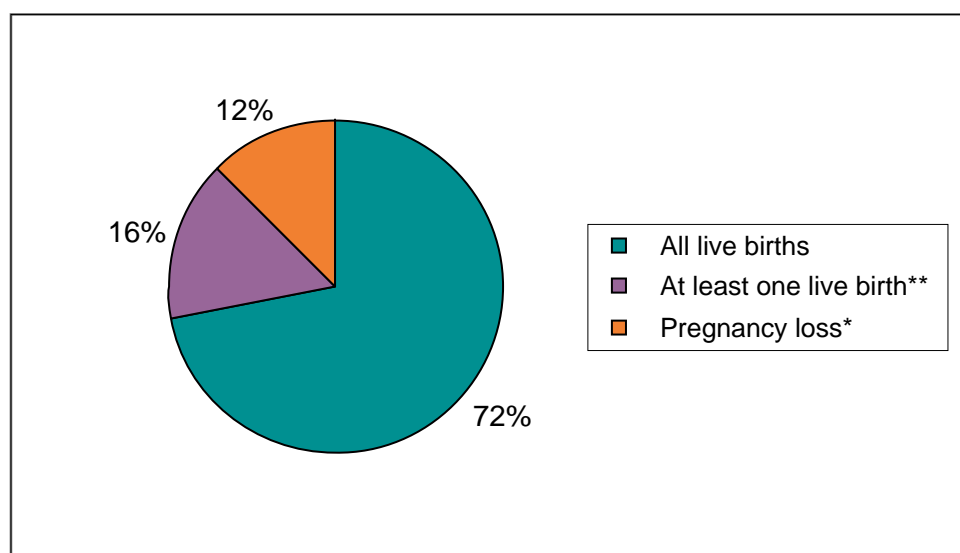
**Figure 9: Multiple pregnancy outcomes following frozen embryo IVF treatment for women aged 37yrs of younger at the start of the treatment cycle [3.19c]**



\*Pregnancy entirely lost to miscarriage, ectopic pregnancy, termination or stillbirth

\*\*At least one baby is born (alive) but the other co-multiple(s) was lost to miscarriage, termination or stillbirth

**Figure 10: Multiple pregnancy outcomes following frozen embryo IVF treatment for women aged 38 years of older at the start of the treatment cycle [3.19d]**



\*Pregnancy entirely lost to miscarriage, ectopic pregnancy, termination or stillbirth

\*\*At least one baby is born (alive) but the other co-multiple(s) was lost to miscarriage, termination or stillbirth

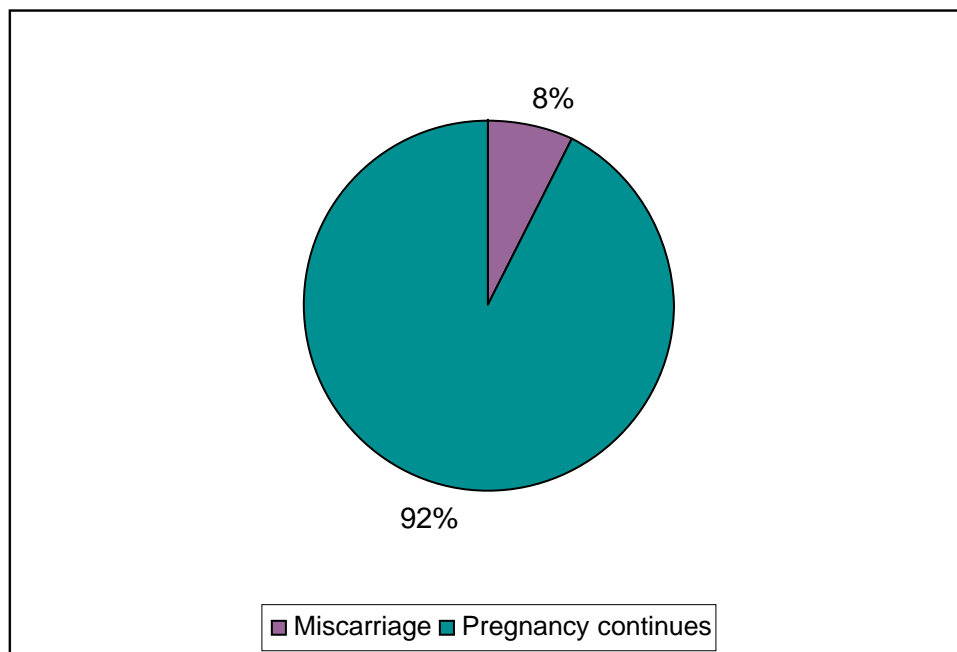
► 5b. What is the risk of miscarriage following frozen embryo IVF? [3.20]

- A total of 846 women became pregnant following frozen embryo IVF treatment which started in 2006; this includes only those pregnancies confirmed by an ultrasound scan.
- A total of 89 of these women miscarried the pregnancy - 11 in every 100 women with an ultrasound confirmed pregnancies (11%) experienced a miscarriage, usually in early pregnancy.

**Risk of miscarriage by the woman's age**

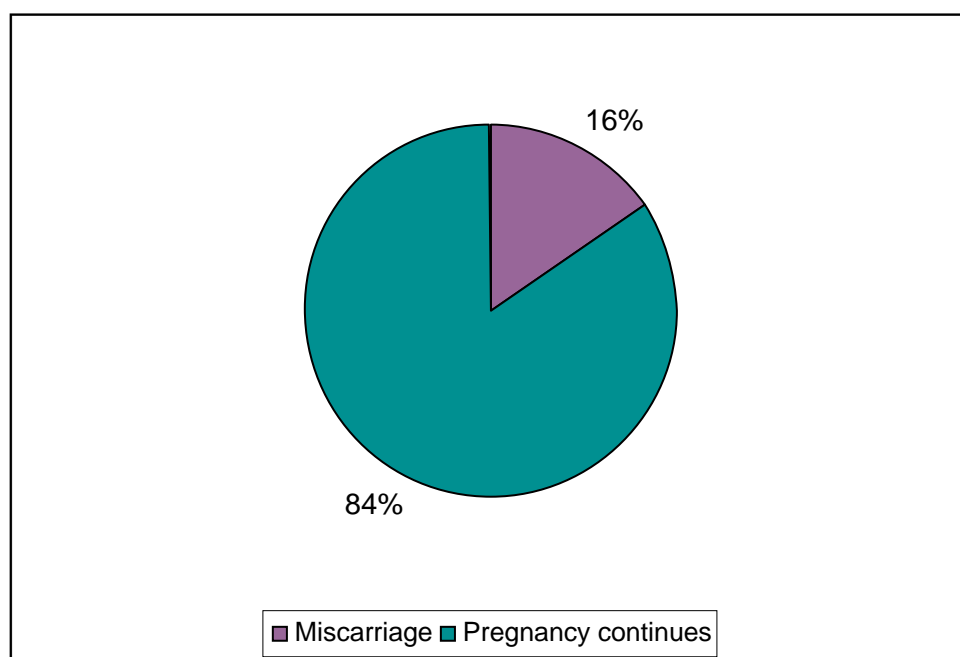
- Women who were older when they were treated were more likely to miscarry than younger women (Figures 11 and 12):
  - Eight in every 100 women who were 37 years old or younger when they started treatment (8%) miscarried the pregnancy whereas
  - Sixteen in every 100 women who were 38 years or older when treated (16%) had a miscarriage.

**Figure 11: Risk of miscarriage for pregnancies\* conceived by women aged 37 years and younger [3.20a]**



\*Ultrasound confirmed pregnancies, excludes those pregnancies with only a positive blood test and not confirmed on ultrasound

**Figure 12: Risk of miscarriage for pregnancies\* conceived by women aged 38 years and older [3.20b]**



\*Ultrasound confirmed pregnancies, excludes those pregnancies with only a positive blood test and not confirmed on ultrasound

### Risk of miscarriage in singleton and multiple pregnancies

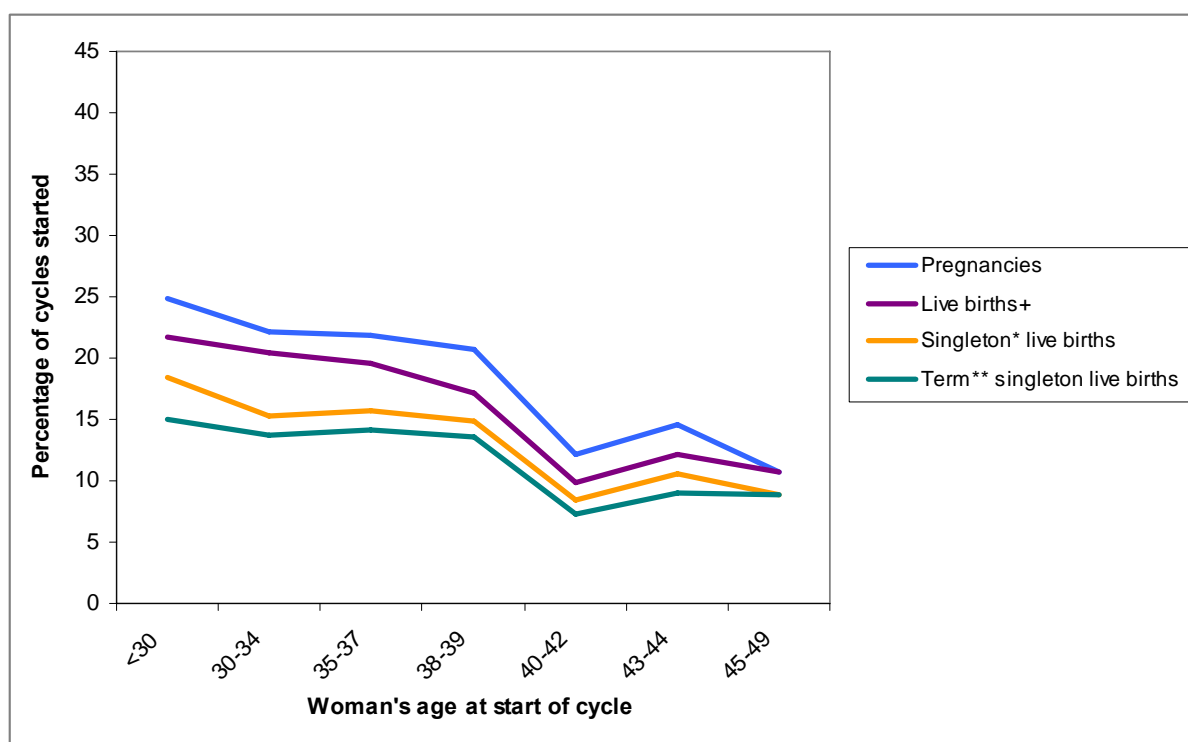
- A total of 846 women became pregnant following IVF which started in 2006; this includes only those pregnancies confirmed by an ultrasound scan.
- Of the 846 women:
  - 690 women were pregnant with a single fetus (82%) and
  - 156 women were pregnant with a multiple pregnancy (18%).
- It is important to know that even though a pregnancy may be conceived as a multiple pregnancy, sometimes one of the fetuses miscarries (and this may or may not be accompanied by bleeding), resulting in the birth of only one baby from a pregnancy that started as a multiple pregnancy.
- The risk of miscarriage was different for women who were carrying a singleton pregnancy compared with a multiple pregnancy:
  - 12 in every 100 women pregnant with a singleton had a miscarriage (12%) whereas
  - 6 in every 100 women with a multiple pregnancy experienced a miscarriage and lost the pregnancy completely (6%). However, a further 14 in every 100 (14%) with a multiple pregnancy experienced the loss of one of the fetuses and delivered fewer babies than she was originally pregnant with, for example a woman pregnant with twins delivered a single live baby.

► 6. How does a woman's age affect birth outcomes following IVF?  
[3.10-3.16]

Results starting from the point a treatment cycle begins:

- The effects of the woman's age on the chances of becoming pregnant and delivering a baby are shown in Figure 13 as a proportion of the treatment cycles started in 2006.

**Figure 13: Pregnancy and birth outcomes for treatment cycles started in 2006**  
[3.10-3.16a]



+ Live births - pregnancies resulting in the delivery of one or more live births

\*Singleton live births - live births resulting from singleton pregnancies, excludes multiple pregnancies which result in just one live birth

\*\* Term – refers to a live birth born following a full-term pregnancy at 37 or more weeks gestation of pregnancy

- The results for women under 40 years of age are broadly similar and so are presented for all women under this age combined. Similarly the results for women 40 years and older are much the same and are also combined in the presentation below.

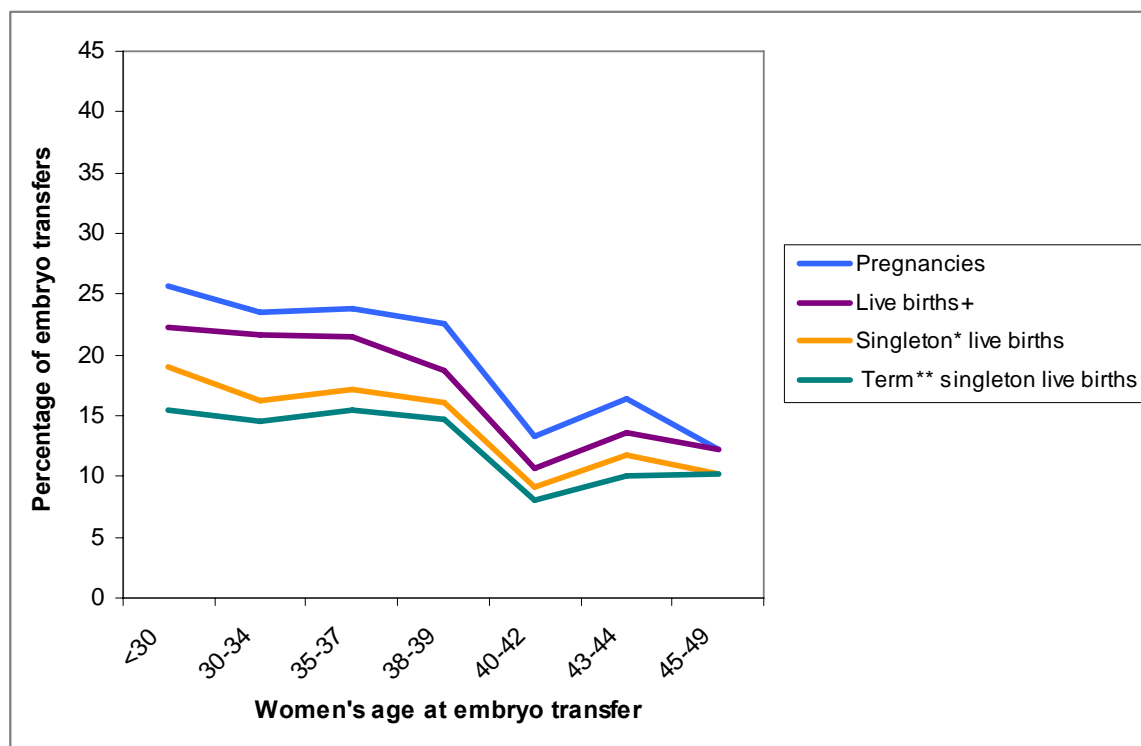


- Women who were **39 years old or younger** when they started treatment had 3,425 cycles of treatment between them which resulted in:
  - 754 ultrasound confirmed pregnancies;
    - 22 in every 100 treatment cycles started (22%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 672 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 20 in every 100 treatment cycles started (20%) resulted in the birth of at least one baby.
  - 536 singleton pregnancies which resulted in a live birth;
    - 16 in every 100 treatment cycles started (16%) led to a singleton pregnancy which resulted in the birth of a baby.
  - 479 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 14 in every 100 treatment cycles started (14%) resulted in a live birth born at term.
- Women who were **40 years or older** when they started treatment received 739 cycles of treatment between them which resulted in:
  - 92 ultrasound confirmed pregnancies;
    - 12 in every 100 treatment cycles started (12%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 76 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 10 in every 100 treatment cycles started (10%) resulted in the birth of at least one baby.
  - 65 singleton pregnancies which resulted in a live birth;
    - 9 in every 100 treatment cycles started (9%) led to a singleton pregnancy which resulted in the birth of a baby.
  - 57 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 8 in every 100 treatment cycles started (8%) resulted in a live birth born at term.

#### Results starting from the point of embryo transfer:

- For a variety of reasons (see section 2) not all treatment cycles which are begun reach the stage of embryo transfer. The results of treatment from the point that an embryo transfer has been carried out are shown below. These figures are useful to help understand what the chances of pregnancy and of having a baby are once an embryo transfer has taken place.
- The effects of the woman's age on the chances of becoming pregnant and delivering a baby are shown from the point of embryo transfer as a proportion of the embryo transfers for treatment started in 2006 (Figure 14).

**Figure 14: Pregnancy and birth outcomes for frozen embryo transfers as part of treatment started 2006 [3.10-3.16b]**



+ Live births - pregnancies resulting in the delivery of one or more live births

\*Singleton live births - live births resulting from singleton pregnancies, excludes multiple pregnancies which result in just one live birth

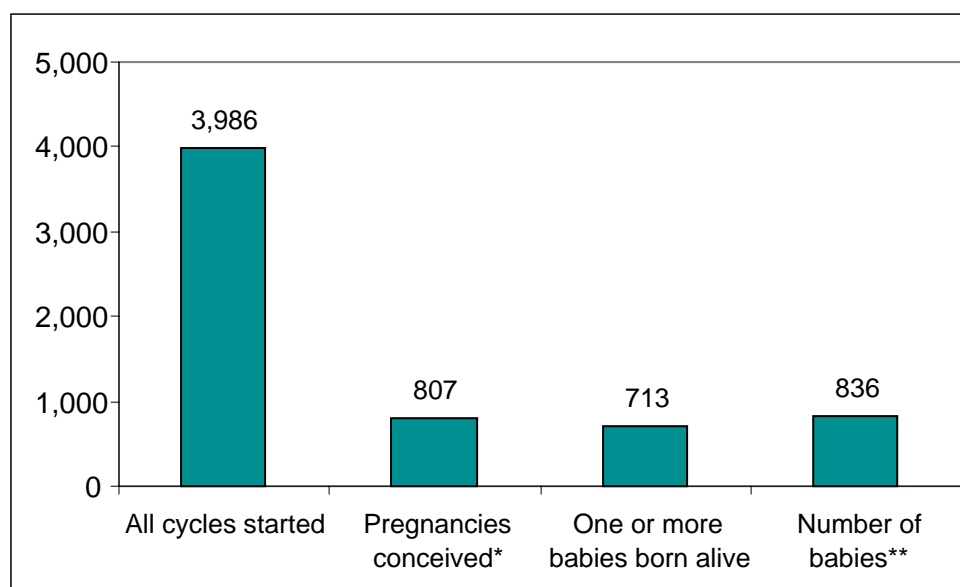
\*\* Term – refers to a live birth born following a full-term pregnancy at 37 or more weeks gestation of pregnancy

- Women who were **39 years old or younger** when they were treated had 3,192 frozen embryo transfers between them which resulted in:
  - 754 ultrasound confirmed pregnancies;
    - 24 in every 100 embryo transfers (24%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 672 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 21 in every 100 embryo transfers (21%) resulted in the birth of at least one baby.
  - 536 singleton pregnancies which resulted in a live birth;
    - 17 in every 100 (17%) embryo transfers led to a singleton pregnancy which resulted in the birth of a baby.
  - 479 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 15 in every 100 embryo transfers (15%) resulted in a live birth born at term.
  
- Women who were **aged 40 years and older** when they started treatment had 671 frozen embryo transfers between them which resulted in:
  - 92 ultrasound confirmed pregnancies;
    - 14 in every 100 embryo transfers (14%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 76 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 11 in every 100 embryo transfers (11%) resulted in the birth of at least one baby.
  - 65 singleton pregnancies which resulted in a live birth;
    - 10 in every 100 embryo transfers (10%) led to a singleton pregnancy which resulted in the birth of a baby.
  - 57 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 8 in every 100 embryo transfers (8%) resulted in a live birth born at term.

► **7. Are the outcomes of treatment affected by whether the sperm used comes from the woman's partner or a donor? [3.43]**

- 4,173 frozen embryo IVF treatment cycles were started in 2006 of these:
  - in 3,986 the intention was to use the woman's partner's sperm - 96 in every 100 cycles started involved partner sperm (96%).
  - in 187 donor sperm was used - only 4 in every 100 cycles started involved donor sperm (4%).
- Of the 3,986 cycles involving partner sperm 807 women became pregnant (Figure 15):
  - 20 in every 100 cycles started led to a pregnancy being conceived (20%).
  - 713 of these pregnancies resulted in the birth of at least one baby (live birth) - 18 in every 100 cycles started led to the birth of at least one baby (18%) and
  - a total of 836 babies were born.

**Figure 15: Outcome of frozen embryo IVF<sup>+</sup> treatment cycles using partner sperm, cycles started in 2006 [3.43a]**



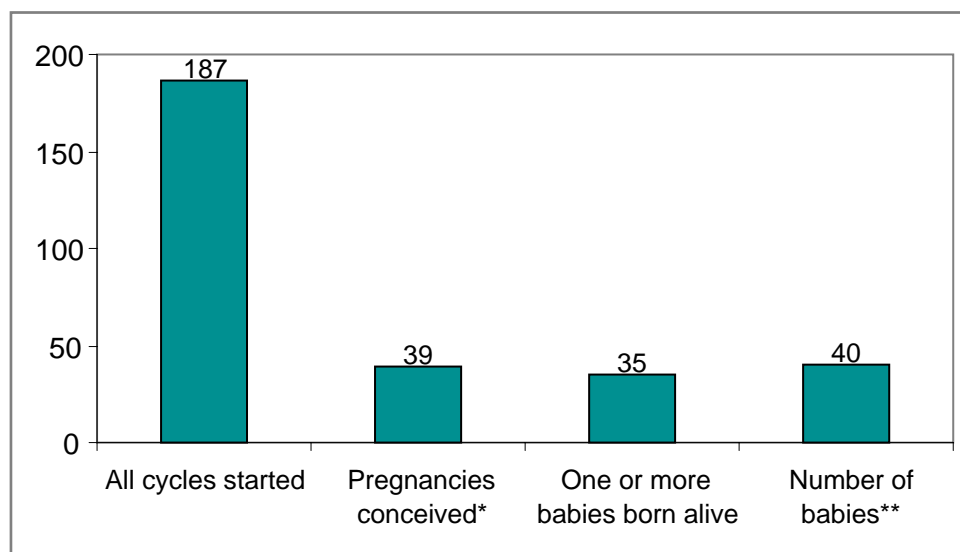
+ Frozen IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Ultrasound confirmed pregnancies

\*\* Total number of babies born alive – includes multiple births

- Of the 187 cycles involving donor sperm 39 women became pregnant (Figure 16);
  - 30 in every 100 cycles started led to a pregnancy being conceived (30%).
  - 35 of these pregnancies resulted in the birth of at least one baby (live birth) - 19 in every 100 cycles started led to the birth of at least one baby (19%) and
  - a total of 40 babies were born.

**Figure 16: Outcome of frozen embryo IVF<sup>+</sup> treatment cycles using donor sperm, cycles started in 2006 [3.43b]**



+ Frozen IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

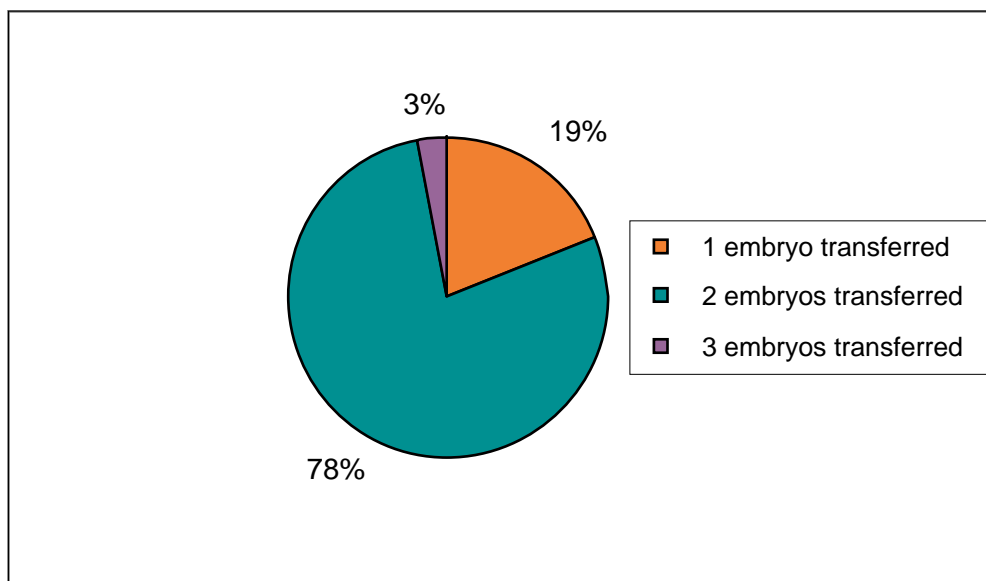
\*Ultrasound confirmed pregnancies

\*\* Total number of babies born alive – includes multiple births

► 8. What is the effect of the number of embryos transferred on the number of babies born? [3.24]

- 3,871 cycles of frozen embryo IVF treatment which started in 2006 reached the embryo transfer stage, of these (Figure 17):
  - 19% involved the transfer of a single embryo (SET).
  - 78% involved the transfer of two embryos (DET) – a double embryo transfer.
  - 3% involved the transfer of three embryos.

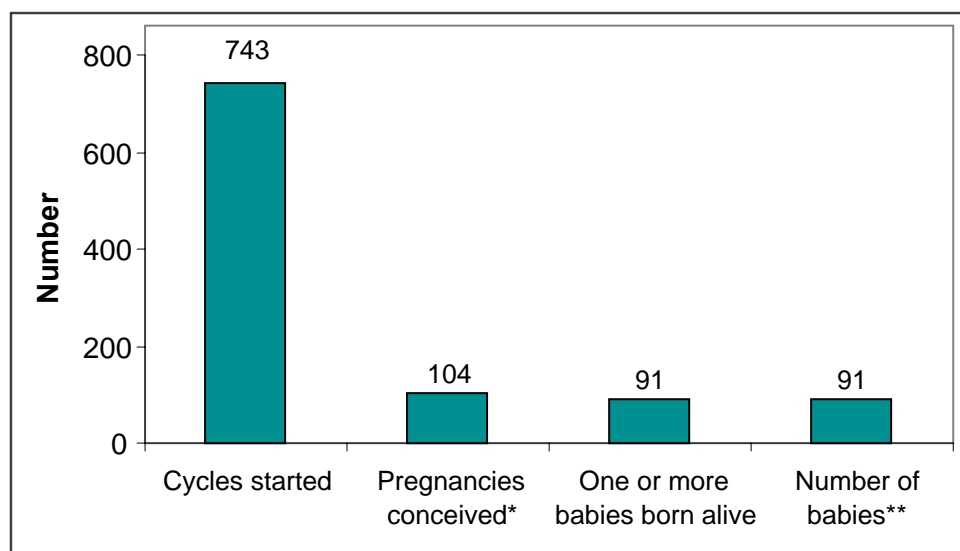
Figure 17: Number of embryos transferred in each cycle of treatment [3.24]



- The 743 single embryos transfers (SET) led to 104 pregnancies and 91 women gave birth to at least one baby (live birth) and in total 91 babies were born (live births) (Figure 18):
  - 86 in every 100 single embryo transfer procedure did not lead to an ultrasound confirmed pregnancy (86%)
 whereas
  - 14 in every 100 single embryo transfer led to a pregnancy (14%).
  - 12 in every 100 women who had a single embryo transfer gave birth to at least one baby (12%).
- Single embryo transfer can be 'elective', where women choose to transfer just one embryo in order to minimise the risk of a multiple pregnancy, even if there is more than one embryo available. Single embryo transfer can also be 'non-elective', where women only have one embryo available to transfer.
- From the information collected on the HFEA register during 2006 it is not possible to separate elective single embryo transfer from single embryo transfer where only one embryo was available; although this will be possible in the future.
- Important: It is likely that the majority of women who had single embryo transfer in 2006 only had one frozen embryo available for transfer. This will place these women in a poorer prognosis group, with a lower chance of conception than women who are younger and/or have more embryos available for transfer.

- The data from 2006 does not reflect current practice. Since January 2009 clinics are required by the HFEA to have a strategy setting out how they will minimise the risk of multiple births. Clinics are increasingly encouraging women with the greatest chance of conception (for example, women aged 37 years and younger who have several good quality embryos available for transfer) to have elective single embryo transfer to try and minimise the risk of multiple births.

**Figure 18: Outcome of frozen embryo IVF treatment cycles<sup>+</sup> involving single embryo transfer (SET) started in 2006 [3.24b]**



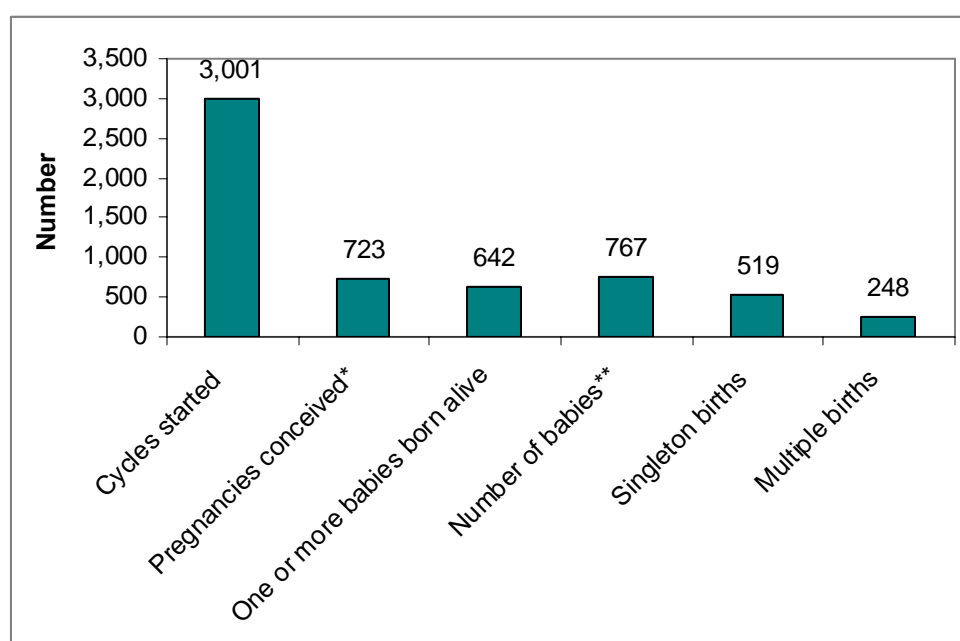
+ Frozen IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Ultrasound confirmed pregnancies

\*\* The total number of babies born alive – which include a small number of multiples

- 3,001 double embryo transfers (DET) led to 723 pregnancies and 642 women gave birth to at least one baby. In total 767 babies were born (live births) and 248 of them were multiple births (Figure 19):
  - 24 in every 100 double embryo transfers led to a pregnancy (24%).
  - 21 in every 100 women who had a double embryo transfer gave birth to at least one baby (21%).
  - 22 in every 100 of the pregnancies following double embryo transfer were multiple pregnancies (22%).
  - 32 in every 100 of the babies born following double embryo transfer were born as one of a multiple birth (32%).

**Figure 19: Outcome of frozen embryo IVF treatment cycles<sup>+</sup> involving double embryo transfer (DET) started in 2006 [3.24c]**



+ Frozen IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

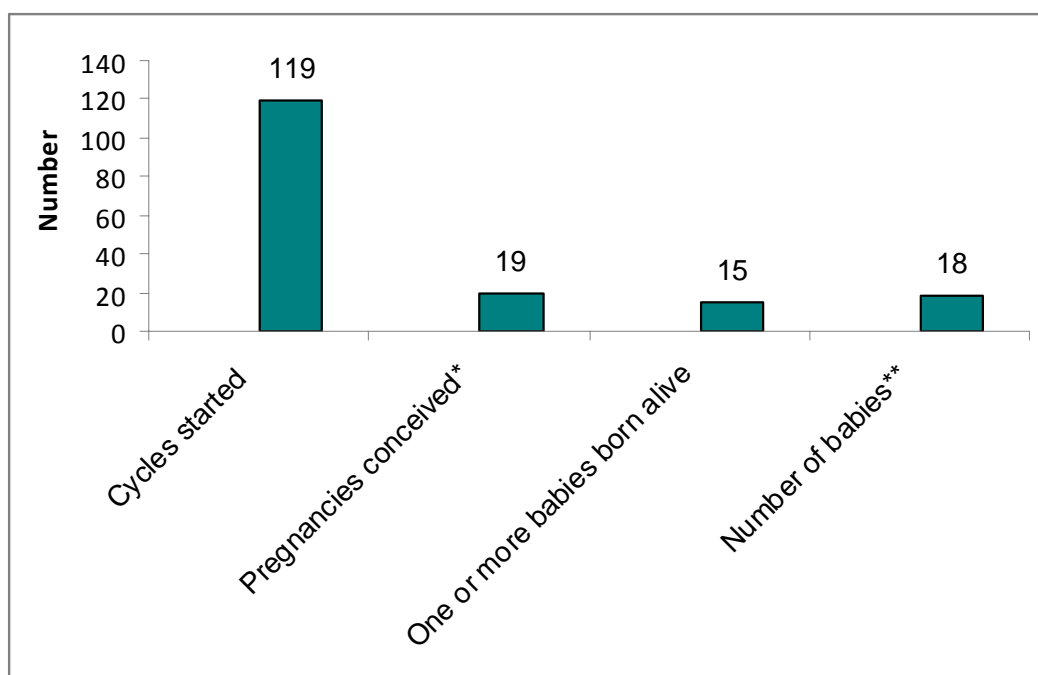
\*Ultrasound confirmed pregnancies

\*\* The total number of babies born alive



- 119 three embryo transfers (3ET) led to 19 pregnancies and 15 women gave birth to at least one baby. In total 18 babies were born (live births) and 13 of them were multiple births (Figure 20).

**Figure 20: Outcome of IVF treatment cycles<sup>+</sup> involving three embryo transfers started in 2006 [3.24d]**



+ Frozen IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

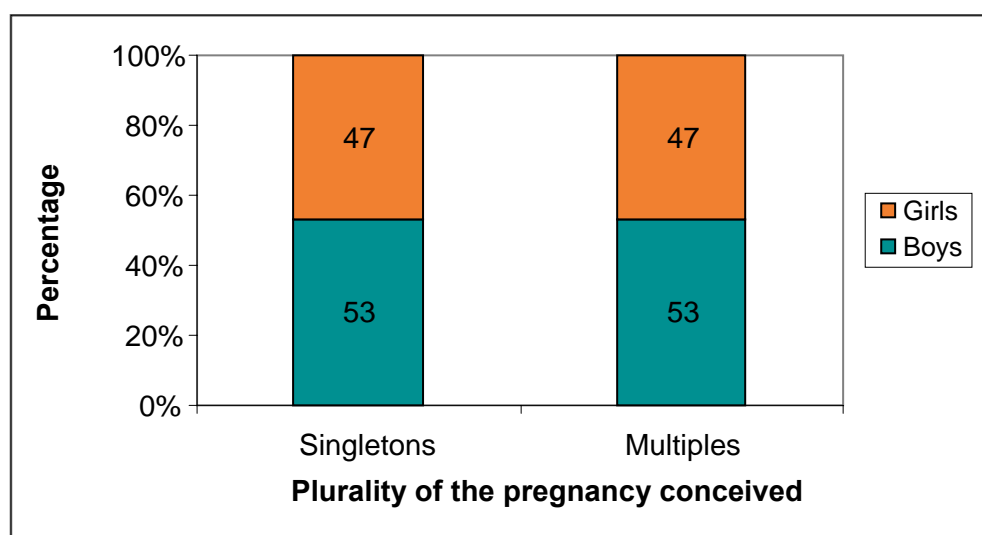
\*Ultrasound confirmed pregnancies

\*\* The total number of babies born alive

► 9. How many boys and girls are born following frozen embryo IVF? [3.51]

- Following frozen embryo IVF which started in 2006, 876 babies were born alive and of these just over half (51%) were boys and just less than half (49%) were girls.
- Over two-thirds of the babies were born to women carrying a singleton pregnancy and of these 381 (53%) were boys and 283 (47%) were girls (Figure 21).
- For the babies born from a multiple pregnancy the split between boys and girls was the same as for the singletons at 53% boys and 47% girls with 145 boys and 128 girls.

**Figure 21: Sex of the babies\* born following frozen embryo IVF<sup>+</sup> started in 2006 [3.51]**



+ Frozen IVF cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Includes only babies born alive

► **10a. How did babies born following frozen embryo IVF in 2006 fare?**  
**[3.26-3.29]**

- The majority of babies born following frozen embryo IVF are born following a full-term pregnancy (37 weeks gestation or greater) and with a normal birthweight (greater than 2.5Kg or 5½lbs):
  - 81 in every 100 woman giving birth following a frozen embryo IVF in 2006 delivered after a full term pregnancy (81%)  
and
  - 82 in every 100 babies were born with a normal birthweight (82%).
- Babies who are born preterm (before the pregnancy has reached full-term which is 37 or greater weeks gestation) and babies who are born with a low birthweight (less than 2.5kg or about 5½lbs) have an increased chance of developing problems during the first few days and weeks after birth. These problems include difficulties with breathing and feeding, having an abnormal level of consciousness and an increased risk of infection. Because multiples are more likely to be born preterm and with a low birthweight they have an increased chance of experiencing these types of problems compared with singletons. Preterm and low birthweight babies also tend to have a small, but increased chance of developing problems in the long-term such as cerebral palsy.
- Importantly, there is a large but not complete overlap between preterm birth and low birthweight; some babies who are born at term are low birthweight and some babies born preterm have a normal birthweight.
- Using information collected on the HFEA register it is possible to look at the chances of prematurity and low birthweight for babies born following IVF and to compare these to national figures collected by the Office for National Statistics on all babies born in England and Wales; the results are similar for Scotland and Northern Ireland.

► 10b. Chances of being born preterm (<37 weeks gestation): [3.26-3.27]

**The outcome of pregnancies:**

- Of the 627 singleton pregnancies resulting in a live birth 553 were delivered following a full-term pregnancy and 94 were delivered preterm (gestational age was missing for 1 pregnancy):
  - 86 in 100 women delivered at the end of a full-term pregnancy (86%) and
  - 14 in 100 delivered preterm (14%).
- Of the 251 multiple pregnancies resulting in at least one live birth 112 delivered following a full-term pregnancy and 139 delivered preterm:
  - 45 in 100 of the women delivered at the end of a full-term pregnancy (45%) and
  - 55 in 100 delivered preterm (55%).

**The outcome of births:**

- To compare the preterm birth rate with national figures for England and Wales, those babies born as singletons from multiple pregnancies are included as singleton births.
- 14.5% of singleton live births following frozen embryo IVF in 2006 were born preterm compared with 6.2% of all live singleton births in England and Wales (Moser et al, 2007)<sup>1</sup> (Figure 22).
- 55% of multiple live births following frozen embryo IVF in 2006 were born preterm compared with 53% of all live multiple births in England and Wales (Moser et al, 2007)<sup>2</sup> (Figure 23).

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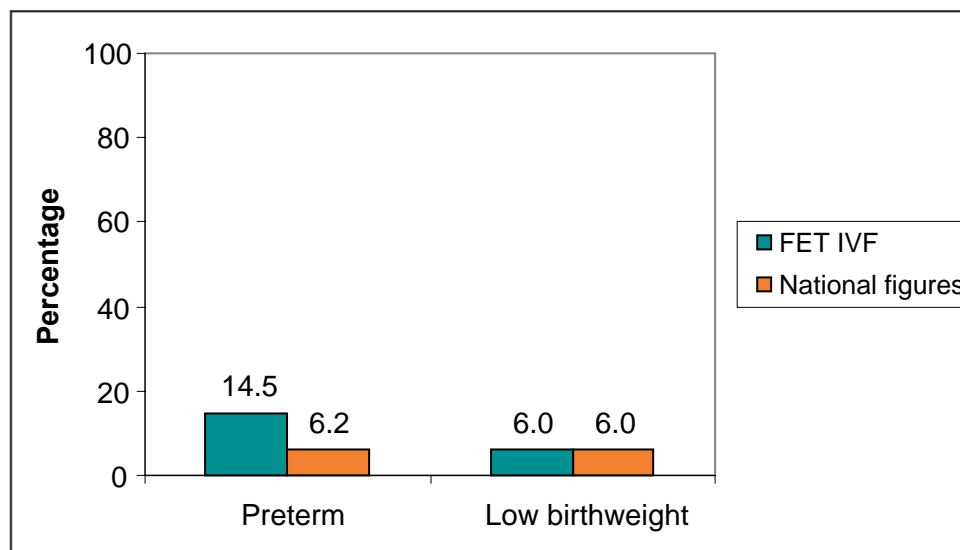
<sup>1</sup> Moser K, Macfarlane A, Huang Chow Y, Hilder L, Dattani N. Introducing new data on gestation-specific infant mortality among babies born in 2005 in England and Wales. Health Statistics Quarterly 2007; 35: 13-27.

► 10c. Chances of being born low birthweight (<2.5kg or 5½lbs): [3.28 & 3.29]

The outcome of pregnancies:

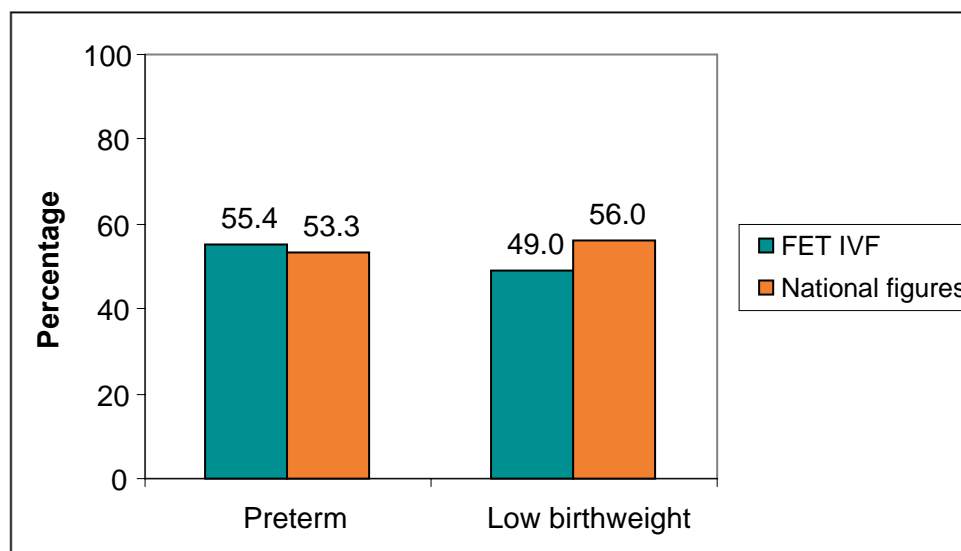
- Of the 601 singleton pregnancies with a known birthweight and resulting in a live birth, 564 delivered a normal birthweight baby and 34 resulted in a low birthweight baby:
  - 92 in 100 of the women delivered a baby with a normal birthweight (92%) and
  - 8 in 100 of them delivered a low birthweight baby (8%).
- Calculating the figures for low birthweight multiple is more complicated than calculating the figures for preterm birth. This is because in general all the babies in a multiple birth will be born at the same gestation of pregnancy whereas it's possible in a set of twins for one baby to be normal birthweight and one to be low birthweight.
- Of the 147 multiple pregnancies resulting in the birth of at least one live birth (were the birthweight was known) 76 resulted in the delivery of at least one low birthweight babies and 71 resulted in babies all of whom had a normal birthweight:
  - 52 in 100 of resulted in the birth of at least one low birthweight baby (52%) and
  - 48 in 100 delivered babies, all of whom had a normal birthweight (48%).

Figure 22: Preterm and low birthweight rate for singleton births comparing frozen embryo IVF<sup>+</sup> conceptions and England & Wales rates [3.28a]



+ Frozen IVF cycles (FET) where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy  
 Low birthweight <2.5kg or <5½lbs; preterm <37 weeks gestation

**Figure 23: Preterm and low birthweight rate for multiple births comparing frozen embryo IVF<sup>+</sup> conceptions and England & Wales rates [3.28b]**



+ Frozen IVF cycles (FET) where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Low birthweight <2.5kg or <5½lbs; preterm <37 weeks gestation

#### The outcome of births:

- To compare the low birthweight (<2.5kg or 5½lbs) rate with national figures for England and Wales, those babies born as singletons from multiple pregnancies are included as singleton births.
- 6.0% of singleton live births born following frozen embryo IVF in 2006 were born with a low birthweight compared with 6.0% of all live singleton births in England and Wales<sup>2</sup> (Figure 22).
- 49% of multiple live births born following frozen embryo IVF in 2006 were born with a low birthweight compared with 56% of all live multiple births in England and Wales<sup>3</sup> (Figure 23).

<sup>2</sup> Office for National Statistics. Mortality statistics. Childhood, infant and perinatal. Review of the National Statistician on deaths in England and Wales, 2007. Series DH3 No. 40. Surrey: Office for National Statistics, 2009. ISSN 1469-2783. (Table 26)

## Appendix B

### ► How we gathered the data

- Clinics are required by law to provide information to the HFEA Register about all licensed fertility treatments they carry out. The Register started operating in August 1991 and is a rich source of information about fertility treatment, its outcomes and the factors that contribute to the birth of a baby following treatment.

### ► Understanding the results presented

- This analysis is of just IVF treatment cycles involving frozen embryo transfers using embryos created from women's own eggs in treatment cycles started at some stage during 2006. While the outcomes of some treatment started in 2006 may not be known until 2007 these treatment outcomes are nevertheless included in this analysis.
- Clinics are not always told by every patient the outcome of each treatment cycle, especially if the woman has travelled to the UK for treatment from abroad. A small number of pregnancy outcomes are therefore not included in the Register. However, since most of the pregnancy outcomes are known, it is likely that any underestimate in the outcome rates is very small.
- The information that the HFEA publishes is a snapshot of data provided to us by licensed clinics at a particular time. This information may be subject to change as individual centres notify us of amendments. Before publication, the HFEA perform a preliminary checking process on the data, and ask the clinic to confirm the accuracy, for which they remain responsible.

## ICSI results – involving fresh embryo transfers for women using their own eggs for treatment cycles started in 2006

### ► Introduction

- The information we collect about fertility treatment can be analysed in many ways. In this report we present key information about those patients having ICSI involving fresh embryo transfer:
  - where the embryos were created using the woman's own eggs
  - where women were having treatment with the intention of conceiving immediately rather than storing or donating eggs and embryos; surrogacy treatment is excluded
  - and the treatment cycle started in 2006 resulting in births in either 2006 or 2007.
- This report does not include information about cycles of IVF which do not involve ICSI, frozen embryo transfer ICSI, or the small number of cycles that involved transferring fresh and frozen embryos in the same cycle.
- Similar reports are available for treatment with IVF, IVF and ICSI involving frozen embryo transfer, and treatment involving donor eggs.
- At some points in the report the small numbers involved mean that some of the information cannot be presented for confidentiality reasons.
- Information about how the data for this report were gathered is given in the appendix together with a glossary of terms.

### ► Summary

- In 2006, 13,425 women started 16,470 cycles of ICSI treatment where the intention was:
  - to carry out a fresh embryo transfer using embryos created from the woman's own eggs, and
  - treatment was undertaken with the purpose of conceiving immediately rather than storing or donating embryos.
- Of the cycles started, 16,424 (99%) resulted in a successful egg collection and 15,468 (93%) of cycles reached the embryo transfer stage.
- The majority (83%) of embryo transfers involved the transfer of two embryos; 12% of cycles involved a single embryo transfer; and 5% were three embryo transfers.
- A total of 4,842 cycles resulted in an ultrasound confirmed pregnancy which represents 29% of treatment cycles started and 4,331 women gave birth to at least one baby (26%).
- The chances of a baby being born following ICSI treatment was strongly affected by the age of the woman when she was treated and also by the number of embryos transferred. Women who were 37 years old or younger were more likely to conceive than women 38 years and older.



- Of the 4,841 women who had a confirmed ultrasound pregnancy 10% had an early miscarriage. Older women were more likely than younger women to miscarry.
- Of the women who conceived following ICSI, 76% conceived a singleton pregnancy, 24% conceived a twin pregnancy and <1% conceived triplets. Younger women were more likely to conceive a multiple pregnancy than older women.
- Having become pregnant following ICSI, 89% of women gave birth to at least one baby (a live birth).
- Having conceived a singleton pregnancy 91% of women gave birth whereas 9% lost their pregnancy to miscarriage, an ectopic pregnancy, termination or the baby was stillborn.
- Having conceived a multiple pregnancy, 84% of women gave birth to all the babies (both twins or all three triplets were live born). 11% gave birth to at least one baby but fewer babies than she originally conceived; whereas 5% of women had a miscarriage, an ectopic pregnancy, a termination or stillbirth and none of the babies were born alive.

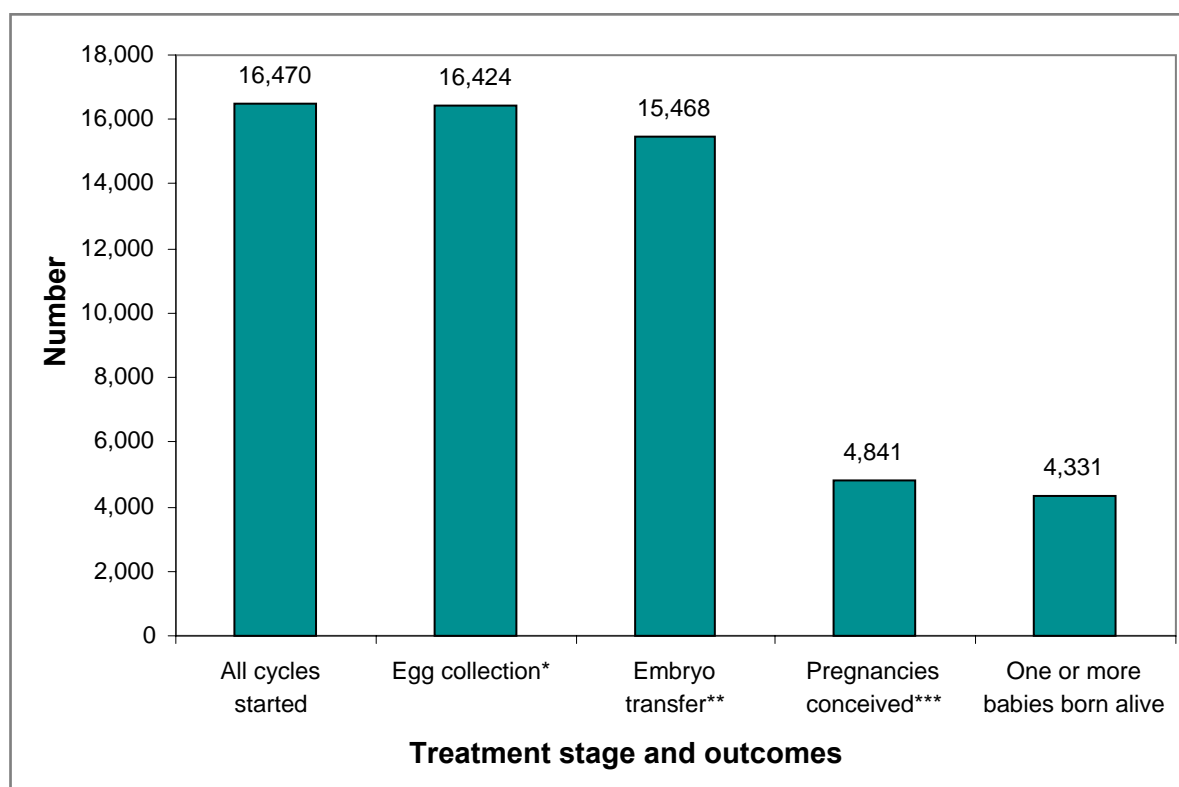
#### ► How are treatment results calculated?

- The results of ICSI treatment can be calculated using treatment cycles as the starting point. This gives figures can help you understand what the chances of pregnancy and of having a baby are when a woman starts treatment.
- However, not all treatment cycles which are started reach the embryo transfer stage. The results of treatment can also be calculated from the point that an embryo transfer occurs. This is useful to understand what the chances of pregnancy and of having a baby are once an embryo transfer has taken place.
- In this report we show:
  - treatment outcomes from the point of view of starting a treatment cycle. These results are given per 100 treatment cycles
  - treatment outcomes from the point at which the embryo transfer has been carried out. These results are given as per 100 embryo transfers.

► 1. How many women were treated with ICSI and what were the outcomes? [4.1-4.8]

- In 2006, 13,425 women started 16,470 cycles of ICSI treatment where the intention was:
  - to carry out a fresh embryo transfer cycle using embryos created from the woman's own eggs, and
  - the treatment was undertaken to try to conceive straight away.
- For a variety of reasons, not all cycles of treatment which are started results in successful egg collection and not all cycles in which eggs are collected reach the embryo transfer stage.
- The majority of cycles reaching the embryo transfer stage do not result in the conception of a pregnancy (Figure 1).

Figure 1: Outcome of ICSI treatment cycles<sup>+</sup> started in 2006 [4.1]



+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\* Cycles in which eggs were collected

\*\* Cycles in which an embryo transfer took place

\*\*\* Ultrasound confirmed pregnancies

**Results relating to treatment cycles:**

- Of the 16,470 cycles started :
  - 16,424 cycles resulted in a successful egg collection where one or more eggs were collected - 99 in every 100 treatment cycles started resulted in a successful egg collection (99%)
  - 15,468 cycles resulted in an embryo transfer - 93 in every 100 treatment cycles started reached the embryo transfer stage (93%)
  - 4,841 cycles resulted in a pregnancy (confirmed on ultrasound) - 29 in every 100 cycles started resulted in an ultrasound confirmed pregnancy (29%)  
and
  - 4,331 cycles led to the birth of one or more babies - 26 in 100 cycles started resulted in one or more live births (26%).

**Results relating to embryo transfers:**

- There were 15,468 cycles of fresh ICSI using women's own eggs which reached the embryo transfer stage:
  - 4,841 cycles resulted in a pregnancy confirmed by ultrasound - 31 in every 100 embryo transfer procedures resulted in an ultrasound confirmed pregnancy (31%)  
and
  - 4,331 cycles led to the birth of one or more babies - 28 in every 100 embryo transfers resulted in one or more live births (28%).

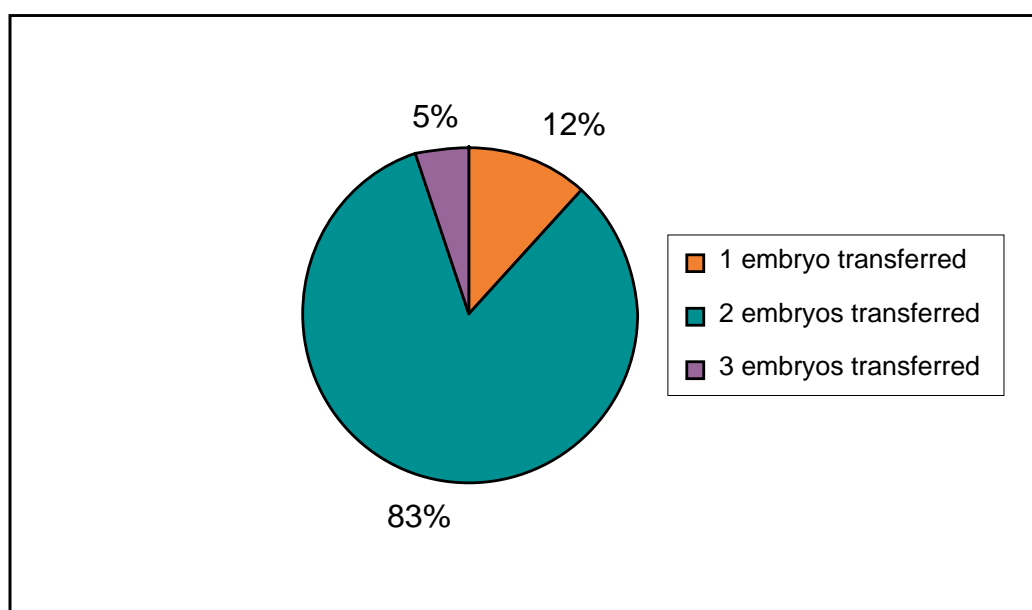
► 2. Why were treatment cycles cancelled? [4.9]

- For a variety of reasons not all cycles of treatment which are started result in a successful egg collection and not all cycles in which eggs were successfully collected reach the embryo transfer stage
- The reasons why cycles were cancelled before they reach the egg collection or embryo transfer stages include:
  - a poor response to stimulation so that no eggs or insufficient eggs were produced and the egg collection could not proceed.
  - there was a high risk of ovarian hyperstimulation syndrome (OHSS).
  - once eggs were collected and the intracytoplasmic sperm injection was carried the out fertilisation process did not occur normally and the embryo did not develop; or in some cases abnormal embryos developed which were not suitable for transfer.
  - in a small number of cases pre-implantation genetic diagnosis (PGD) or pre-implantation genetic screening (PGS) was carried out, the result was positive and there were no suitable embryos available for transfer.

► 3a. How many embryos were transferred in each treatment cycle? [4.23]

- Overall in 2006 the vast majority of embryo transfers involved the transfer of two embryos (Figure 2):
  - 12 in every 100 treatment cycles (12%) reaching the embryo transfer stage involved a single embryo transfer (1ET)
  - 83 in every 100 treatment cycles (83%) reaching the embryo transfer stage involved a double embryo transfer (2ET) and
  - five in every 100 treatment cycles (5%) reaching embryo transfer involved the transfer of three embryos (3ET).

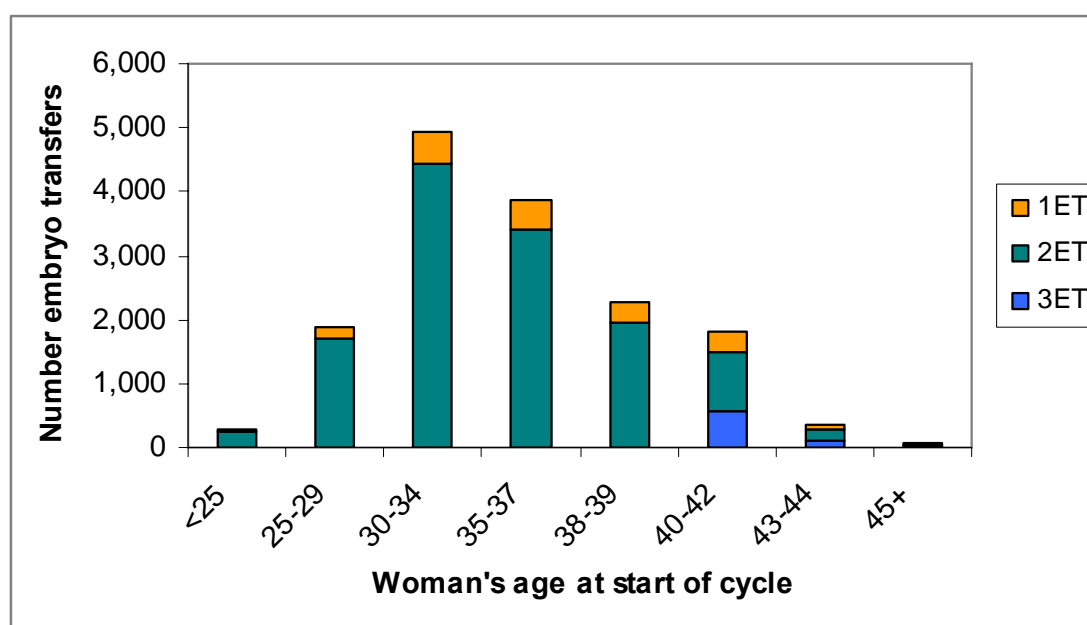
Figure 2: Number of embryos transferred in each cycle of treatment [2.24]



- Transferring a single embryo reduces the risk of multiple pregnancies, although a small number of twins can result from spontaneous splitting of a single embryo (resulting in identical twins).
- Single embryo transfer can be 'elective', where women choose to transfer just one embryo in order to minimise the risk of a multiple pregnancy, even if there is more than one embryo available. Single embryo transfer can also be 'non-elective', where women only have one embryo available to transfer.
- From the information collected on the HFEA register during 2006 it is not possible to separate elective single embryo transfer from single embryo transfer where only one embryo was available; although this will be possible in the future.
- Important: It is likely that the increasing proportion of single embryo transfers seen in older women in 2006 is due to most women only having one embryo available for transfer. This will place these women in a poorer prognosis group, with a lower chance of conception than women who are younger and/or have more embryos available for transfer.

- The data from 2006 does not reflect current practice. Since January 2009 clinics have been required by the HFEA to have a strategy setting out how they will minimise the risk of multiple births. Clinics are increasingly encouraging women with the greatest chance of conception (for example, women aged 37 years and younger who have several good quality embryos available for transfer) to have elective single embryo transfer to try and minimise the risk of multiple births.
- The proportion of single embryo transfers increased with the increasing age of the women being treated (Figure 3):
  - About eight in every 100 women under the age of 30 years had a single embryo transfer (8%) whereas
  - 28 in 100 women over the age of 45 years had a single embryo transfer (28%).
- Transfer of three embryos was performed in 32 of every 100 transfers carried out to treat women aged 40 to 44 years (32%).
- 33 in every 100 transfers carried out in women 45 years and older involved transferring three embryos (33%).
- A total of 34 cycles involving transfer of three embryos were carried out in women under the age of 40.

**Figure 3: Number of embryos transferred during ICSI by the woman's age [4.23]**



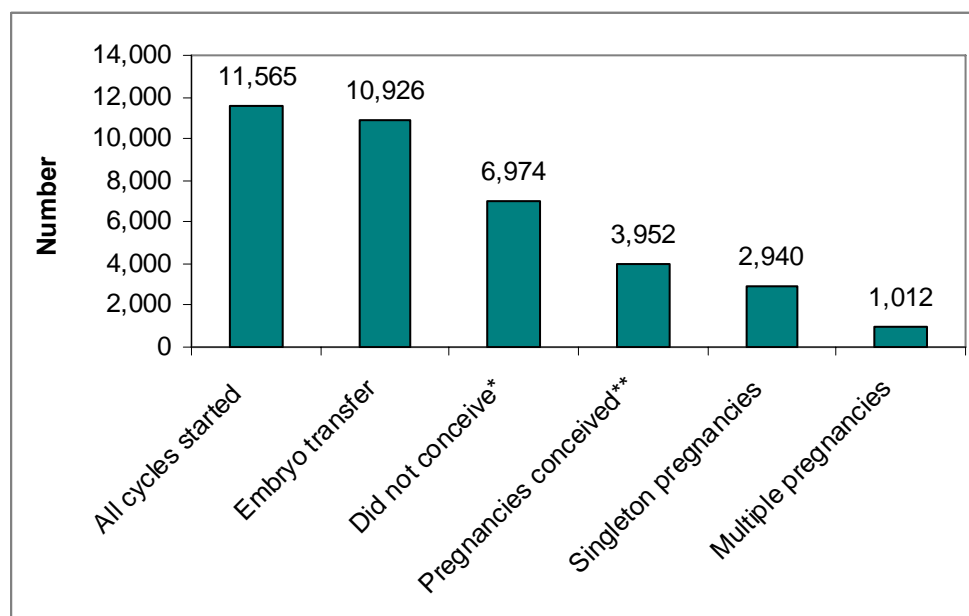
▶ 3b. At what stage of development were embryos transferred? [4.52-4.58]

- Conventionally in ICSI, following the injection of the eggs with the sperm, the embryos that develop are allowed to grow in the incubator for between two and three days they are either transferred to the woman's uterus, frozen or donated.
- More recently, embryos have been allowed to develop in the incubator for between five and seven days before transfer. This stage of development is called a blastocyst; a blastocyst consists of many more individual cells than a 2-3 day old embryo. A transfer at this stage of development is called blastocyst transfer rather than an embryo transfer.
- In 2006 blastocyst transfer was only just being introduced into clinical practice and in that year only eight in every 100 transfers involved blastocyst transfer (8%).

► 4a. How does the woman's age affect the chances of pregnancy following ICSI? [4.18]

- The outcomes following ICSI are strongly affected by the age of the women when she undergoes treatment. The results of treatment are shown for women of different ages in the following figures (4 to 7).

**Figure 4: Treatment outcomes for women age 37 years or younger when they started treatment in 2006 [4.18a]**

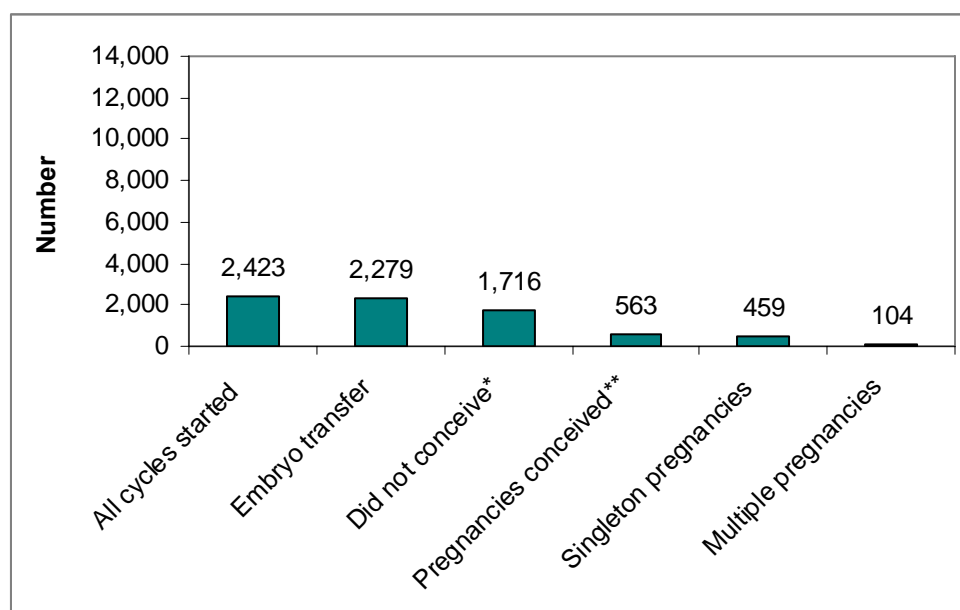


\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

\*\*Ultrasound confirmed pregnancies



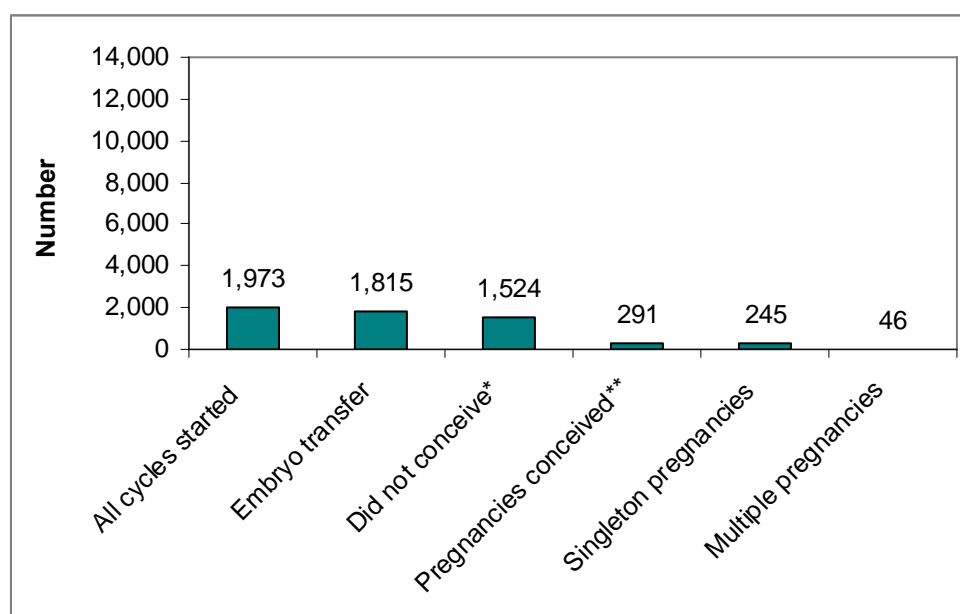
**Figure 5: Treatment outcomes for women aged 38 to 39 years when they started treatment in 2006 [4.18b]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

\*\*Ultrasound confirmed pregnancies

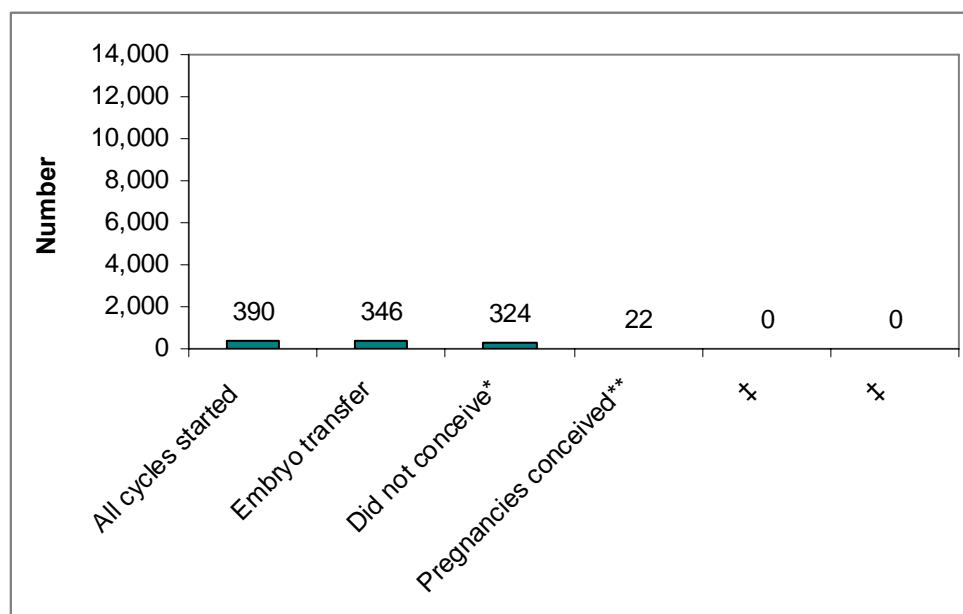
**Figure 6: Treatment outcomes for women aged 40 to 42 years when they started treatment in 2006 [4.18c]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

\*\*Ultrasound confirmed pregnancies

**Figure 7: Treatment outcomes for women aged 43 to 44 years when they started treatment in 2006 [4.18d]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

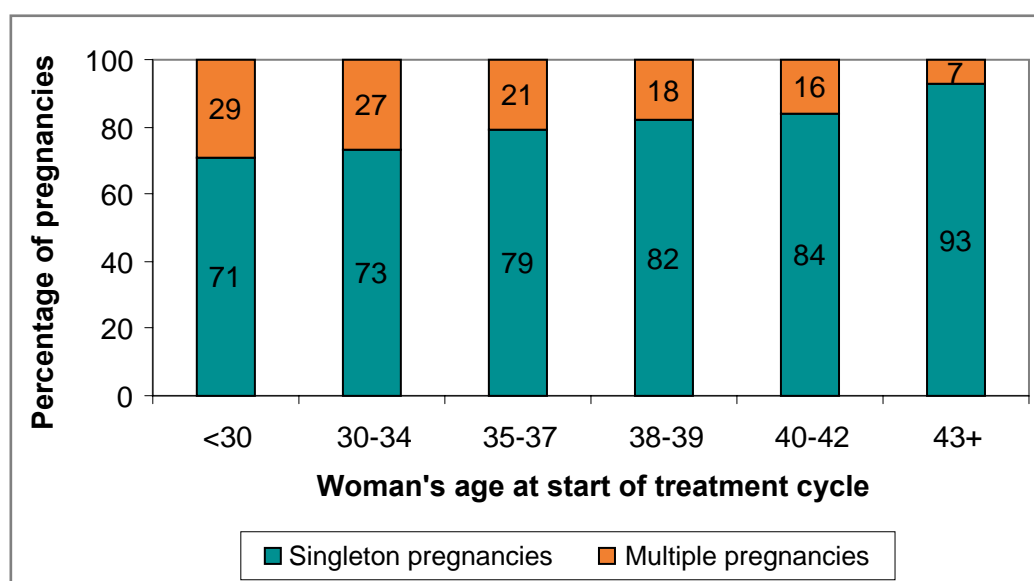
\*\*Ultrasound confirmed pregnancies

† These results are not presented because of confidentiality issues in relation to the small numbers involved

► 4b. Which women are most likely to conceive a multiple pregnancy? [4.21]

- The chance of conceiving a multiple pregnancy is affected by the age of the women when she starts treatment and the number of embryos transferred.
- Figure 8 shows the split between singleton and multiple pregnancies by the woman's age at the start of her treatment for women who became pregnant following ICSI starting in 2006.

**Figure 8: Split between singleton and multiple pregnancies by the women's age at the start of ICSI<sup>+</sup> treatment, cycles started in 2006 [4.21]**



+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

The following figures only relate to the women who became pregnant following ICSI:

- Over two-thirds of the women who were less than 30 years old and conceived following ICSI were pregnant with a singleton pregnancy;
  - 71 in every 100 women less than 30 years old who conceived were pregnant with a singleton (71%) and 29 in every 100 conceived a multiple pregnancy (29%).
- The chances of conceiving following ICSI decline as the age of the woman increases. At the same time, for those who do conceive, the chance of conceiving a singleton rather than a multiple pregnancy increases as women get older.
- 93 in 100 women who were 43 years and older when they conceived were pregnant with a singleton (93%) and seven in 100 conceived a multiple pregnancy (7%).

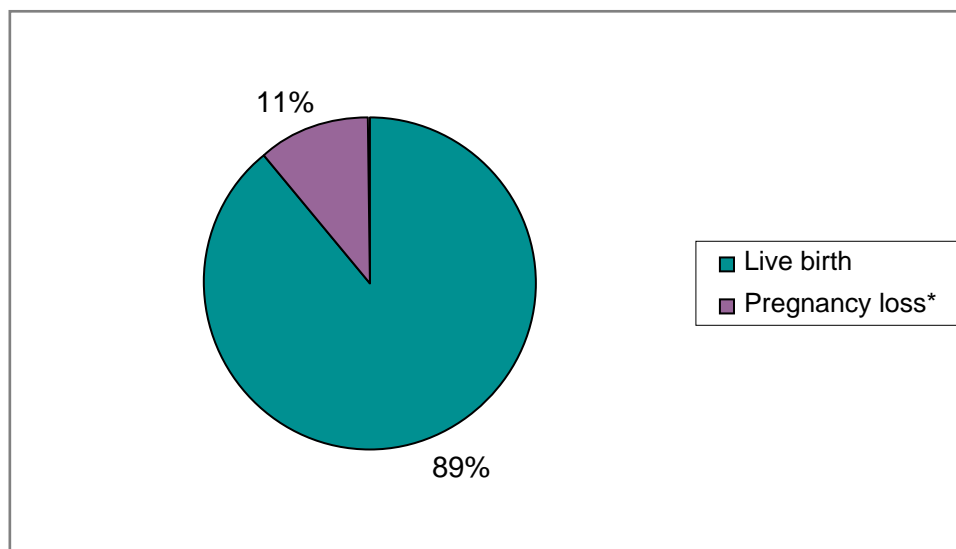
► **5a. What can happen to a pregnancy conceived by ICSI – will a baby always be born? [4.10-4.17, 4.19]**

- Overall 4,841 women conceived a pregnancy following ICSI treatment which started in 2006:
  - 4,331 of these pregnancies resulted in the birth of at least one baby (live birth – see glossary);
    - 89 in every 100 women who conceived an ICSI pregnancy gave birth to at least one baby (89%).
  - 3,675 of these women were pregnant with a single pregnancy:
    - 3,219 of these singleton pregnancies resulted in the birth of a baby (live births);
      - 88 in every 100 women who conceived an ICSI singleton pregnancy gave birth to a baby (88%) and
      - 12 in every 100 women who conceived an ICSI singleton pregnancy had a miscarriage, an ectopic pregnancy, a termination or the baby was stillborn (12%).
  - 1,166 of these women were pregnant with a multiple pregnancy:
    - 985 of the multiple pregnancies resulted in the birth of all the babies (all the babies were born alive; that is both twins or all three triplets);
      - 84 in every 100 women who conceived an ICSI multiple pregnancy gave birth to all the babies (84%).
    - 126 of the multiple pregnancies resulted in the birth of at least one baby (one of the twins and one or two of the triplets);
      - 11 in every 100 women who conceived an ICSI multiple pregnancy gave birth to at least one baby but fewer babies than she was originally pregnant with (11%).
    - 54 of the multiple pregnancies resulted in the pregnancy being lost to miscarriage, an ectopic pregnancy, termination or the babies were stillborn;
      - five in every 100 women who conceived an ICSI multiple pregnancy had a miscarriage, an ectopic pregnancy, a termination, or a stillbirth and none of the babies were born alive (5%).
- Pregnancy outcomes are affected by whether the pregnancy is a singleton or a multiple pregnancy and by the age of the woman when she starts the ICSI treatment cycle. This is illustrated in Figures 9 and 10 for women pregnant with singleton pregnancies.

### Outcomes for singleton pregnancies

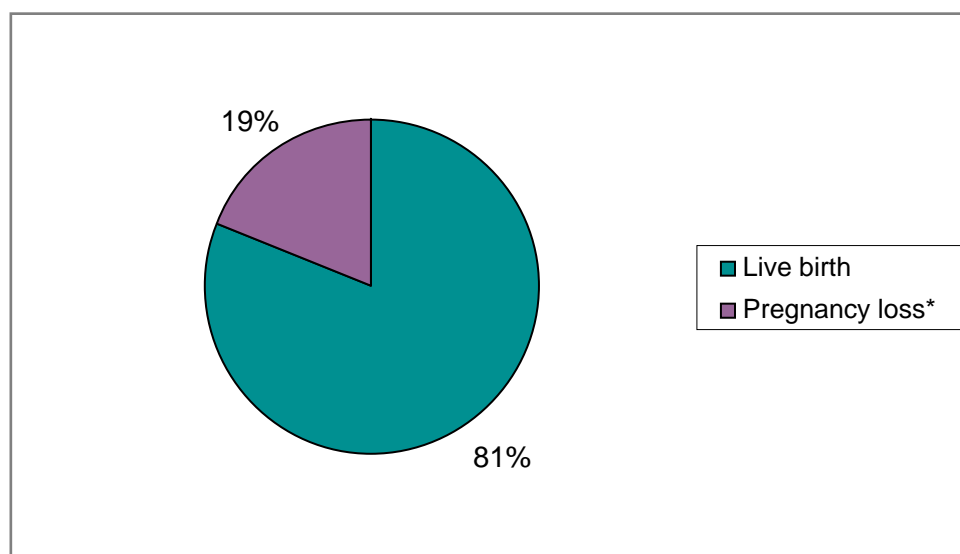
- Women pregnant with a singleton who were aged 37 years or younger at the start of the treatment cycles were more likely to have a baby than women who were aged 38 years and over:
  - 89 in every 100 women **aged 37 years or younger** with a singleton pregnancy following ICSI gave birth to a baby (89%). The remaining 11 in 100 women lost the pregnancy to either miscarriage, an ectopic pregnancy, termination or a stillbirth (11%) whereas
  - 81 in every 100 women **aged 38 years or older** with a singleton pregnancy following ICSI gave birth to a baby (81%). The remaining 19 in 100 women lost the pregnancy to either miscarriage, an ectopic pregnancy, termination or a stillbirth (19%).

**Figure 9: Singleton pregnancy outcomes following ICSI treatment for women aged 37yrs of younger at the start of the treatment cycle [4.19a]**



\* Pregnancy lost to miscarriage, ectopic pregnancy, termination or stillbirth

**Figure 10: Singleton pregnancy outcomes following ICSI treatment for women aged 38 years of older at the start of the treatment cycle [4.19b]**

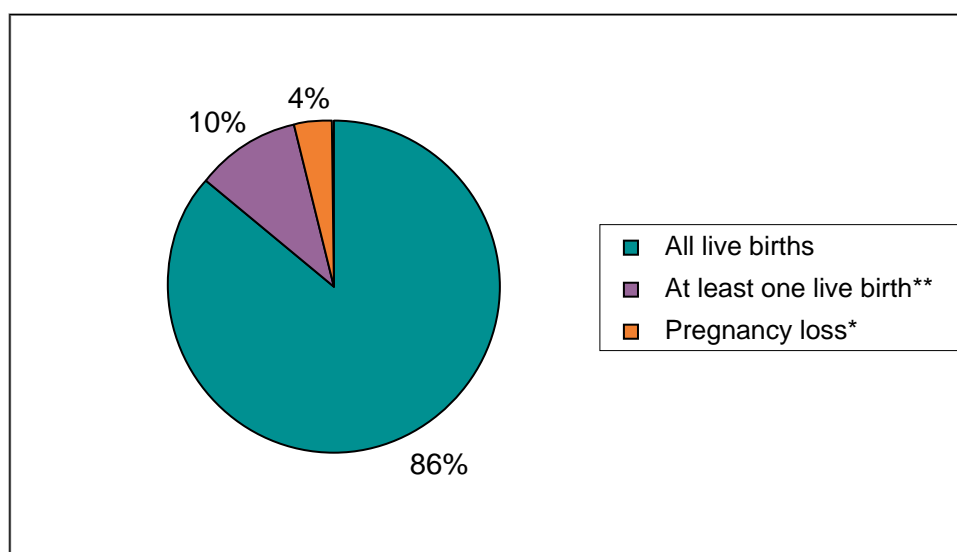


\* Pregnancy lost to miscarriage, ectopic pregnancy, termination or stillbirth

### Outcomes for multiple pregnancies

- Pregnancy outcomes are more complicated for multiple pregnancies. For twins both babies may be born, or one baby may be born and one lost to miscarriage, termination or stillbirth, or both babies may be lost. The situation is even more complicated for triplets where all the babies may be born, or two, or just one with the others being lost during pregnancy.
- As with singleton pregnancies the outcomes are affected by the age of the women when she starts the treatment cycle. This is illustrated in Figures 11 and 12.
- Women pregnant with a multiple pregnancy who were aged 37 years or younger at the start of the treatment cycles were more likely to give birth to more than one of the babies than women who were aged 38 years and over:
  - 86 in every 100 women **aged 37 years or younger** with a multiple pregnancy following ICSI gave birth to all the babies (86%). Ten in every 100 women gave birth to at least one, but not all of the multiples (10%). The remaining four in 100 women lost the entire pregnancy to either miscarriage, an ectopic pregnancy, termination or a stillbirth (4%) whereas
  - 73 in every 100 women **aged 38 years or older** with a multiple pregnancy following ICSI gave birth to all the babies (73%). 17 in every 100 women gave birth to at least one, but not all of the multiples (17%). The remaining 10 in 100 women lost the entire pregnancy to either miscarriage, an ectopic pregnancy, termination or a stillbirth (10%).

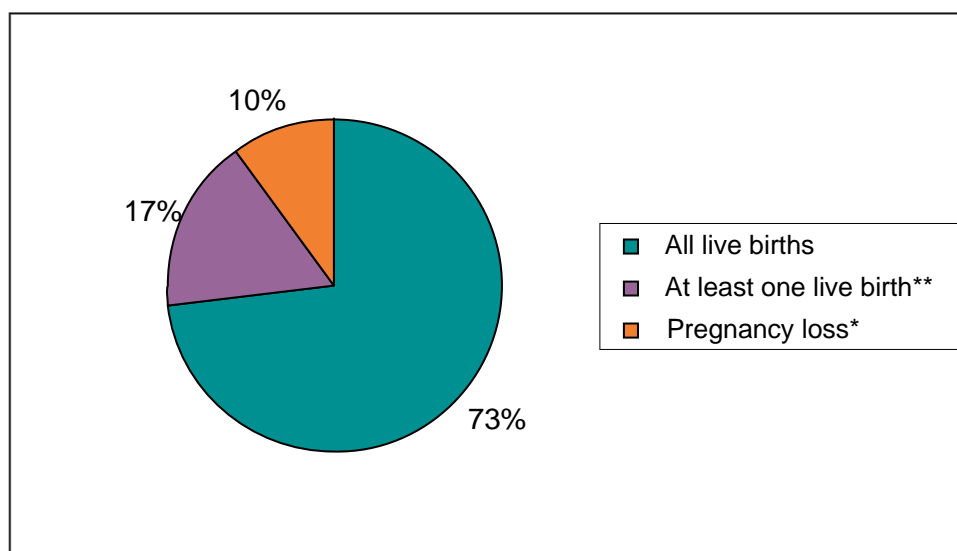
**Figure 11: Multiple pregnancy outcomes following ICSI treatment for women aged 37yrs of younger at the start of the treatment cycle [4.19c]**



\*Pregnancy entirely lost to miscarriage, ectopic pregnancy, termination or stillbirth

\*\*At least one baby is born (alive) but the other co-multiples were lost to miscarriage, termination of pregnancy or stillbirth

**Figure 12: Multiple pregnancy outcomes following ICSI treatment for women aged 38 years of older at the start of the treatment cycle [4.19d]**



\*Pregnancy entirely lost to miscarriage, ectopic pregnancy, termination or stillbirth

\*\*At least one baby is born (alive) but the other co-multiples were lost to miscarriage, termination of pregnancy or stillbirth

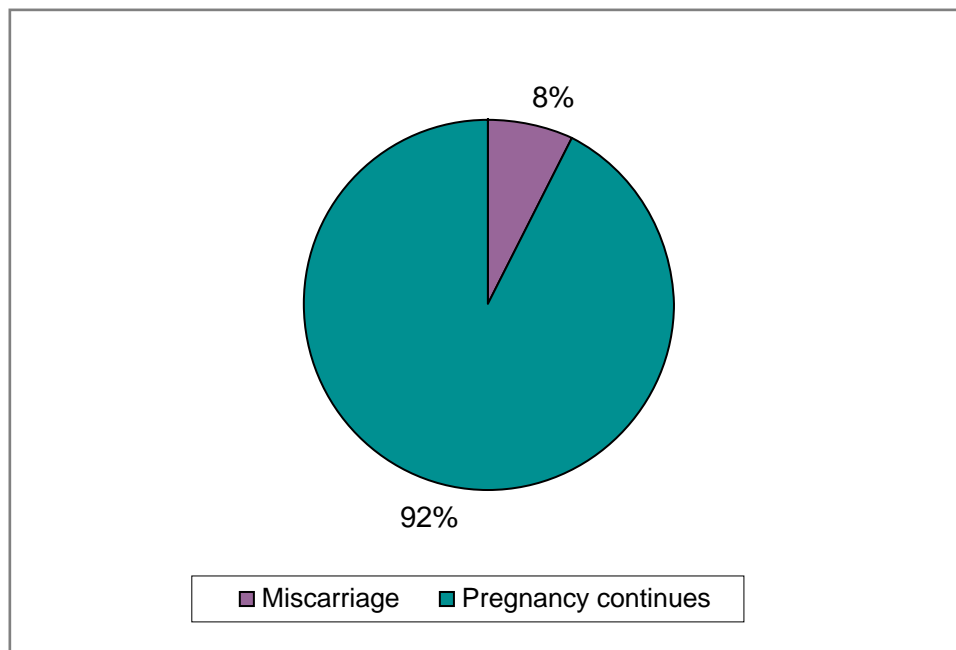
► 5b. What is the risk of miscarriage following ICSI? [4.20]

- A total of 4,841 women became pregnant following ICSI treatment which started in 2006; this includes only those pregnancies confirmed by an ultrasound scan.
- A total of 464 of these women miscarried the pregnancy - 10 in every 100 women with ultrasound confirmed pregnancies (10%) experienced a miscarriage in early pregnancy.

**Risk of miscarriage by the woman's age**

- Women who were older when they were treated were more likely to miscarry than younger women (Figures 13 and 14):
  - Eight in every 100 women who were 37 years old or younger when they started treatment (8%) miscarried the pregnancy whereas
  - 16 in every 100 women who were 38 years or older when treated (16%) had a miscarriage.

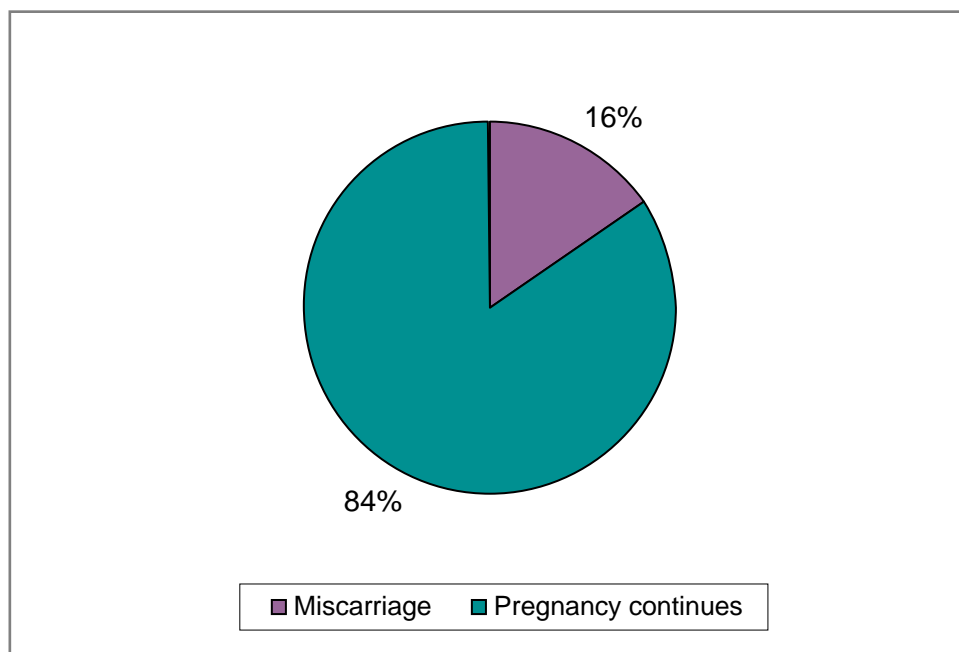
**Figure 13: Risk of miscarriage for pregnancies\* conceived by women aged 37 years and younger [4.20a]**



\*Ultrasound confirmed pregnancies, excludes those pregnancies with only a positive blood test and not confirmed on ultrasound



**Figure 14: Risk of miscarriage for pregnancies\* conceived by women aged 38 years and older [4.20b]**



\*Ultrasound confirmed pregnancies, excludes those pregnancies with only a positive blood test and not confirmed on ultrasound

### Risk of miscarriage in singleton and multiple pregnancies

- A total of 4,841 women became pregnant following ICSI which started in 2006; this includes only those pregnancies confirmed by an ultrasound scan.
- Of the 4,841 women:
  - 3,675 women were pregnant with a single fetus (76%)
  - 1,149 women were pregnant with twins (24%)  
and
  - 17 women were pregnant with triplets (<1%).
- It is important to know that even though a pregnancy may be conceived as a multiple pregnancy, sometimes one of the fetuses is lost spontaneously (and this may or may not be accompanied by bleeding), resulting in the birth of only one baby from a pregnancy that started as a multiple pregnancy
- The risk of miscarriage was different for women who were carrying a singleton pregnancy compared with a multiple pregnancy:
  - 11 in every 100 women pregnant with a singleton had a miscarriage (11%) whereas
  - five in every 100 women pregnant with twins experienced a miscarriage and lost the pregnancy completely (5%). However, a further 10 in every 100 (10%) of the women pregnant with twins experienced the spontaneous loss of one of the fetuses and delivered a single baby from her pregnancy which was originally conceived as a twin pregnancy.

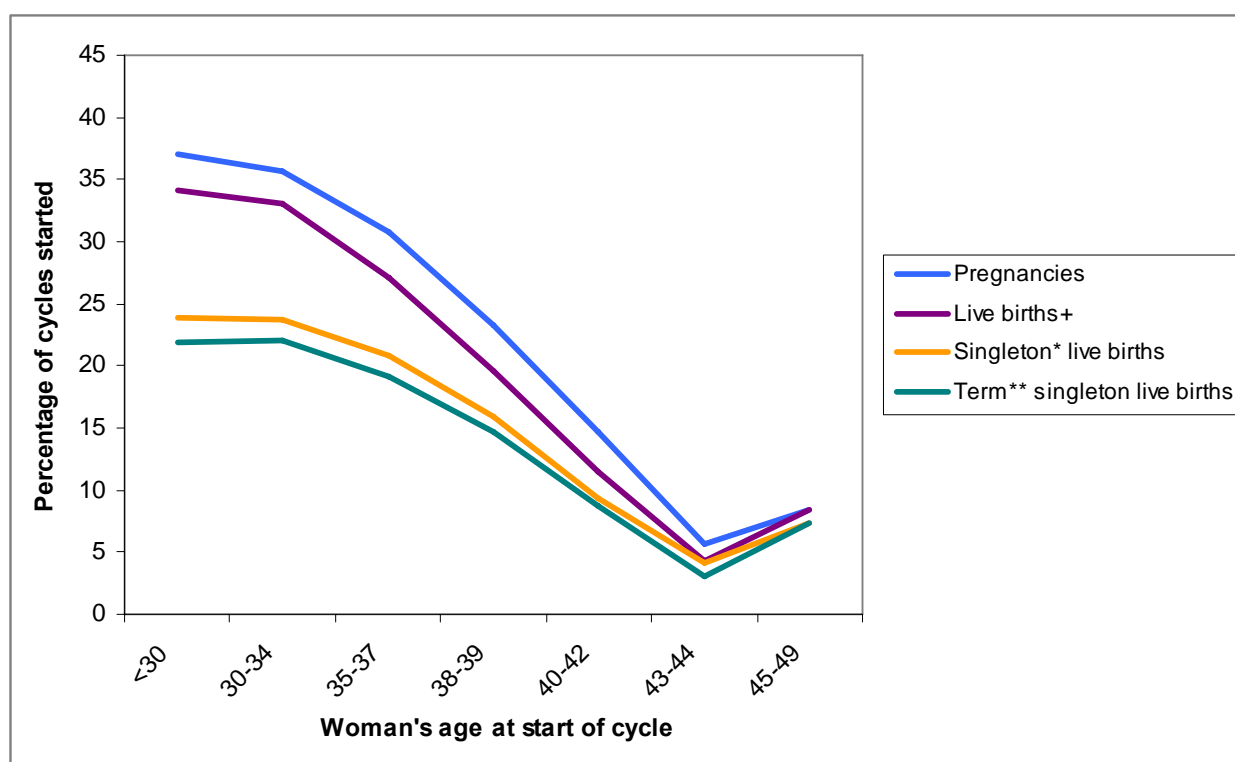
Please note that because of the small number of triplet pregnancies the results relating to miscarriage are not presented here because of confidentiality issues.

► 6. How does a woman's age affect birth outcomes following ICSI?  
[4.10-4.16]

Results starting from when a treatment cycle begins:

- The effects of the woman's age on the chances of becoming pregnant and delivering a baby are shown in Figure 15 as a proportion of the treatment cycles started in 2006.

Figure 15: Pregnancy and birth outcomes for treatment cycles started in 2006  
[4.10-4.16a]



+ Live births - pregnancies resulting in the delivery of one or more live births

\*Singleton live births - live births resulting from singleton pregnancies, excludes multiple pregnancies which result in just one live birth

\*\* Term – refers to a live birth born following a full-term pregnancy at 37 or more weeks gestation of pregnancy

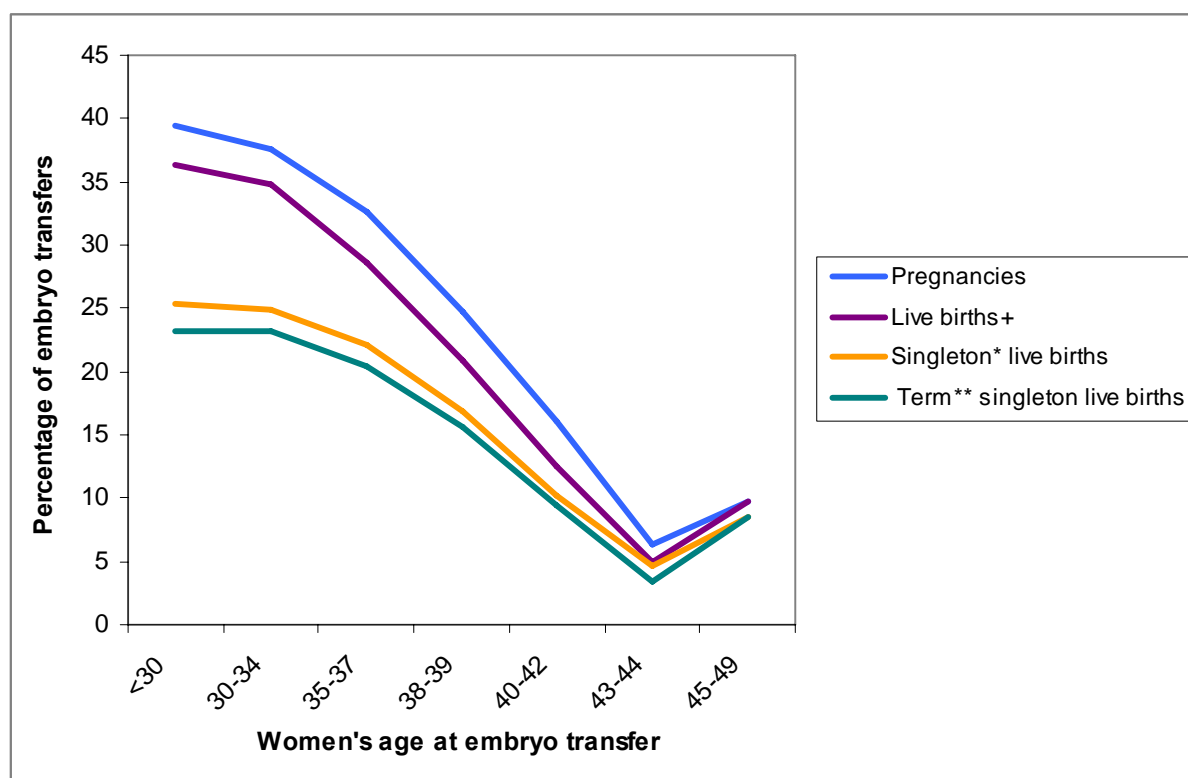
- The results for women less than 38 years of age are broadly similar and so are presented for all women under this age combined. Whereas, the results for women 38 years and older change markedly for every year increase in age. For this reason the results for these women are presented below in more detail.
- Women who were **37 years old or younger** when they started treatment had 11,565 cycles of treatment between them which resulted in:
  - 3,952 ultrasound confirmed pregnancies;
    - 34 in every 100 treatment cycles started (34%) resulted in a pregnancy confirmed on an ultrasound scan.

- 3,598 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 31 in every 100 treatment cycles started (31%) resulted in the birth of at least one baby.
  - 2,625 singleton pregnancies which resulted in a live birth;
    - 23 in every 100 treatment cycles started (23%) led to a singleton pregnancy which resulted in the birth of a baby.
  - 2,427 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 21 in every 100 treatment cycles started (21%) resulted in a live birth born at term.
- Women who were **aged 38 to 39** when they started treatment received 2,423 cycles of treatment between them which resulted in:
    - 563 ultrasound confirmed pregnancies;
      - 23 in every 100 treatment cycles started (23%) resulted in a pregnancy confirmed on an ultrasound scan.
    - 476 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
      - 20 in every 100 treatment cycles started (20%) resulted in the birth of at least one baby.
    - 384 singleton pregnancies which resulted in a live birth;
      - 16 in every 100 treatment cycles started (16%) led to the conception of a singleton pregnancy which resulted in the birth of a baby.
    - 356 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
      - 15 in every 100 treatment cycles started (15%) resulted in a live birth born at term.
  - Women who were **aged 40 to 42** when they started treatment received 1,973 cycles of treatment between them which resulted in:
    - 291 ultrasound confirmed pregnancies;
      - 15 in every 100 treatment cycles started (15%) resulted in a pregnancy confirmed on an ultrasound scan.
    - 227 pregnancies which resulted in the birth of one or more babies (live births of which some were singleton, twins or triplets);
      - 11 in every 100 treatment cycles started (11%) resulted in the birth of at least one baby.
    - 184 singleton pregnancies which resulted in a live birth;
      - nine in every 100 treatment cycles started (9%) led to the conception of a singleton pregnancy which resulted in the birth of a baby.
    - 171 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
      - nine in every 100 treatment cycles started (9%) resulted in a live birth born at term.
  - There were 390 treatment cycles received by women who were **aged 43 to 44** when they started treatment. These resulted in 22 pregnancies of which 17 led to the birth of one or more babies.
  - There were 95 treatment cycles received by women who were **45 years or older** when they started treatment which resulted in eight pregnancies leading to the birth of one of more babies.

### Results starting from the point of embryo transfer:

- For a variety of reasons (see section 2) not all treatment cycles which are started reach the stage of embryo transfer. The results of treatment from the point that an embryo transfer has been carried out are shown below. These figures are useful to help understand the chances of pregnancy and of having a baby are once an embryo transfer has taken place.
- The effects of the woman's age on the chances of becoming pregnant and delivering a baby are shown from the point of embryo transfer as a proportion of the embryo transfers for treatment started in 2006 (Figure 16).

**Figure 16: Pregnancy and birth outcomes for embryo transfers as part of treatment started 2006 [4.10-4.16b]**



+ Live births - pregnancies resulting in the delivery of one or more live births

\*Singleton live births - live births resulting from singleton pregnancies, excludes multiple pregnancies which result in just one live birth

\*\* Term – refers to a live birth born following a full-term pregnancy at 37 or more weeks gestation of pregnancy

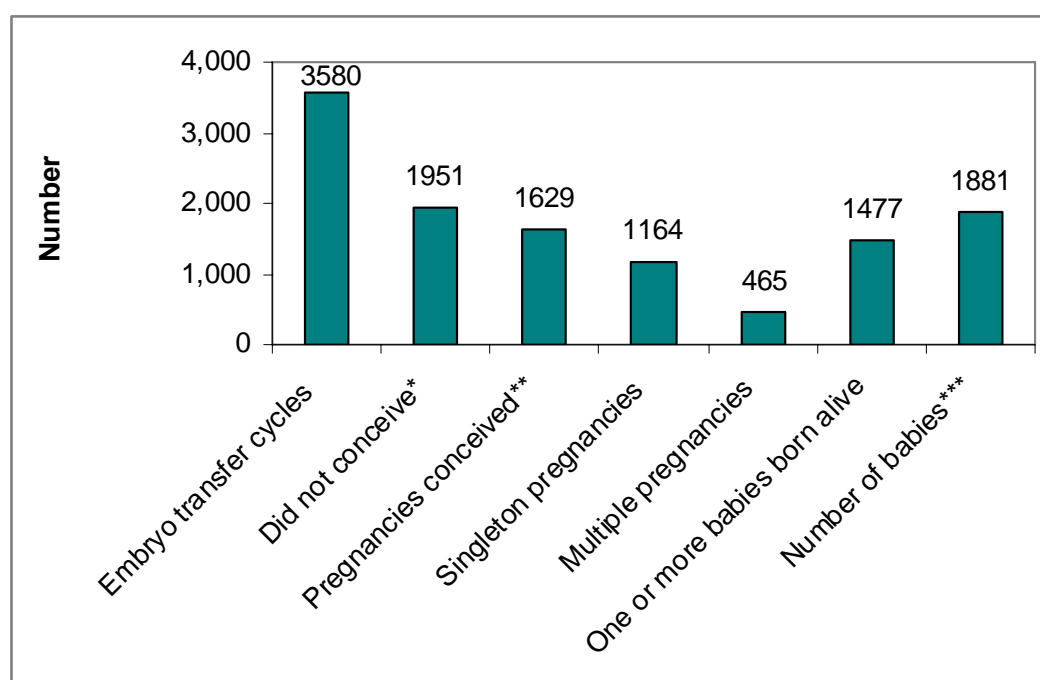
- Women who were **37 years old or younger** when they were treated had 10,926 embryo transfers between them which resulted in:
  - 3,952 ultrasound confirmed pregnancies;
    - 36 in every 100 embryo transfers (36%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 3,598 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 33 in every 100 embryo transfers (33%) resulted in the birth of at least one baby.
  - 2,625 singleton pregnancies which resulted in a live birth;
    - 24 in every 100 (24%) embryo transfers led to the conception of a singleton pregnancy which resulted in the birth of a baby.
  - 2,427 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 22 in every 100 embryo transfers (22%) resulted in a live birth born at term.
  
- Women who were **aged 38 to 39** when they started treatment had 2,279 embryo transfers between them which resulted in:
  - 563 ultrasound confirmed pregnancies;
    - 25 in every 100 embryo transfers (25%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 476 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 21 in every 100 embryo transfers (21%) resulted in the birth of at least one baby.
  - 384 singleton pregnancies which resulted in a live birth;
    - 17 in every 100 embryo transfers (17%) led to the conception of a singleton pregnancy which resulted in the birth of a baby.
  - 356 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 16 in every 100 embryo transfers (16%) resulted in a live birth born at term.

- Women who were **aged 40 to 42** when they started treatment had 1,815 embryo transfers between them which resulted in:
  - 291 ultrasound confirmed pregnancies;
    - 16 in every 100 embryo transfers (16%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 227 pregnancies which resulted in the birth of one or more babies (live births of which some were singleton, twins or triplets);
    - 13 in every 100 embryo transfers (13%) resulted in the birth of at least one baby.
  - 184 singleton pregnancies which resulted in a live birth;
    - 11 in every 100 embryo transfers (11%) led to the conception of a singleton pregnancy which resulted in the birth of a baby.
  - 171 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - nine in every 100 embryo transfers (9%) resulted in a live birth born at term.
- There were 346 embryo transfers carried out for women who were **aged 43 to 44** when they started treatment. These resulted in 22 ultrasound confirmed pregnancies of which 17 led to the birth of one or more babies.
- There were 95 treatment cycles received by women who were **45 years or older** when they started treatment that led to 82 embryo transfers which resulted in eight pregnancies leading to the birth of one of more babies.

## ► 7. Good prognosis patient outcomes [4.37-4.39]

- Women aged 37 years and younger who have several good quality embryos available for transfer have the greatest chance of conception.
- The data held on the HFEA register does not include information about embryo quality. As an alternative, results are given here for women aged 37 years and younger who still have embryos available once a transfer has taken place. This section gives the treatment results specifically for that group of women (Figure 17).

**Figure 17: Treatment outcomes for women aged 37 years or younger who had extra embryos available, for treatment started in 2006 [4.37a]**



\*Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

\*\* Ultrasound confirmed pregnancies

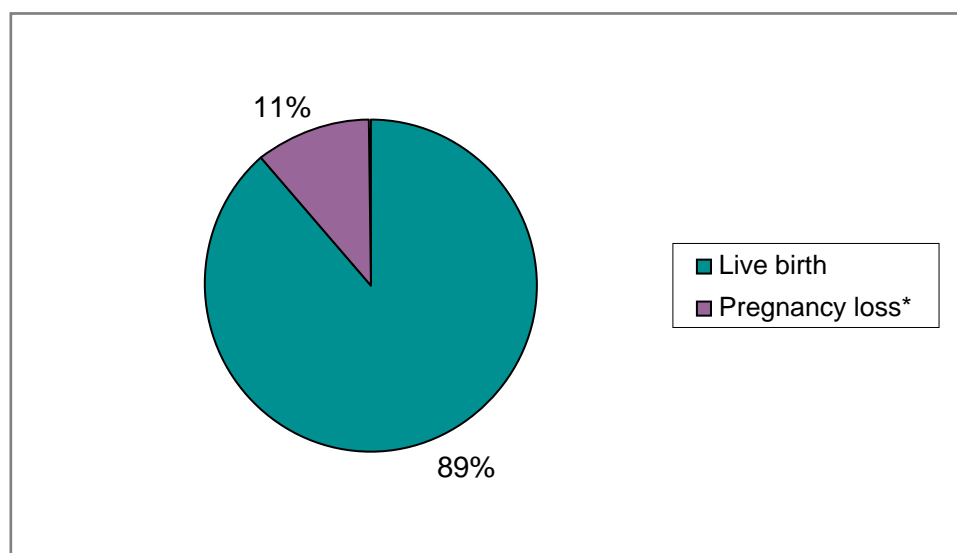
\*\*\*Total number of babies born alive – includes multiple births

- In 2006, there was a total of 3,580 embryo transfer procedures following ICSI from which:
  - 1,951 women did not conceive - 54 in 100 embryo transfer procedures (54%).
  - 1,629 ultrasound confirmed pregnancies were conceived - 46 in 100 embryo transfer procedures resulted in conception (46%).
  - 1,477 pregnancies resulted in the birth of at least one baby:
    - 41 in every 100 embryo transfers resulted in at least one birth, some of which were multiple births (41%)
  - and
  - a total of 1,881 babies were born (alive).



- Of the 1,629 pregnancies conceived:
  - 1,164 were single pregnancies - 71 in 100 pregnancies were singletons (71%).
  - 465 were multiple pregnancies - 29 in 100 pregnancies were multiple pregnancies (29%).
- Of the 1,164 women pregnant with a singleton pregnancy 1,032 gave birth to a baby (Figure 18):
  - 89 in every 100 women gave birth to a baby (89%).
  - 11 in every 100 women lost the pregnancy to either miscarriage, an ectopic pregnancy, termination or the baby was stillborn (11%).

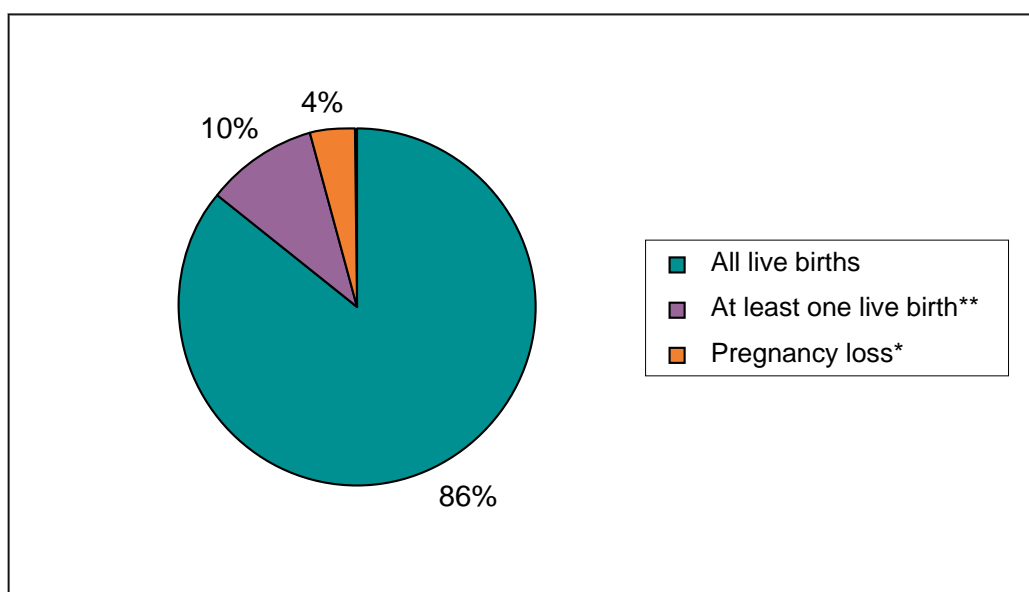
**Figure 18: Singleton pregnancy outcomes following ICSI for women aged 37 years or younger who had extra embryos available, for treatment started in 2006 [4.37b]**



\*Pregnancy lost to miscarriage, ectopic pregnancy, termination or stillbirth

- Of the 465 women pregnant with a multiple pregnancy, 399 gave birth to all the babies conceived, 46 gave birth to at least one, but not all of the multiples, and 20 women lost the pregnancy (Figure 19):
  - 86 in every 100 women pregnant with a multiple pregnancy gave birth to all the babies (86%).
  - 10 in every 100 women pregnant with a multiple pregnancy gave birth to at least one, but not all of the multiples (10%) with at least one baby lost to miscarriage, ectopic pregnancy, termination or stillbirth.
  - 4 in every 100 women pregnant with a multiple pregnancy lost the entire pregnancy to miscarriage, ectopic pregnancy, termination or stillbirth.

Figure 19: Singleton pregnancy outcomes following ICSI for women aged 37 years or younger who had extra embryos available, for treatment started in 2006 [4.37b]

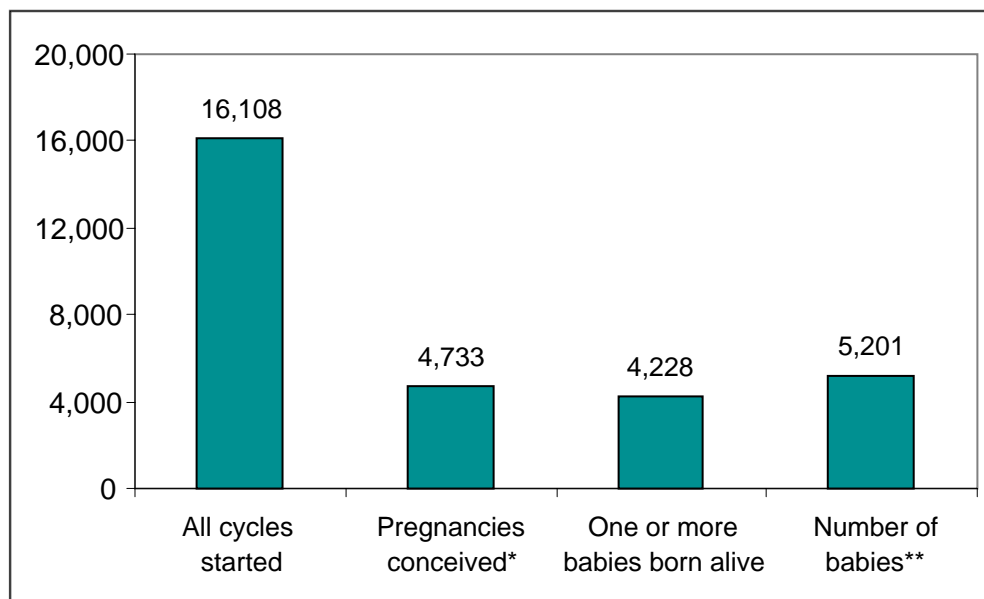


\*Pregnancy entirely lost to miscarriage, ectopic pregnancy, termination or stillbirth

\*\*At least one baby born (alive) but the other co-multiples, are lost to miscarriage, termination of pregnancy or stillbirth

- ▶ **8. Are the outcomes of treatment affected by whether the sperm used comes from the woman's partner or a donor? [4.43]**
- 16,470 ICSI treatment cycles were started in 2006 of these:
    - in 16,108 the intention was to use the woman's partner's sperm - 98 in every 100 cycles started involved partner sperm (98%).
    - in 362 donor sperm was used - only 2 in every 100 cycles started involved donor sperm (2%).
  - Of the 16,108 cycles involving partner sperm 4,733 women became pregnant (Figure 20);
    - 29 in every 100 cycles started led to a woman becoming pregnant (29%)
    - 4,228 of these pregnancies resulted in the birth of at least one baby (live birth) - 26 in every 100 cycles started led to the birth of at least one baby (26%)
    - and
    - a total of 5,201 babies were born.

**Figure 20: Outcome of ICSI<sup>+</sup> treatment cycles using partner sperm, cycles started in 2006 [4.43a]**



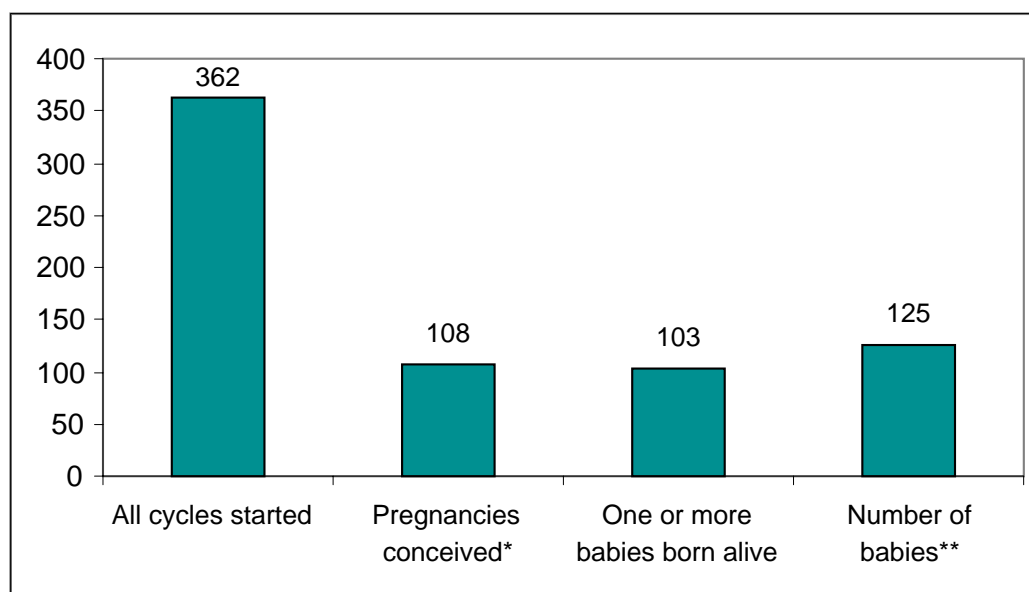
+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Ultrasound confirmed pregnancies

\*\* Total number of babies born alive – includes multiple births

- Of the 362 cycles involving donor sperm 108 women became pregnant (Figure 21);
  - 30 in every 100 cycles started led to a pregnancy being conceived (30%)
  - 103 of these pregnancies resulted in the birth of at least one baby (live birth)
  - 29 in every 100 cycles started led to the birth of at least one baby (29%)
  - and
  - a total of 125 babies were born.

**Figure 21: Outcome of ICSI<sup>+</sup> treatment cycles using donor sperm, cycles started in 2006 [2.43b]**



+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

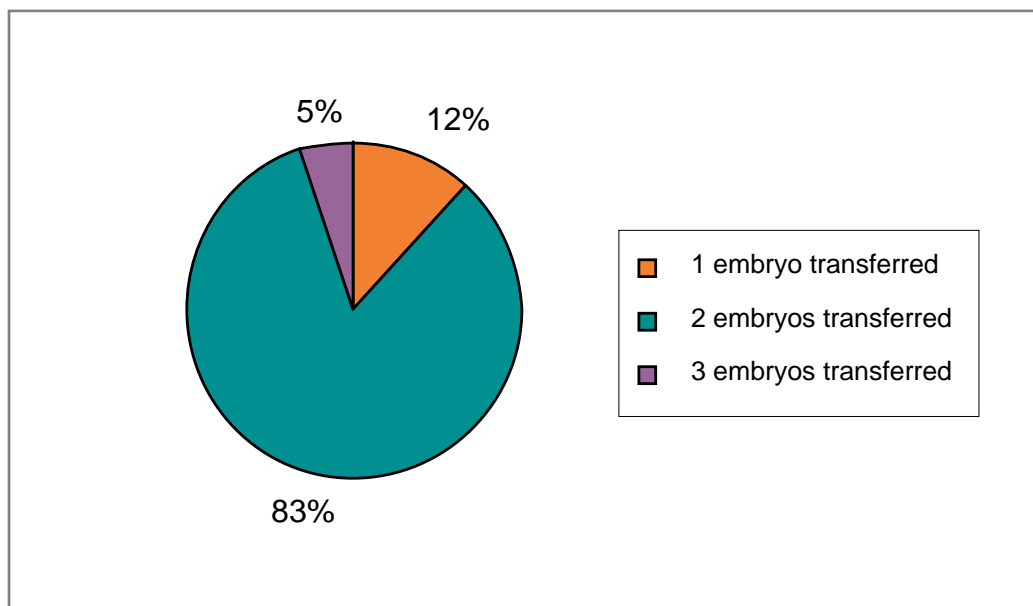
\*Ultrasound confirmed pregnancies

\*\* Total number of babies born alive – includes multiple births

► 9. What is the effect of the number of embryos transferred on the number of babies born? [4.24]

- 15,468 cycles of ICSI treatment which started in 2006 reached the embryo transfer stage, of these (Figure 22):
  - 12% involved the transfer of a single embryo (SET).
  - 83% involved the transfer of two embryos (DET) – a double embryo transfer.
  - 5% involved the transfer of three embryos (these were in women aged 40 years and over).

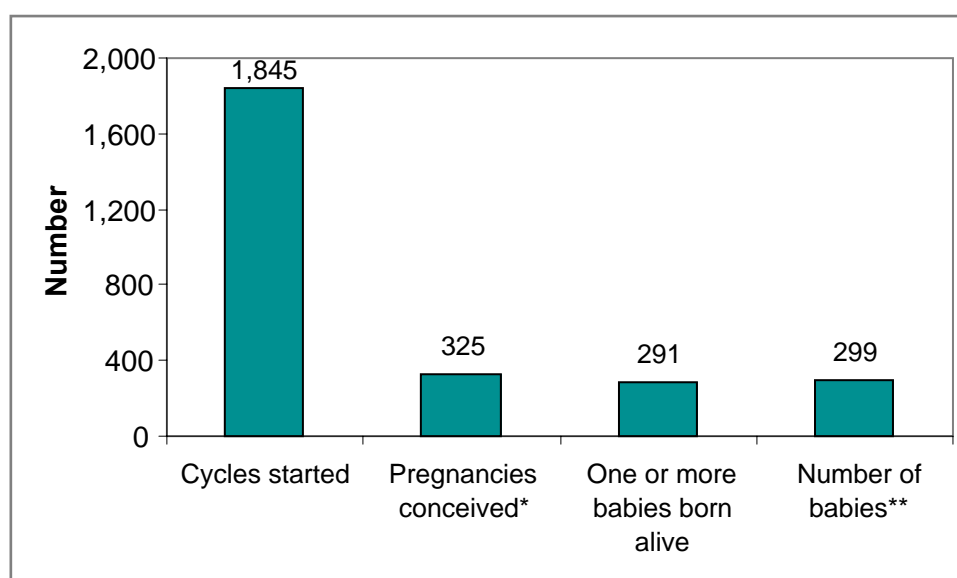
Figure 22: Number of embryos transferred in each cycle of treatment [4.24]



- The 1,845 single embryo transfers (SET) led to 325 pregnancies. 291 women gave birth to at least one baby (live birth) and in total 299 babies were born (live births) (Figure 23):
  - 82 in every 100 single embryo transfer procedures did not lead to an ultrasound confirmed pregnancy (82%)  
whereas
  - 18 in every 100 single embryo transfers led to a pregnancy (18%)
  - 16 in every 100 women who had a single embryo transfer gave birth to at least one baby (16%)
  - a small number of these women gave birth to twins which would have resulted from the spontaneous splitting of the single embryo transferred, resulting in identical twins.
- Single embryo transfer can be 'elective', where women choose to transfer just one embryo in order to minimise the risk of a multiple pregnancy, even if there is more than one embryo available. Single embryo transfer can also be 'non-elective', where women only have one embryo available to transfer.
- From the information collected on the HFEA register during 2006 it is not possible to separate elective single embryo transfer from single embryo transfer where only one embryo was available; although this will be possible in the future.

- It is likely that the majority of women who had single embryo transfer in 2006 only had one embryo available for transfer. This will place these women in a poorer prognosis group, with a lower chance of conception than women who are younger and/or have more embryos available for transfer.
- The data from 2006 does not reflect current practice. Since January 2009 clinics are required by the HFEA to have a strategy setting out how they will minimise the risk of multiple births. Clinics are increasingly encouraging women with the greatest chance of conception (for example, women aged 37 years and younger who have several good quality embryos available for transfer) to have elective single embryo transfer to try and minimise the risk of multiple births.

**Figure 23: Outcome of ICSI treatment cycles<sup>+</sup> involving single embryo transfer (SET) started in 2006 [4.24b]**



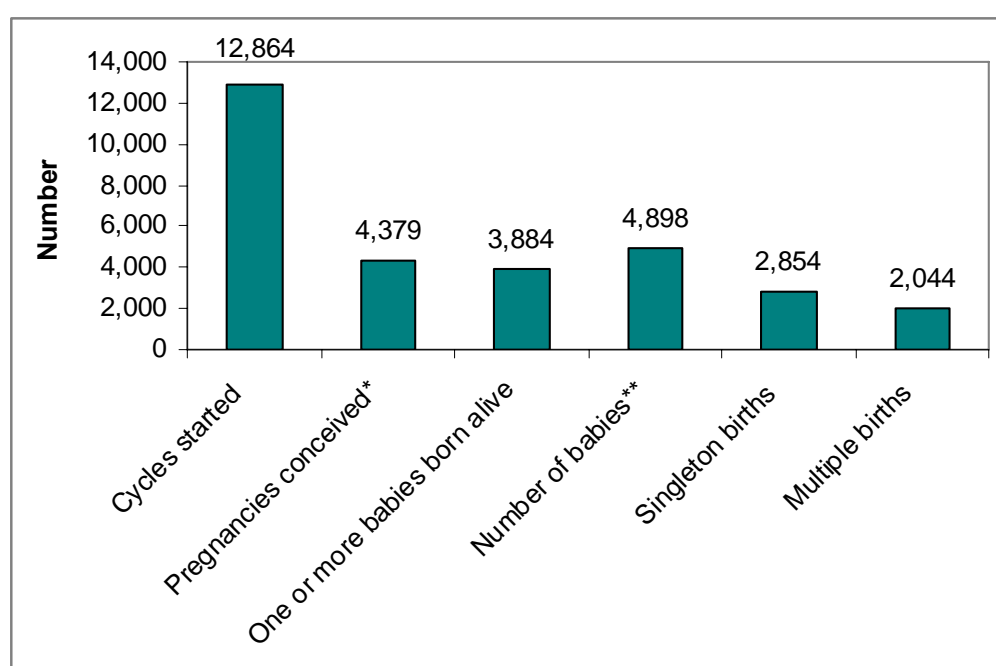
+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Ultrasound confirmed pregnancies

\*\* The total number of babies born alive – which include a small number of multiples

- 12,864 double embryo transfers (DET) led to 4,379 pregnancies and 3,884 women gave birth to at least one baby. In total 4,898 babies were born (live births) and 2,044 of them were multiple births (Figure 24):
  - 34 in every 100 double embryo transfers led to a pregnancy (34%).
  - 30 in every 100 women who had a double embryo transfer gave birth to at least one baby (30%).
  - 26 in every 100 of the pregnancies following double embryo transfer were multiple pregnancies (26%).
  - 39 in every 100 of the babies born following double embryo transfer were born as one of a multiple birth (39%).

**Figure 24: Outcome of ICSI treatment cycles<sup>+</sup> involving double embryo transfer (DET) started in 2006 [4.24c]**



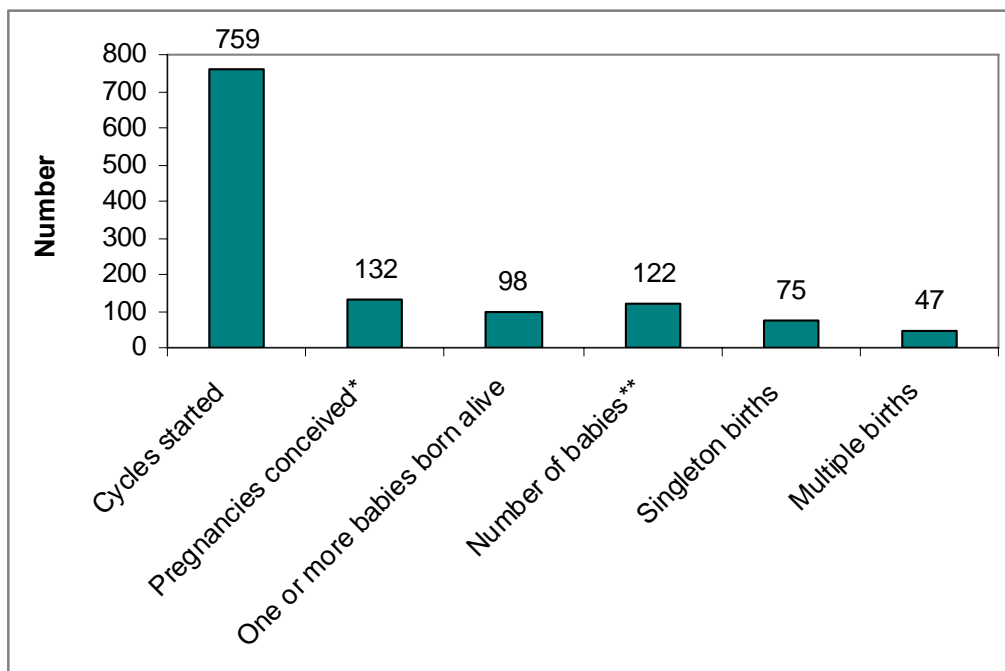
+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Ultrasound confirmed pregnancies

\*\* The total number of babies born alive

- 759 three embryo transfers (3ET) led to 132 pregnancies and 98 women gave birth to at least one baby. In total 122 babies were born (live births) and 47 of them were multiple births (Figure 25):
  - 17 in every 100 three embryo transfers led to a pregnancy (17%).
  - 13 in every 100 women who had a three embryo transfer gave birth to at least one baby (13%).
  - 20 in every 100 of the pregnancies following three embryo transfer were multiple pregnancies (20%).
  - 36 in every 100 of the babies born following three embryo transfer were born as one of a multiple birth (36%).

**Figure 25: Outcome of ICSI treatment cycles<sup>+</sup> involving three embryo transfers started in 2006 [4.24d]**



+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Ultrasound confirmed pregnancies

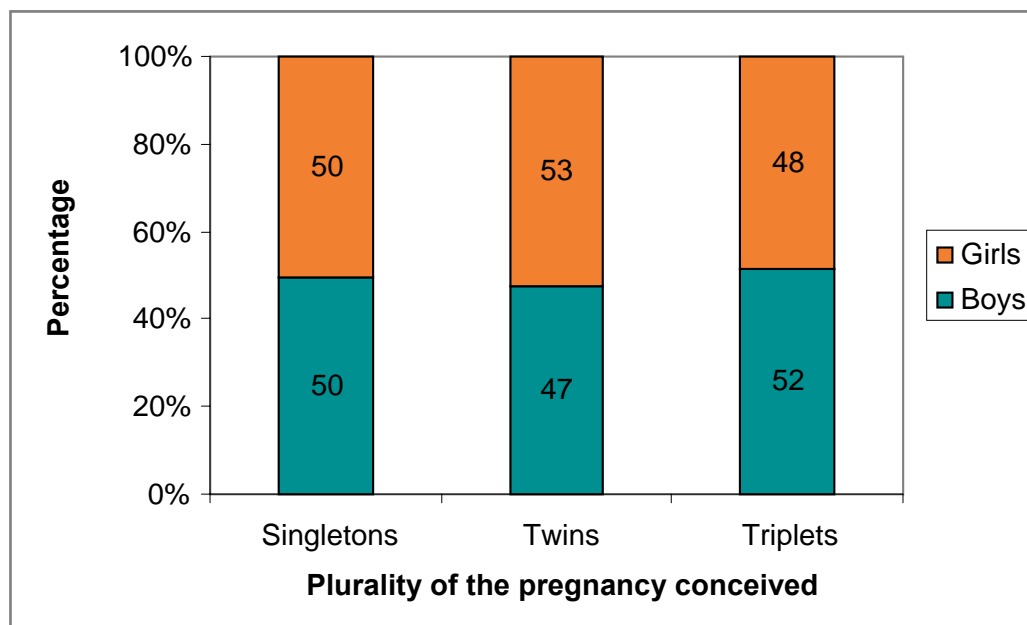
\*\* The total number of babies born alive



► 10. How many boys and girls are born following ICSI? [4.51]

- Following ICSI treatment which started in 2006 5,319 babies were born alive and of these just less than half (49%) were boys and just over half (51%) were girls.
- 60 % of the babies were born to women carrying a singleton pregnancy and of these 1,597 (50%) were boys and 1,619 (50%) were girls (Figure 26).
- For the babies born from a twin pregnancy the split between boys and girls was 47% versus 53% respectively with 984 boys and 1,088 girls.
- For the babies born from a triplet pregnancy boys and girls were nearly equal in number with 16 boys and 15 girls.

Figure 26: Sex of the babies\* born following ICSI<sup>+</sup> started in 2006 [4.51]



+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Includes only babies born alive

► 11a. How did babies born following ICSI in 2006 fare? [4.26-4.29]

- The majority of babies born following ICSI conception are born following a full-term pregnancy (37 weeks gestation or greater) and with a normal birthweight (greater than 2.5Kg or 5½lbs):
  - 82 in every 100 woman giving birth following an ICSI conception delivered after a full term pregnancy (82%) and
  - 73 in every 100 babies were born with a normal birthweight (73%).
- Babies who are born preterm (before the pregnancy has reached full-term, which is 37 or greater weeks gestation) and babies who are born with a low birthweight (less than 2.5kg or about 5½lbs) have an increased chance of developing problems during the first few days and weeks after birth.

These problems include:

- difficulties with breathing and feeding,
- having an abnormal level of consciousness, and
- an increased risk of infection.

Because multiples are more likely to be born preterm and with a low birthweight they have an increased chance of experiencing these types of problems compared with singletons. Preterm and low birthweight babies also tend to have a small, but increased chance of developing problems in the long-term such as cerebral palsy.

- Importantly, there is a large but not complete overlap between preterm birth and low birthweight; some babies who are born at term are low birthweight and some babies born preterm have a normal birthweight.
- Using information collected on the HFEA register it is possible to look at the chances of prematurity and low birthweight for babies born following ICSI and to compare these to national figures collected by the Office for National Statistics on all babies born in England and Wales; the results are similar for Scotland and Northern Ireland.
- As the results shown below indicate ICSI multiples tend to have slightly better (or equivalent) outcomes in terms of prematurity, low birthweight, stillbirth and neonatal death, compared with the national figures overall. This is thought to be mainly due to the fact that very few ICSI multiples are identical.

Identical twins who share a single placenta and amniotic sac tend to have poorer outcomes than non-identical twins who have their own placenta and amniotic sac.

Most ICSI twins result from the transfer of two embryos with less than 5% due to a single embryo dividing into two. Whereas about a third of spontaneously conceived twins in the UK are identical and result from the division of a single embryo.

► 11b. Chances of being born preterm (<37 weeks gestation): [4.26-4.27]

The outcome of pregnancies:

- Of the 3,219 singleton pregnancies resulting in a live birth, 2,976 were delivered following a full-term pregnancy and 234 were delivered preterm (the data for gestational age was missing for 9 pregnancies):
  - 93 in 100 women delivered at the end of a full-term pregnancy (93%)
  - and
  - 7 in 100 delivered preterm (7%).
- Of the 1,107 multiple pregnancies resulting in at least one live birth, 568 delivered following a full-term pregnancy and 539 delivered preterm:
  - 51 in 100 of the women delivered at the end of a full-term pregnancy (51%)
  - and
  - 49 in 100 delivered preterm (49%).

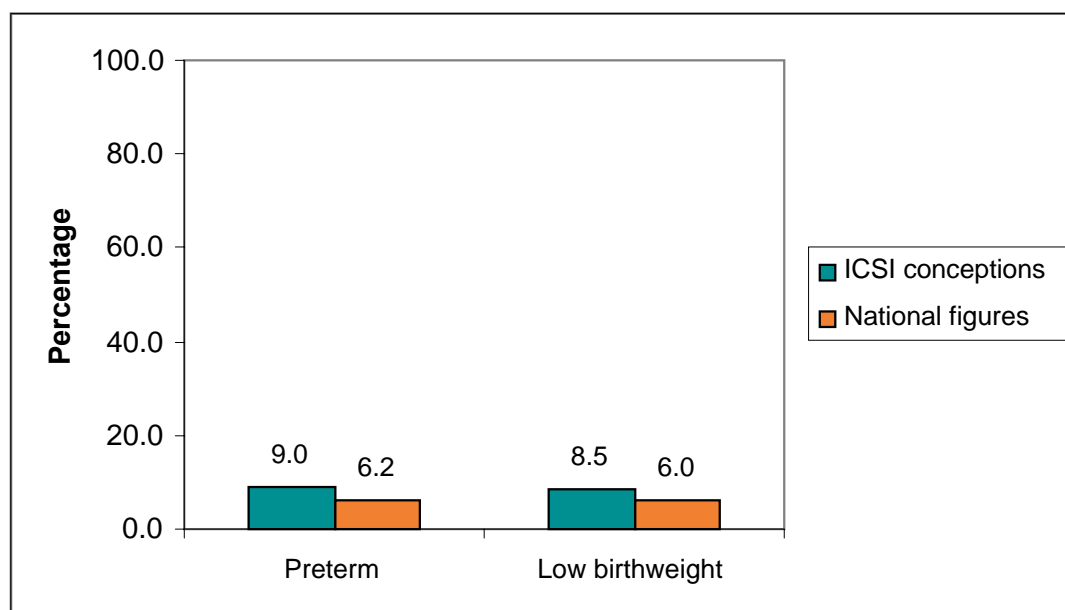
The outcome of births:

- To compare the preterm birth rate with national figures for England and Wales, those babies born as singletons from multiple pregnancies are included as singleton births.
- 9.0% of singleton live births following ICSI conception in 2006 were born preterm compared with 6.2% of all live singleton births in England and Wales (Moser et al, 2007)<sup>1</sup> (Figure 27).
- 48% of multiple live births following ICSI conception in 2006 were born preterm compared with 53% of all live multiple births in England and Wales (Moser et al, 2007)<sup>2</sup> (Figure 28).

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<sup>1</sup> Moser K, Macfarlane A, Huang Chow Y, Hilder L, Dattani N. Introducing new data on gestation-specific infant mortality among babies born in 2005 in England and Wales. Health Statistics Quarterly 2007; 35: 13-27.

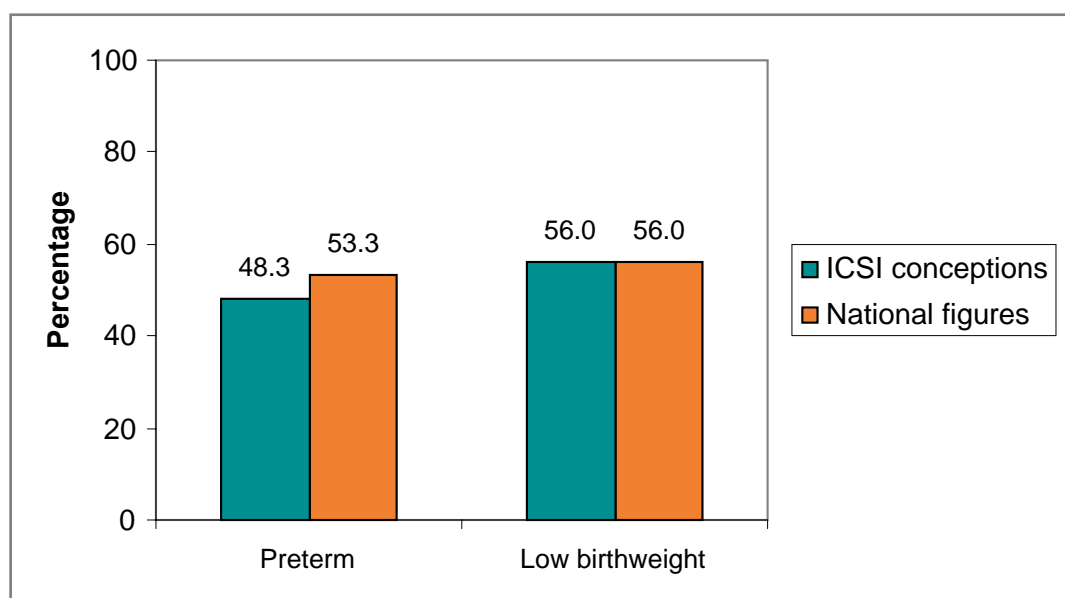
**Figure 27: Preterm and low birthweight rate for singleton births comparing ICSI<sup>+</sup> conceptions and England & Wales rates [4.28a]**



+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Low birthweight <2.5kg or <5½lbs; preterm <37 weeks gestation

**Figure 28: Preterm and low birthweight rate for multiple births comparing ICSI<sup>+</sup> conceptions and England & Wales rates [4.28b]**



+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Low birthweight <2.5kg or <5½lbs; preterm <37 weeks gestation

► 11c. Chances of being born low birthweight (<2.5kg or 5½lbs): [4.28 & 4.29]

The outcome of pregnancies:

- Of the 3,204 singleton pregnancies resulting in a live birth, 22,959 delivered a normal birthweight baby and 245 resulted in a low birthweight baby:
  - 92 in 100 women delivered a baby with a normal birthweight (92%) and
  - 8 in 100 delivered a low birthweight baby (8%).
- Calculating the figures for low birthweight multiple is more complicated than calculating the figures for preterm birth. This is because in general all the babies in a multiple birth will be born at the same gestation of pregnancy whereas it is possible in a set of twins for one baby to be normal birthweight and one to be low birthweight.
- Of the 1,113 multiple pregnancies resulting in the birth of at least one live baby, 697 resulted in the delivery of at least one low birthweight baby and 402 resulted in babies all of whom had a normal birthweight (the birthweight of 4 babies was missing):
  - 67 in 100 resulted in the birth of at least one low birthweight baby (67%) and
  - 33 in 100 delivered babies, all of whom had a normal birthweight (33%).

The outcome of births:

- To compare the low birthweight (<2.5kg or 5½lbs) rate with national figures for England and Wales, those babies born as singletons from multiple pregnancies are included as singleton births.
- 8.5% of singleton live births born following ICSI conception in 2006 were born with a low birthweight compared with 6.0% of all live singleton births in England and Wales<sup>2</sup> (Figure 27).
- 56% of multiple live births born following ICSI conception in 2006 were born with a low birthweight compared with 56% of all live multiple births in England and Wales<sup>3</sup> (Figure 28).

<sup>2</sup> Office for National Statistics. Mortality statistics. Childhood, infant and perinatal. Review of the National Statistician on deaths in England and Wales, 2007. Series DH3 No. 40. Surrey: Office for National Statistics, 2009. ISSN 1469-2783. (Table 26)

► **11d. How many ICSI babies were stillborn and how many died in the first month after birth? [4.30-4.31]**

### Stillbirths

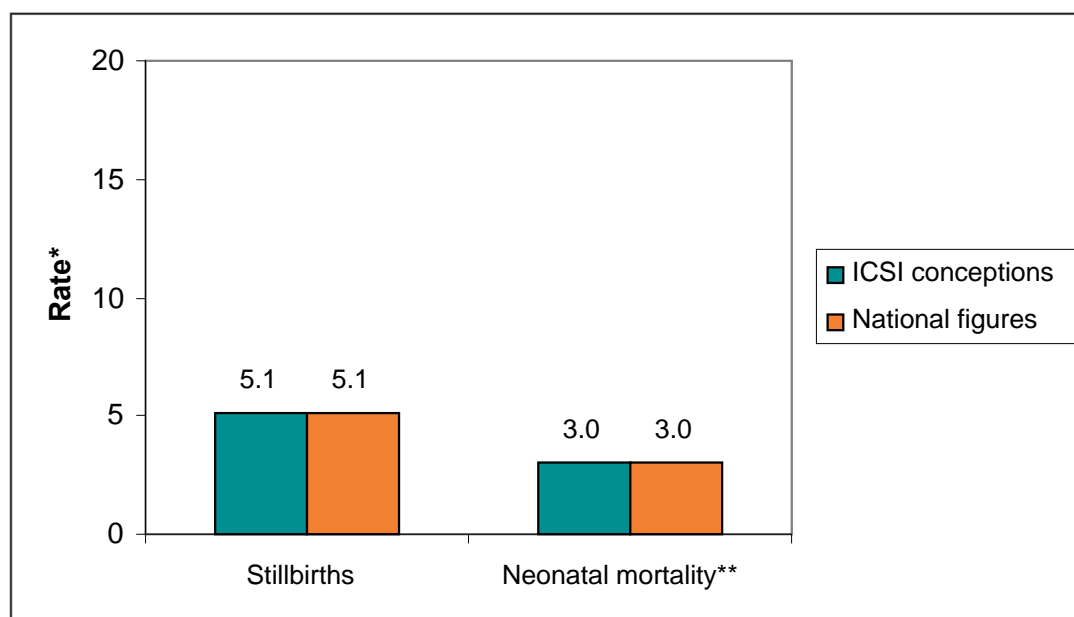
- As with any pregnancy a small proportion of ICSI pregnancies end with the delivery of a baby who is stillborn.
- The stillbirth rate is calculated as the number of babies born after 23 weeks gestation of pregnancy who did not show any signs of life after birth expressed per 1,000 total births (stillbirths + live births).
- The stillbirth rate for singletons born following ICSI conception was 5.1 per 1,000 total births compared with the England and Wales figure of 5.1 per 1,000 total births<sup>3</sup> (Figure 29).
- The stillbirth rate for multiples born following ICSI conception was 8.6 per 1,000 total births compared with the England and Wales figure of 11.8 per 1,000 total births (Figure 30).

### Neonatal deaths

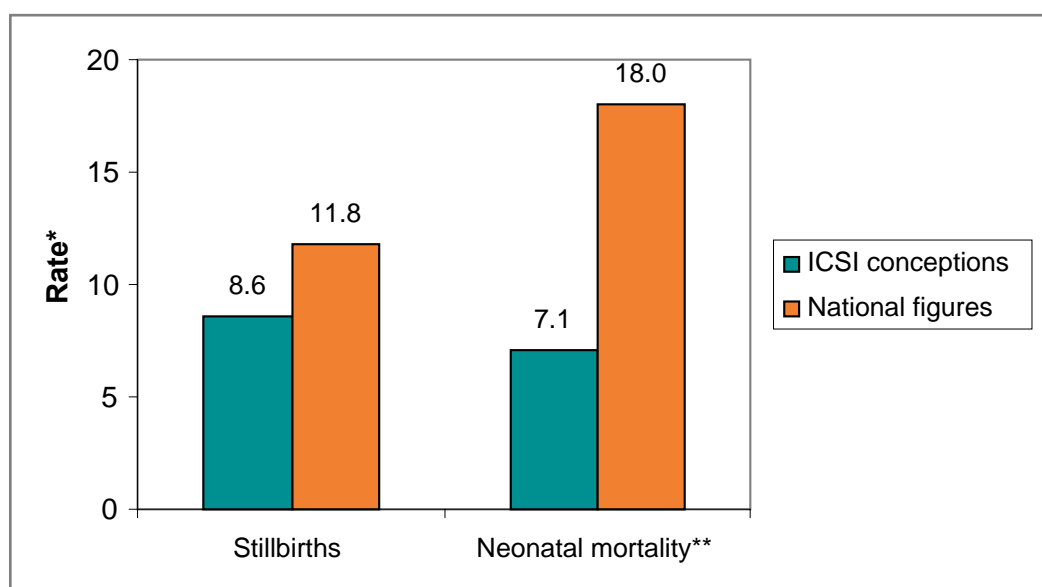
- As with any babies born, a small proportion of babies born following ICSI conception die during the first month after birth and these are called neonatal deaths.
- The neonatal death rate is calculated as the number of babies who die in the first four weeks after birth expressed per 1,000 live births.
- The neonatal death rate for singletons born following ICSI conception was 3.0 per 1,000 live births compared with the England and Wales figure of 3.0 per 1,000 live births<sup>1</sup> (Figure 29).
- The neonatal death rate for multiples born following ICSI conception was 7.1 per 1,000 live births compared with the England and Wales figure of 18.0 per 1,000 live births<sup>1</sup> (Figure 30).

<sup>3</sup> Office for National Statistics. Mortality statistics. Childhood, infant and perinatal. Review of the National Statistician on deaths in England and Wales, 2007. Series DH3 No. 40. Surrey: Office for National Statistics, 2009. ISSN 1469-2783. (Table 25)

**Figure 29: Stillbirth and neonatal death rates for singleton births comparing ICSI<sup>+</sup> conceptions and England & Wales rates [4.30a]**



**Figure 30: Stillbirth and neonatal death rate for multiple births comparing ICSI<sup>+</sup> conceptions and England & Wales rates [4.30b]**



+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Rate – per 1,000 total births for stillbirths and per 1,000 live births for the neonatal deaths

\*\*Neonatal mortality refers to deaths in the first four weeks after birth

## Appendix C

### ► How we gathered the data

- Clinics are required by law to provide information to the HFEA Register about all licensed fertility treatments they carry out. The Register started operating in August 1991 and is a rich source of information about fertility treatment, its outcomes and the factors that contribute to the birth of a baby following treatment.

### ► Understanding the results presented

- This analysis is of just ICSI treatment cycles involving fresh embryo transfers using embryos created from women's own eggs in treatment cycles started at some stage during 2006. While the outcomes of some treatment started in 2006 may not be known until 2007 these treatment outcomes are nevertheless included in this analysis.
- Clinics are not always told by every patient the outcome of each treatment cycle, especially if the woman has travelled to the UK for treatment from abroad. A small number of pregnancy outcomes are therefore not included in the Register. However, since most of the pregnancy outcomes are known, it is likely that any underestimate in the outcome rates is very small.
- The information that the HFEA publishes is a snapshot of data provided to us by licensed clinics at a particular time. This information may be subject to change as individual centres notify us of amendments. Before publication, we perform a preliminary checking process on the data, and ask the clinic to confirm the accuracy, for which they remain responsible.



## ICSI results – involving frozen embryo transfers for women using their own eggs for treatment cycles started in 2006

### ► Introduction

- The information we collect about fertility treatment can be analysed in many ways. In this report we present key information about those patients having ICSI involving frozen embryo transfer:
  - where the embryos created following ICSI were frozen
  - where the embryos were created using the woman's own eggs
  - where women were having treatment with the intention of conceiving immediately rather than storing or donating eggs and embryos; surrogacy treatment is excluded
  - and the treatment cycle started in 2006 resulting in births in either 2006 or 2007.
- This report does not include information about cycles of IVF that do not involve ICSI, fresh embryo transfer ICSI or the small number of cycles that involved transferring fresh and frozen embryos in the same cycle.
- Similar reports are available for fresh embryo transfer in IVF and ICSI, IVF involving frozen embryo transfer, and treatment involving donor eggs and embryos.
- At some points in the report the small numbers involved mean that some of the information cannot be presented for confidentiality reasons.
- Information about how the data for this report were gathered is given in the appendix together with a glossary of terms.

### ► Summary

- In 2006 2,074 women started 3,612 cycles of treatment where the intention was to carry out a frozen embryo transfer using embryos created from the woman's own eggs following ICSI, and treatment was undertaken with the purpose of conceiving immediately.
- Of the 3,612 cycles of frozen embryo ICSI started 3,353 cycles resulted in an embryo transfer (93%).
- The majority (79%) of embryo transfers involved the transfer of two embryos; 19% of cycles involved a single embryo transfer; and 2% were three embryo transfers.
- A total of 695 cycles resulted in an ultrasound confirmed pregnancy which represents 19% of treatment cycles started and 612 women gave birth to at least one baby (17%).
- The chances of a baby being born following frozen embryo ICSI treatment was affected by the age of the woman when she was treated and also by the number of embryos transferred. Women who were 39 years old or younger were more likely to conceive than women 40 years and older.

- Of the 695 women who had a confirmed ultrasound pregnancy 11% had a miscarriage. Older women were more likely than younger women to miscarry.
- Of the women who conceived following frozen embryo ICSI 80% conceived a singleton pregnancy and 20% conceived a multiple pregnancy. Younger women were more likely to conceive a multiple pregnancy than older women.
- Having conceived a pregnancy following frozen embryo ICSI 89% of women gave birth to at least one baby (a live birth).
- Having conceived a singleton pregnancy 86% of women gave birth whereas 14% lost their pregnancy to miscarriage, an ectopic pregnancy, termination or the baby was stillborn.
- Having conceived a multiple pregnancy 90% of women gave birth to all the babies, that is both twins or all three triplets were live born; 8% gave birth to at least one baby but fewer babies than she originally conceived; whereas 2% of women had a miscarriage, an ectopic pregnancy, a termination or stillbirth and none of the babies were born alive.

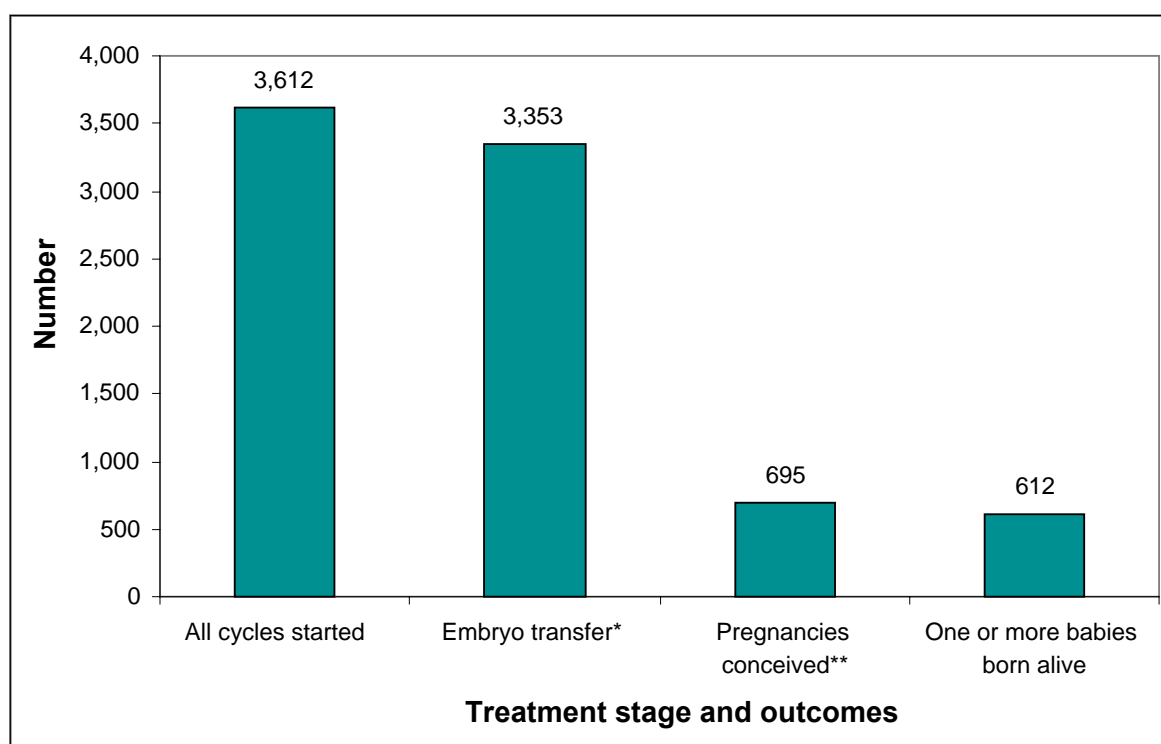
#### ► How are treatment results calculated?

- The results of IVF and ICSI treatment (both fresh and frozen) can be calculated using treatment cycles as the starting point. This gives figures which are useful to help understand what the chances of pregnancy and of having a baby are when a woman starts treatment.
- However, not all treatment cycles which are started reach the embryo transfer stage. The results of treatment can also be calculated from the point that an embryo transfer occurs. This is useful to understand what the chances of pregnancy and of having a baby are once an embryo transfer has taken place.
- In this report we show:
  - Treatment outcomes from the point of view of starting a treatment cycle and these results are given per 100 treatment cycles and
  - Treatment outcomes from the point at which the embryo transfer has been carried out and these results are given as per 100 embryo transfers.

► 1. How many women were treated with frozen embryo ICSI and what were the outcomes? [5.1-5.8]

- In 2006 2,074 women started 3,612 cycles of ICSI where the intention was to carry out a frozen embryo transfer cycle using embryos created using ICSI from the woman's own eggs and the treatment was undertaken to try to conceive straight away.
- For a variety of reasons not all cycles of treatment which are started reach the embryo transfer stage.
- The majority of cycles reaching the embryo transfer stage do not result in the conception of a pregnancy (Figure 1).

Figure 1: Outcome of frozen embryo ICSI treatment cycles<sup>+</sup> started in 2006 [5.1]



+ Frozen ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\* Cycles in which an embryo transfer took place

\*\* Ultrasound confirmed pregnancies

**Results relating to treatment cycles:**

- Of the 3,612 cycles started :
  - 3,353 cycles resulted in a frozen embryo transfer - 93 in every 100 treatment cycles started reached the frozen embryo transfer stage (93%).
  - 695 cycles resulted in a pregnancy (confirmed on ultrasound) -19 in every 100 cycles started resulted in an ultrasound confirmed pregnancy (19%) and
  - 612 cycles led to birth to one or more babies - 17 in 100 cycles started resulted in one or more live births (17%).

**Results relating to frozen embryo transfers:**

- There were 3,353 cycles of frozen embryo ICSI using women's own eggs which reached the embryo transfer stage:
  - 695 cycles resulted in a pregnancy confirmed by ultrasound - 21 in every 100 frozen embryo transfer procedures resulted in an ultrasound confirmed pregnancy (21%) and
  - 612 cycles led to the birth of one or more babies - 18 in every 100 frozen embryo transfers resulted in one or more live births (18%).

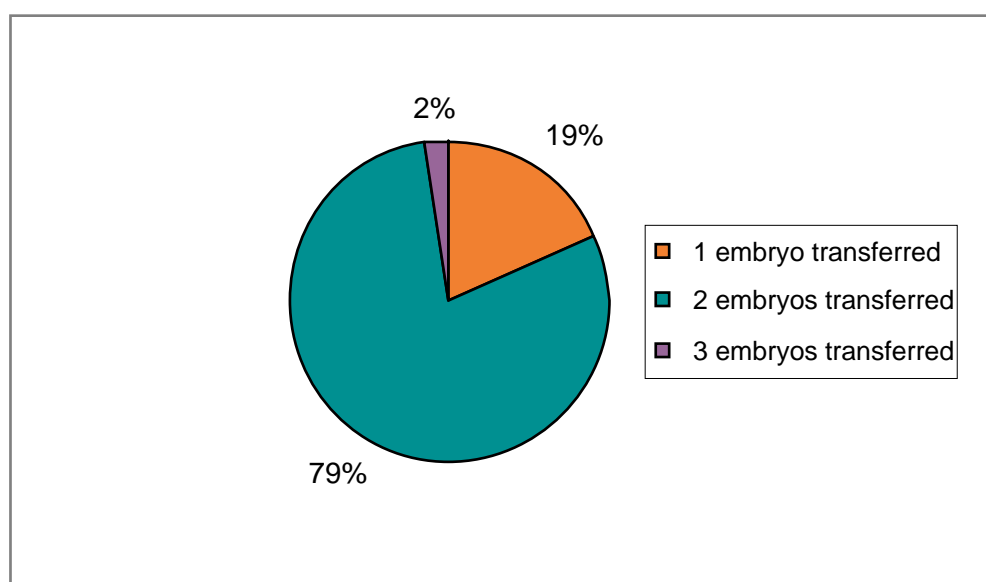
**► 2. Why were treatment cycles cancelled? [5.9]**

- For a variety of reasons not all cycles of frozen embryo transfer treatment reach the embryo transfer stage.
- The main reason why frozen embryo transfer cycles of IVF were cancelled is that when the frozen embryos were taken out of storage they were damaged during the thawing process and were not of sufficiently good quality to be transferred.

► 3. How many embryos were transferred in each treatment cycle? [5.23]

- Overall in 2006 the majority of ICSI frozen embryo transfers involved the transfer of two embryos (Figure 2):
  - 19 in every 100 treatment cycles (19%) reaching the embryo transfer stage involved a single embryo transfer (1ET).
  - 79 in every 100 treatment cycles (79%) reaching the embryo transfer stage involved a double embryo transfer (2ET) and
  - 2 in every 100 treatment cycles (2%) reaching embryo transfer involved the transfer of three embryos (3ET).

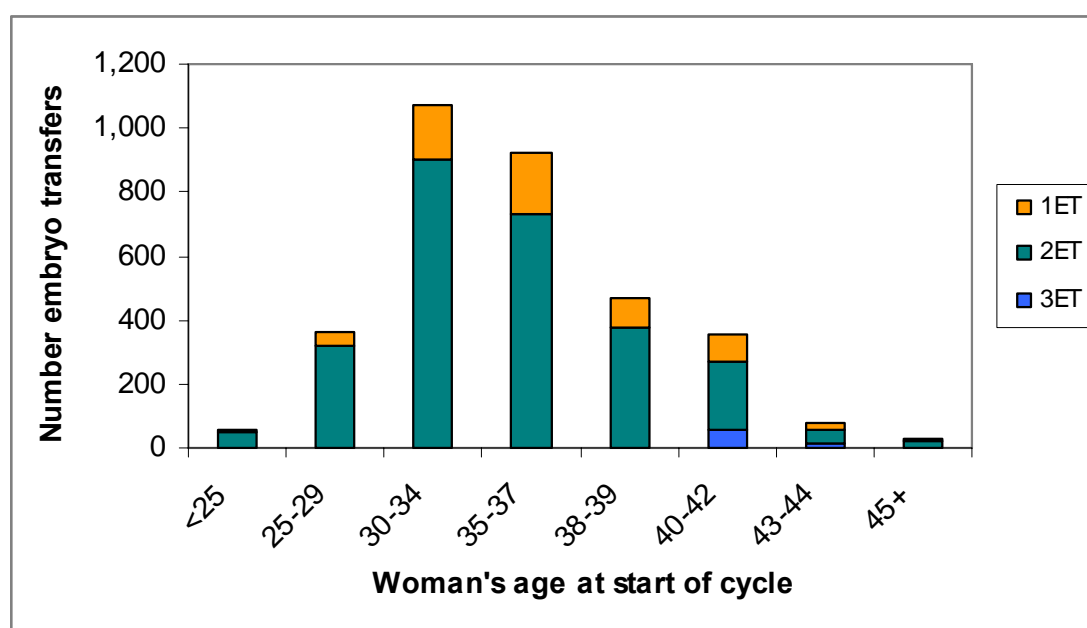
Figure 2: Number of embryos transferred in each cycle of treatment [5.24]



- Transferring a single embryo reduces the risk of a multiple pregnancy, although a small number of twins can result from spontaneous splitting of a single embryo resulting in identical twins.
- Single embryo transfer can be 'elective', where women choose to transfer just one embryo in order to minimise the risk of a multiple pregnancy, even if there is more than one embryo available. Single embryo transfer can also be 'non-elective', where women only have one embryo available to transfer.
- From the information collected on the HFEA register during 2006 it is not possible to separate elective single embryo transfer from single embryo transfer where only one embryo was available; although this will be possible in the future.
- Important: It is likely that the small increase in the proportion of single embryo transfers seen in older women in 2006 is due to most women only having one frozen embryo available for transfer. This will place these women in a poorer prognosis group, with a lower chance of conception than women who are younger and/or have more embryos available for transfer.

- The data from 2006 does not reflect current practice. Since January 2009 clinics are required by the HFEA to have a strategy setting out how they will minimise the risk of multiple births. Clinics are increasingly encouraging women with the greatest chance of conception (for example, women aged 37 years and younger who have several good quality embryos available for transfer) to have elective single embryo transfer to try and minimise the risk of multiple births.
- The proportion of single frozen embryo transfer increased with increasing age of the women being treated (Figure 3):
  - About 18 in every 100 women under the age of 40 yrs had a single embryo transfer (18%) whereas
  - 24 in 100 women 40 yrs and over had a single embryo transfer (24%).
- Transfer of three embryos was performed in 15 of every 100 transfers carried out to treat women aged 40 years and older.
- A total of 5 cycles involving transfer of three embryos were carried out in women under the age of 40.

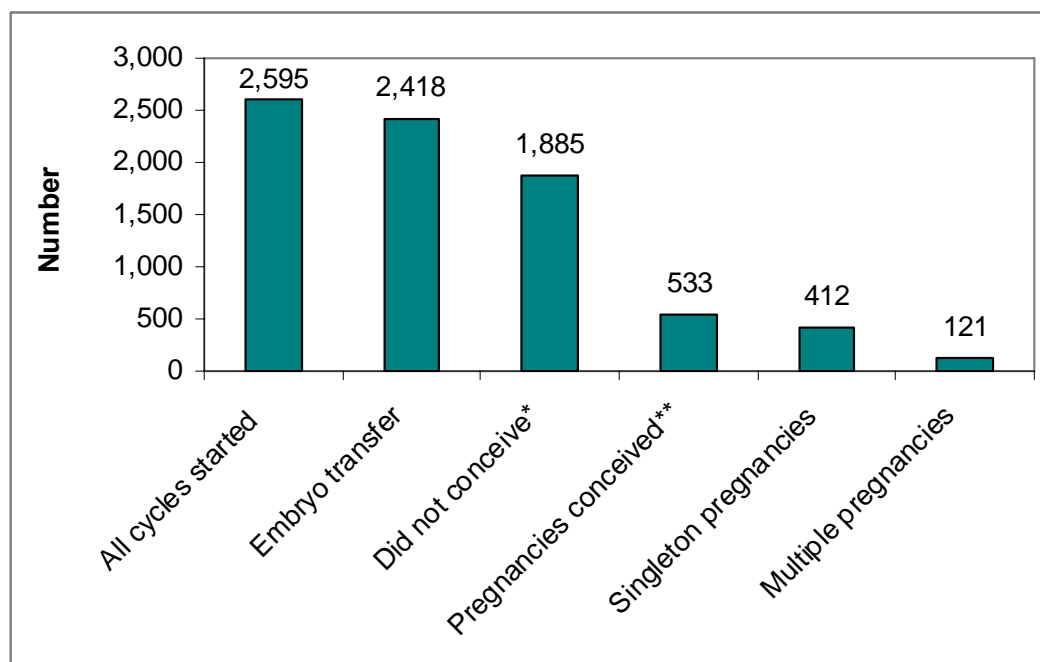
**Figure 3: Number of embryos transferred by the woman's age [5.23]**



► 4a. How does the woman's age affect the chances of pregnancy following ICSI? [5.18]

- The outcomes following frozen embryo ICSI are affected by the age of the women when she undergoes treatment. The results of treatment are shown for women in two different age groups (Figures 4 and 5).

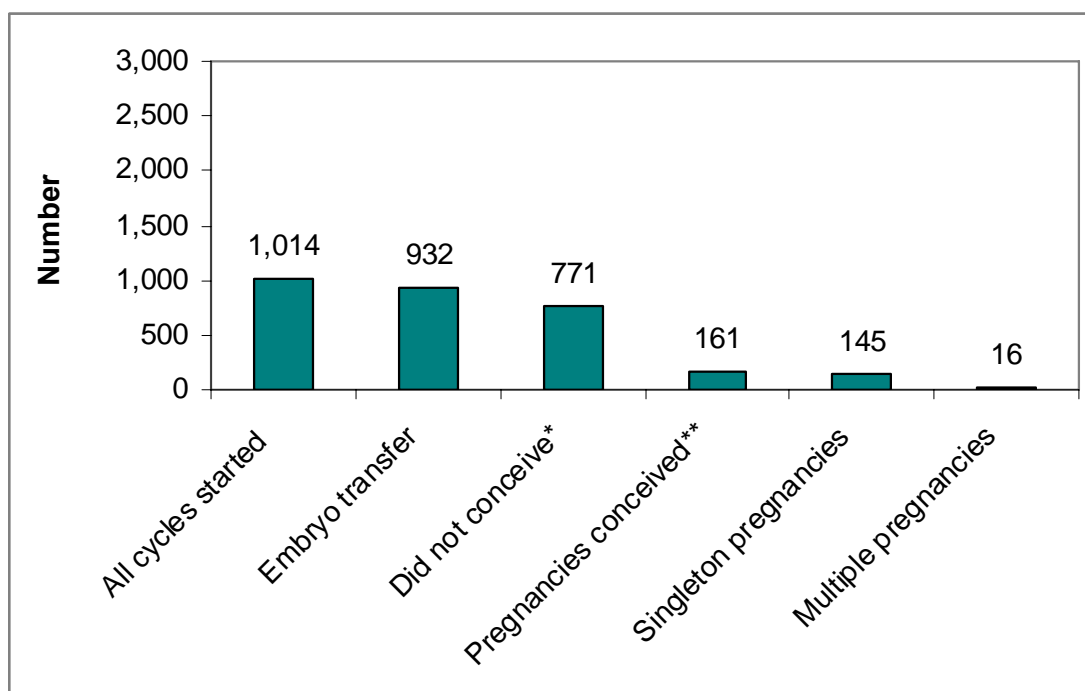
**Figure 4: Treatment outcomes for women aged 37 years or younger when they started treatment in 2006 [5.18a]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

\*\*Ultrasound confirmed pregnancies

**Figure 5: Treatment outcomes for women aged 38 years and older when they started treatment in 2006 [5.18b]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

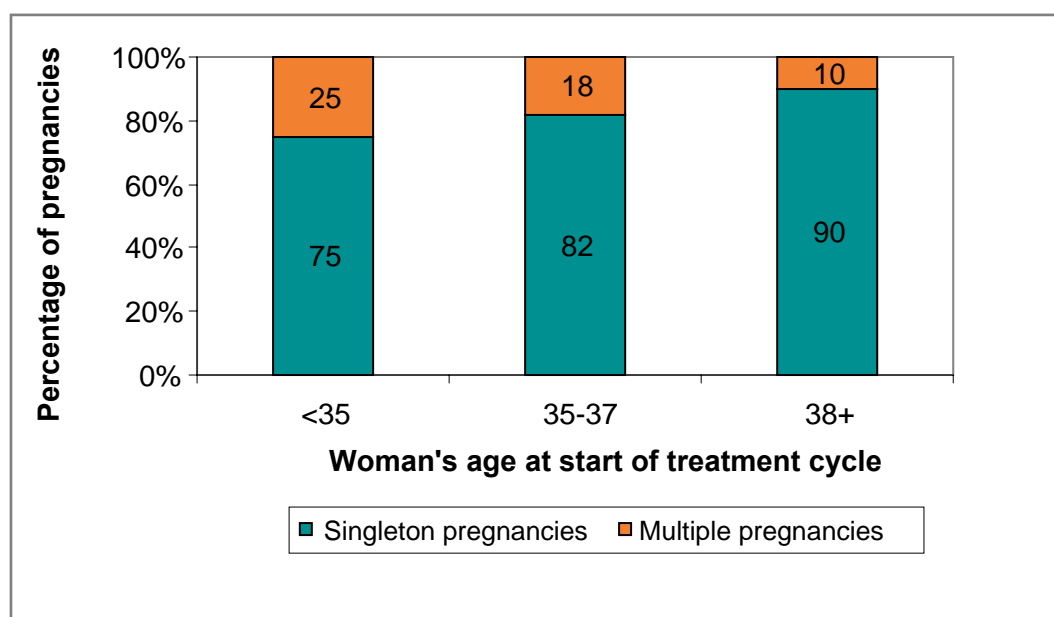
\*\*Ultrasound confirmed pregnancies



► **4b. Which women are most likely to conceive a multiple pregnancy? [5.21]**

- The chance of conceiving a multiple pregnancy is affected by the age of the women when she starts treatment and the number of embryos transferred.
- Figure 6 shows the split between singleton and multiple pregnancies by the woman's age at the start of her treatment for women who became pregnant following frozen embryo ICSI treatment starting in 2006.

**Figure 6: Split between singleton and multiple pregnancies by the women's age at the start of frozen embryo ICSI<sup>+</sup> treatment, cycles started in 2006 [5.21]**



+ Frozen ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

The following figures only relate to the women who became pregnant following frozen embryo ICSI:

- Three-quarters of the women who were younger than 35 years old and conceived following frozen embryo ICSI were pregnant with a singleton pregnancy;
  - 75 in every 100 women less than 35 years old who conceived was pregnant with a singleton (75%) and 25 in every 100 conceived a multiple pregnancy (25%).
- The chances of conceiving following frozen embryo ICSI decline as the age of the woman increases. At the same time, for those who do conceive, the chance of conceiving a singleton rather than a multiple pregnancy increases as women get older.
- 90 in 100 women who were 38 years or older when they conceived were pregnant with a singleton (90%) and 10 in 100 conceived a multiple pregnancy (10%).

► **5a. What can happen to a pregnancy conceived by frozen embryo ICSI – will a baby always be born? [5.10-5.17, 5.19]**

- Overall 695 women conceived a pregnancy following frozen embryo ICSI treatment which started in 2006:
  - 612 of these pregnancies resulted in the birth of at least one baby (live birth – see glossary);
    - 88 in every 100 women who conceived a frozen embryo ICSI pregnancy gave birth to at least one baby (88%).
  - 558 of these women were pregnant with a single pregnancy:
    - 418 of these singleton pregnancies resulted in the birth of a baby (live births);
      - 86 in every 100 women who conceived a frozen embryo ICSI singleton pregnancy gave birth to a baby (86%) and
      - 14 in every 100 women who conceived a frozen embryo ICSI singleton pregnancy had a miscarriage, an ectopic pregnancy, a termination or the baby was stillborn (14%).
  - 137 of these women were pregnant with a multiple pregnancy:
    - 123 of the multiple pregnancies resulted in the birth of all the babies (all the babies were born alive; that is both twins or all three triplets);
      - 90 in every 100 women who conceived a frozen embryo ICSI multiple pregnancy gave birth to all the babies (90%).
    - 11 of the multiple pregnancies resulted in the birth of at least one baby, that is one of the twins and one or two of the triplets;
      - 8 in every 100 women who conceived a frozen embryo ICSI multiple pregnancy gave birth to at least one baby but fewer babies than she was originally pregnant with (8%).
    - The multiple pregnancies that resulted in miscarriage, an ectopic pregnancy, a termination, or a stillbirth and none of the babies were born alive, have not been presented here because the numbers involved are too small.

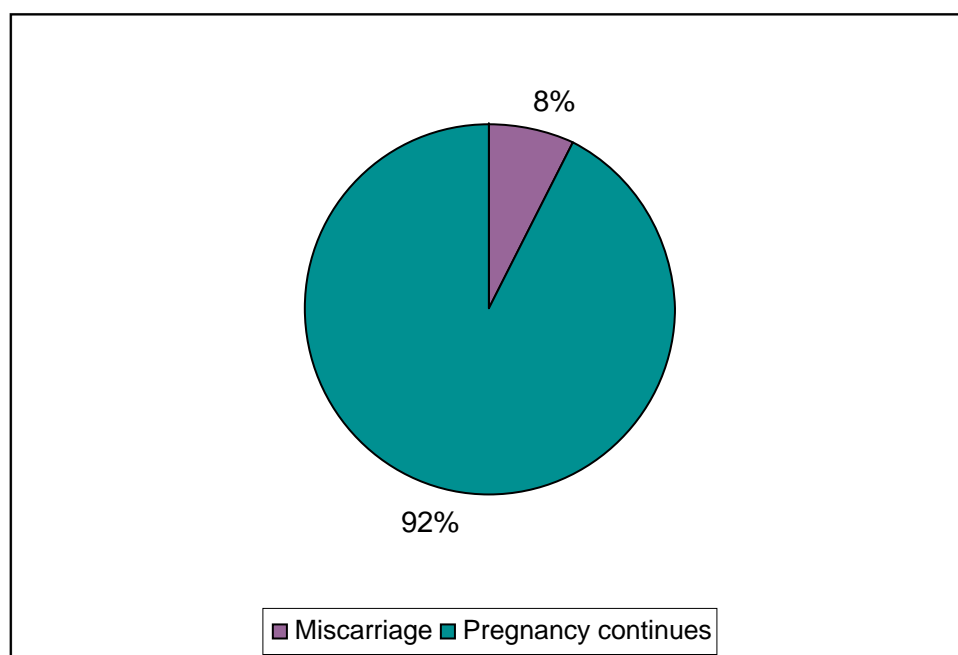
► 5b. What is the risk of miscarriage following frozen embryo ICSI? [5.20]

- A total of 695 women became pregnant following frozen embryo ICSI treatment which started in 2006; this includes only those pregnancies confirmed by an ultrasound scan.
- A total of 74 of these women miscarried the pregnancy - 11 in every 100 women with an ultrasound confirmed pregnancies (11%) experienced a miscarriage, usually in early pregnancy.

**Risk of miscarriage by the woman's age**

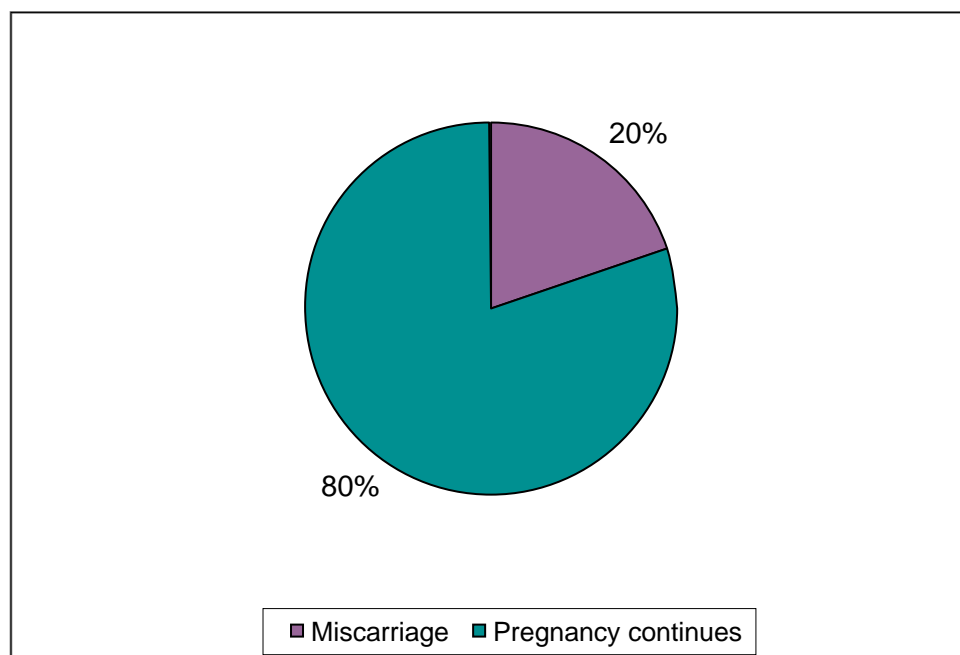
- Women who were older when they were treated were more likely to miscarry than younger women (Figures 7 and 8):
  - Eight in every 100 women who were 37 years old or younger when they started treatment (8%) miscarried the pregnancy whereas
  - 20 in every 100 women who were 38 years or older when treated (20%) had a miscarriage.

**Figure 7: Risk of miscarriage for pregnancies\* conceived by women aged 37 years and younger [5.20a]**



\*Ultrasound confirmed pregnancies, excludes those pregnancies with only a positive blood test and not confirmed on ultrasound

**Figure 8: Risk of miscarriage for pregnancies\* conceived by women aged 38 years and older [5.20b]**



\*Ultrasound confirmed pregnancies, excludes those pregnancies with only a positive blood test and not confirmed on ultrasound

### Risk of miscarriage in singleton and multiple pregnancies

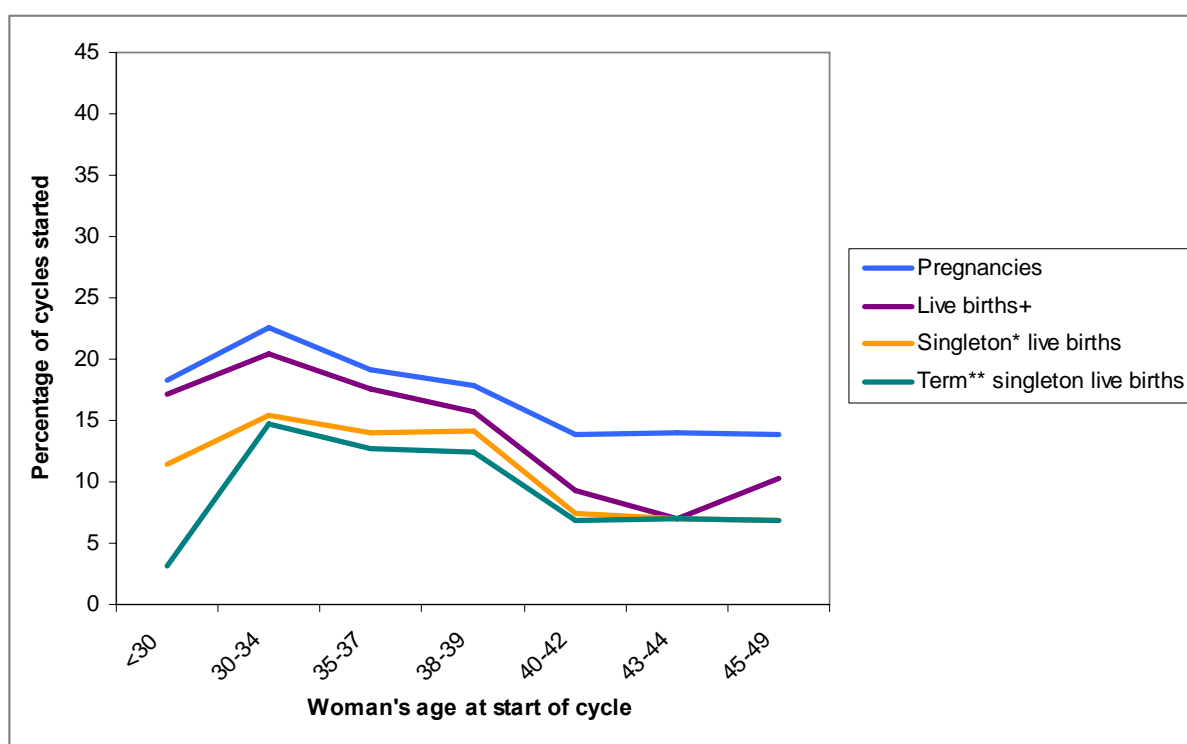
- A total of 695 women became pregnant following frozen embryo ICSI treatment which started in 2006; this includes only those pregnancies confirmed by an ultrasound scan.
- Of the 695 women:
  - 558 women were pregnant with a single fetus (80%) and
  - 135 women were pregnant with a multiple pregnancy (20%).
- It is important to know that even though a pregnancy may be conceived as a multiple pregnancy, sometimes one of the fetuses miscarries (and this may or may not be accompanied by bleeding), resulting in the birth of only one baby from a pregnancy that started as a multiple pregnancy.
- The risk of miscarriage was different for women who were carrying a singleton pregnancy compared with a multiple pregnancy:
  - 14 in every 100 women pregnant with a singleton had a miscarriage (14%) whereas
  - 2 in every 100 women with a multiple pregnancy experienced a miscarriage and lost the pregnancy completely (2%). However, a further 11 in every 100 women (11%) with a multiple pregnancy experienced the loss of one of the fetuses and delivered fewer babies than she was originally pregnant with, for example a woman pregnant with twins delivered a single live baby.

► 6. How does a woman's age affect birth outcomes following ICSI?  
[5.10-5.16]

Results starting from the point a treatment cycle begins:

- The effects of the woman's age on the chances of becoming pregnant and delivering a baby are shown in Figure 9 as a proportion of the treatment cycles started in 2006.

**Figure 9: Pregnancy and birth outcomes for treatment cycles started in 2006**  
[5.10-5.16a]



+ Live births - pregnancies resulting in the delivery of one or more live births

\*Singleton live births - live births resulting from singleton pregnancies, excludes multiple pregnancies which result in just one live birth

\*\* Term – refers to a live birth born following a full-term pregnancy at 37 or more weeks gestation of pregnancy

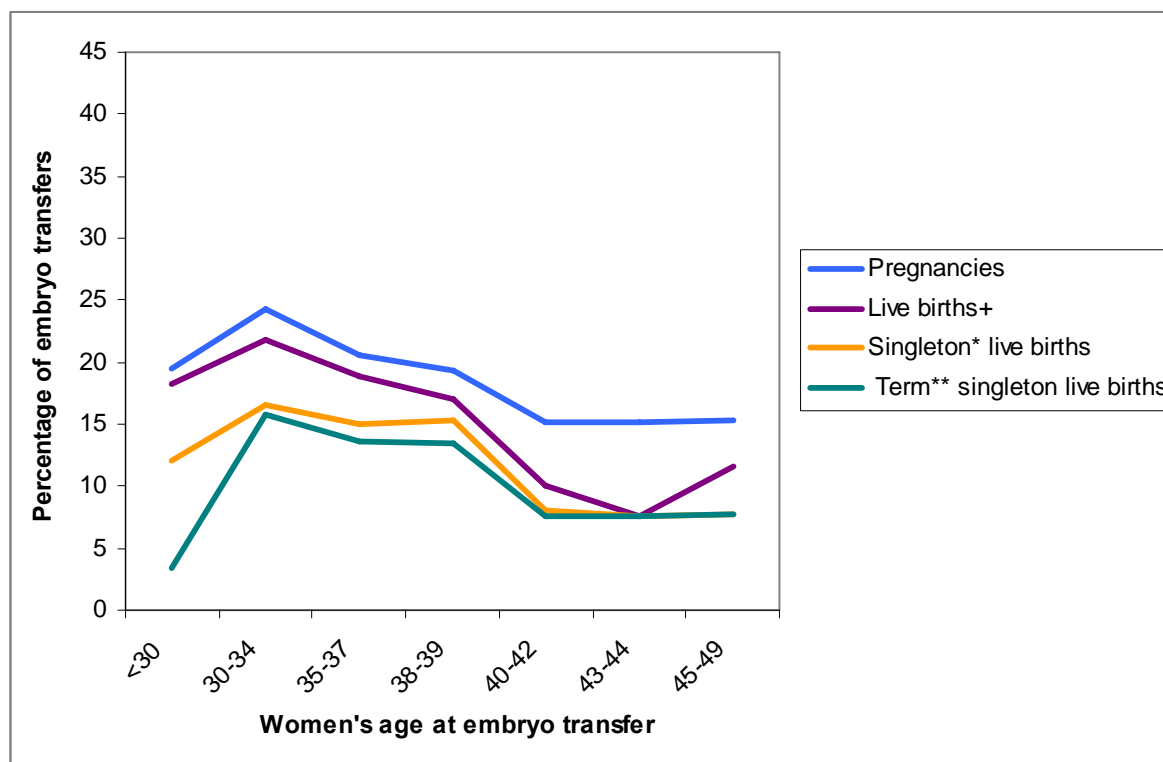
- The results for women under 40 years of age are broadly similar and so are presented for all women under this age combined. Similarly the results for women 40 years and older are much the same and are also combined in the presentation below.

- Women who were **39 years old or younger** when they started treatment had 3,104 cycles of treatment between them which resulted in:
  - 624 ultrasound confirmed pregnancies;
    - 20 in every 100 treatment cycles started (20%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 566 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 18 in every 100 treatment cycles started (18%) resulted in the birth of at least one baby.
  - 440 singleton pregnancies which resulted in a live birth;
    - 14 in every 100 treatment cycles started (14%) led to a singleton pregnancy which resulted in the birth of a baby.
  - 372 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 12 in every 100 treatment cycles started (12%) resulted in a live birth born at term.
- Women who were **40 years or older** when they started treatment received 505 cycles of treatment between them which resulted in:
  - 70 ultrasound confirmed pregnancies;
    - 14 in every 100 treatment cycles started (14%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 45 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 9 in every 100 treatment cycles started (9%) resulted in the birth of at least one baby.
  - 37 singleton pregnancies which resulted in a live birth;
    - 7 in every 100 treatment cycles started (7%) led to a singleton pregnancy which resulted in the birth of a baby.
  - 35 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 7 in every 100 treatment cycles started (7%) resulted in a live birth born at term.

#### Results starting from the point of embryo transfer:

- For a variety of reasons (see section 2) not all treatment cycles which are begun reach the stage of embryo transfer. The results of treatment from the point that an embryo transfer has been carried out are shown below. These figures are useful to help understand what the chances of pregnancy and of having a baby are once an embryo transfer has taken place.
- The effects of the woman's age on the chances of becoming pregnant and delivering a baby are shown from the point of embryo transfer as a proportion of the embryo transfers for treatment started in 2006 (Figure 10).

Figure 10: Pregnancy and birth outcomes for frozen embryo transfers as part of treatment started 2006 [5.10-5.16b]



+ Live births - pregnancies resulting in the delivery of one or more live births

\*Singleton live births - live births resulting from singleton pregnancies, excludes multiple pregnancies which result in just one live birth

\*\* Term – refers to a live birth born following a full-term pregnancy at 37 or more weeks gestation of pregnancy

- Women who were **39 years old or younger** when they were treated had 2,887 frozen ICSI embryo transfers between them which resulted in:
  - 624 ultrasound confirmed pregnancies;
    - 22 in every 100 embryo transfers (22%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 566 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 20 in every 100 embryo transfers (20%) resulted in the birth of at least one baby.
  - 440 singleton pregnancies which resulted in a live birth;
    - 15 in every 100 (15%) embryo transfers led to a singleton pregnancy which resulted in the birth of a baby.
  - 372 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 13 in every 100 embryo transfers (13%) resulted in a live birth born at term.

- Women who were **aged 40 years and older** when they started treatment had 463 ICSI frozen embryo transfers between them which resulted in:
  - 70 ultrasound confirmed pregnancies;
    - 15 in every 100 embryo transfers (15%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 45 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 10 in every 100 embryo transfers (10%) resulted in the birth of at least one baby.
  - 37 singleton pregnancies which resulted in a live birth;
    - 8 in every 100 embryo transfers (8%) led to a singleton pregnancy which resulted in the birth of a baby.
  - 35 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 8 in every 100 embryo transfers (8%) resulted in a live birth born at term.

► **7. Are the outcomes of treatment affected by whether the sperm used comes from the woman's partner or a donor? [5.43]**

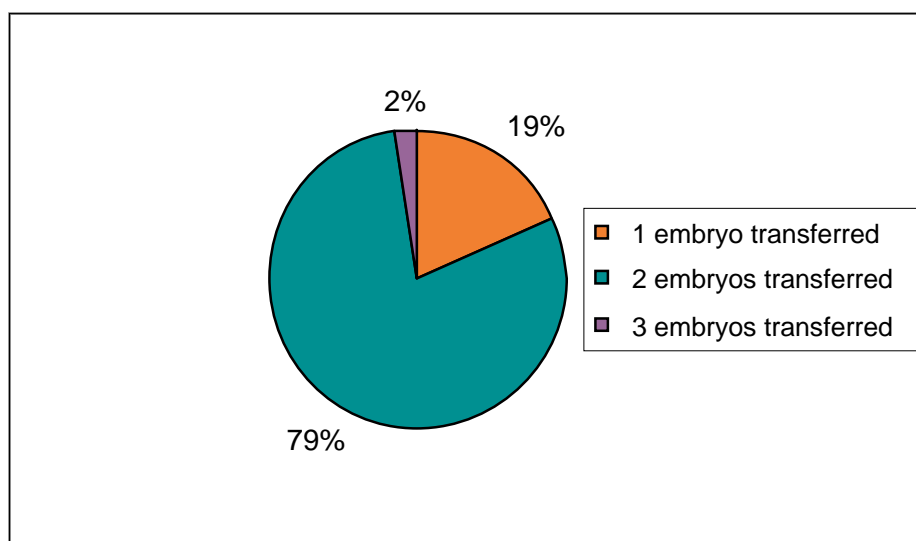
- In 2006 only 45 cycles of frozen embryo transfer treatment followed ICSI which had involved the use of donor sperm. This is not surprising since ICSI was developed as a treatment of male factor infertility which enables, in most case, the woman's partner's sperm to be used in treatment.
- Because of the very small numbers involved it is not possible to present the treatment outcomes when donor sperm has been used in ICSI frozen embryo transfer. Since the vast majority of cycles involve the use of partner sperm the results overall give a close indication of the outcomes following frozen ICSI involving partner sperm.



► 8. What is the effect of the number of embryos transferred on the number of babies born? [5.24]

- 3,353 cycles of frozen embryo ICSI treatment which started in 2006 reached the embryo transfer stage, of these (Figure 11):
  - 19% involved the transfer of a single embryo (SET).
  - 79% involved the transfer of two embryos (DET) – a double embryo transfer.
  - 2% involved the transfer of three embryos.

Figure 11: Number of embryos transferred in each cycle of treatment [5.24]

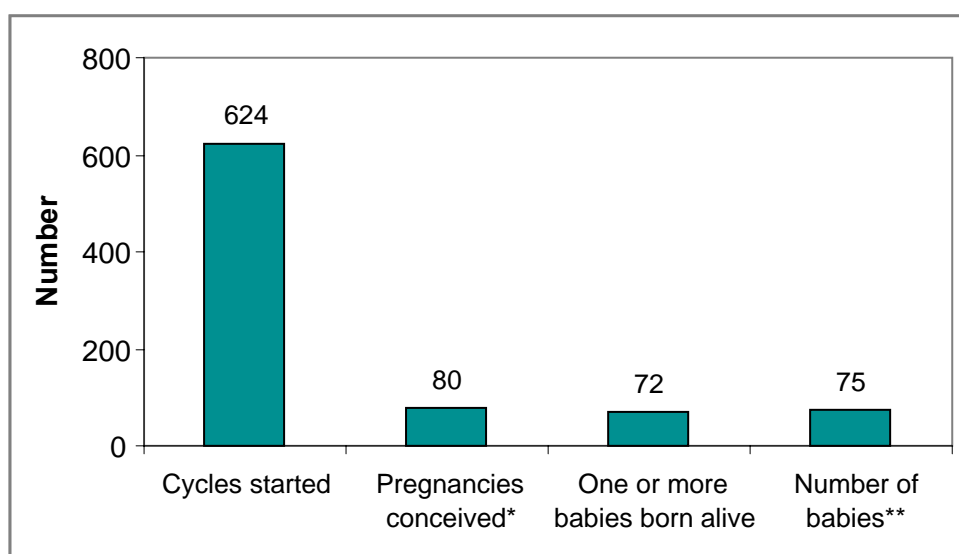


- The 624 single embryos transfers (SET) led to 80 pregnancies and 72 women gave birth to at least one baby (live birth) and in total 75 babies were born (live births) (Figure 12):
  - 87 in every 100 single embryo transfer procedures did not lead to an ultrasound confirmed pregnancy (87%)  
whereas
  - 13 in every 100 single embryo transfer led to a pregnancy (13%).
  - 12 in every 100 women who had a single embryo transfer gave birth to at least one baby (12%).
  - a small number of these women gave birth to twins which would have resulted from the spontaneous splitting of the single embryo transferred resulting in identical twins.
- Single embryo transfer can be 'elective', where women choose to transfer just one embryo in order to minimise the risk of a multiple pregnancy, even if there is more than one embryo available. Single embryo transfer can also be 'non-elective', where women only have one embryo available to transfer.
- From the information collected on the HFEA register during 2006 it is not possible to separate elective single embryo transfer from single embryo transfer where only one embryo was available; although this will be possible in the future.
- Important: It is likely that the majority of women who had single embryo transfer in 2006 only had one frozen embryo available for transfer. This will place these

women in a poorer prognosis group, with a lower chance of conception than women who are younger and/or have more embryos available for transfer.

- The data from 2006 does not reflect current practice. Since January 2009 clinics are required by the HFEA to have a strategy setting out how they will minimise the risk of multiple births. Clinics are increasingly encouraging women with the greatest chance of conception (for example, women aged 37 years and younger who have several good quality embryos available for transfer) to have elective single embryo transfer to try and minimise the risk of multiple births.

**Figure 12: Outcome of frozen embryo ICSI treatment cycles<sup>+</sup> involving single embryo transfer (SET) started in 2006 [5.24b]**



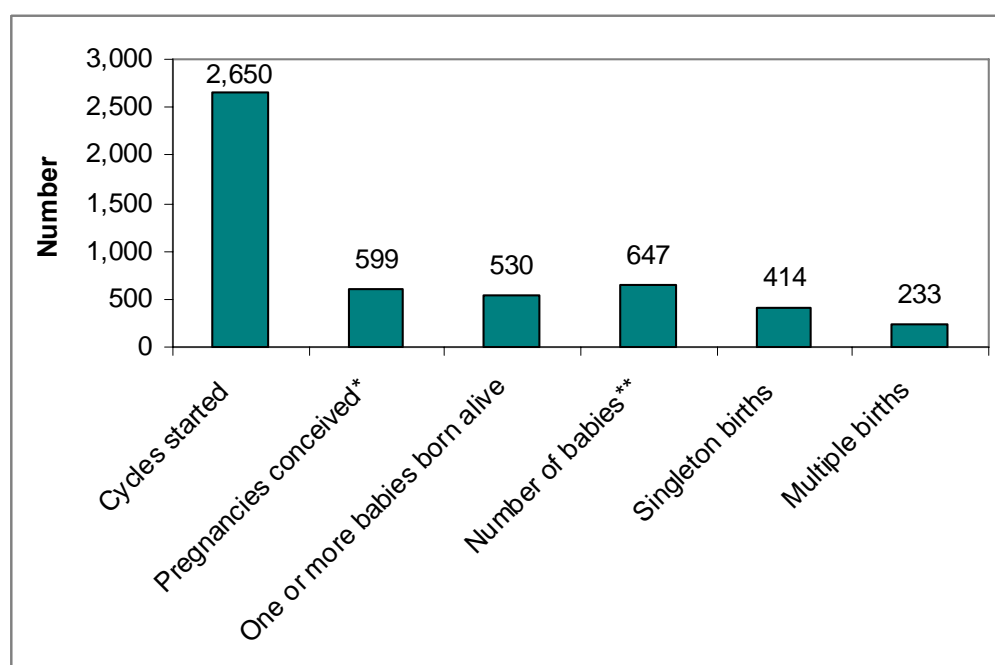
+ Frozen ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Ultrasound confirmed pregnancies

\*\* The total number of babies born alive – which include a small number of multiples

- 2,650 double embryo transfers (DET) led to 599 pregnancies and 530 women gave birth to at least one baby. In total 647 babies were born (live births) and 233 of them were multiple births (Figure 13):
  - 77 in every 100 double embryo transfer procedures did not lead to an ultrasound confirmed pregnancy (77%) whereas
  - 23 in every 100 double embryo transfers led to a pregnancy (23%).
  - 20 in every 100 women who had a double embryo transfer gave birth to at least one baby (20%).
  - 22 in every 100 of the pregnancies following double embryo transfer were multiple pregnancies (22%).
  - 36 in every 100 of the babies born following double embryo transfer were born as one of a multiple birth (36%).

**Figure 13: Outcome of frozen embryo ICSI treatment cycles<sup>+</sup> involving double embryo transfer (DET) started in 2006 [5.24c]**



+ Frozen ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Ultrasound confirmed pregnancies

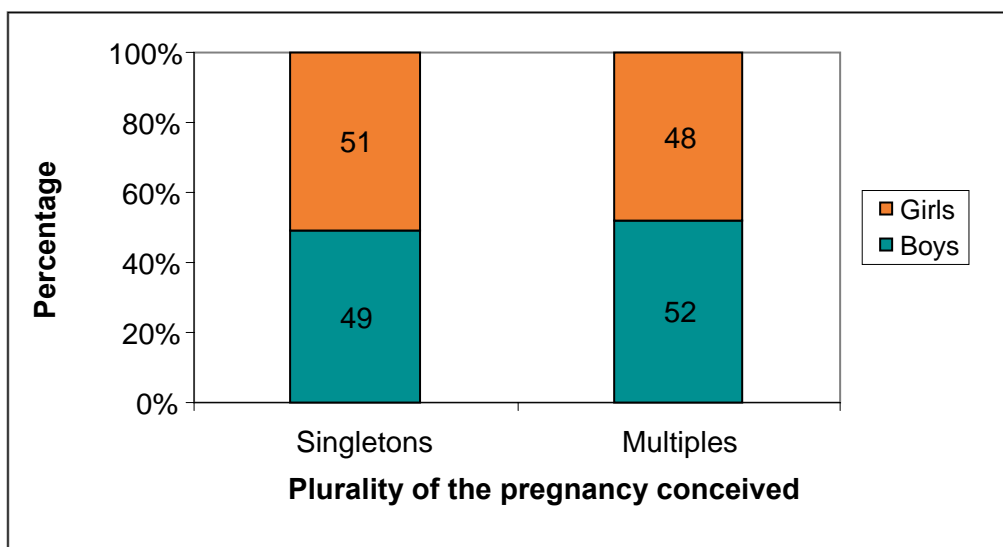
\*\* The total number of babies born alive

- Only 76 cycles involving three embryo transfer were performed. The number of pregnancies that resulted have not been presented here because the numbers involved are too small.

► 9. How many boys and girls are born following frozen embryo ICSI? [6.51]

- Following frozen embryo ICSI treatment which started in 2006 736 babies were born alive and of these half (50%) were boys and half (50%) were girls.
- About two-thirds of the babies were born to women carrying a singleton pregnancy and of these 234 (49%) were boys and 244 (51%) were girls (Figure 14).
- For the babies born from a multiple pregnancy the split between boys and girls was 52% boys and 48% girls with 134 boys and 124 girls (Figure 14).

**Figure 14: Sex of the babies\* born following frozen embryo ICSI<sup>+</sup> started in 2006 [5.51]**



+ Frozen ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Includes only babies born alive

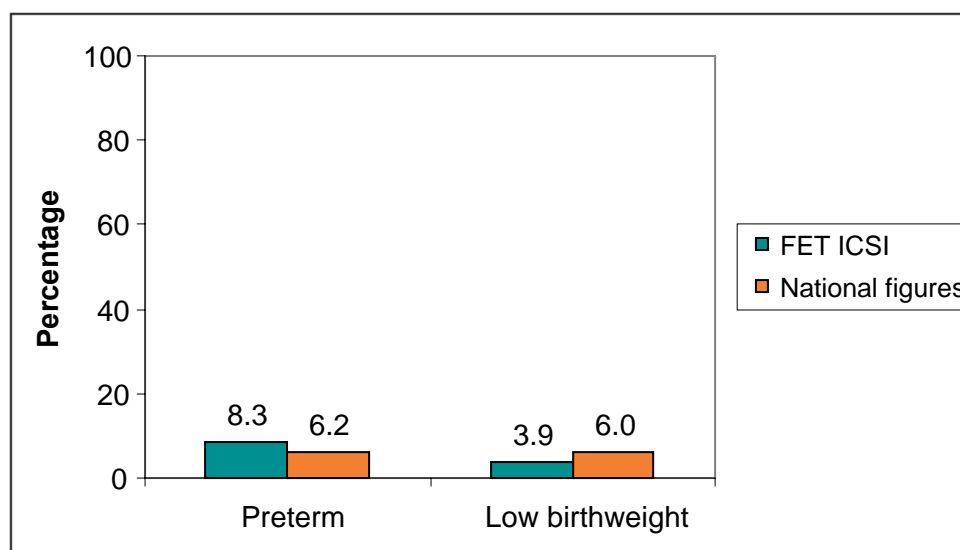
► **10a. How did babies born following frozen embryo ICSI in 2006 fare?**  
**[5.26-5.29]**

- The majority of babies born following frozen embryo ICSI conception are born following a full-term pregnancy (37 weeks gestation or greater) and with a normal birthweight (greater than 2.5Kg or 5½lbs):
  - 80 in every 100 woman giving birth following a frozen embryo ICSI conception in 2006 delivered after a full term pregnancy (80%) and
  - 84 in every 100 babies were born with a normal birthweight (84%).
- Babies who are born preterm (before the pregnancy has reached full-term which is 37 or greater weeks gestation) and babies who are born with a low birthweight (less than 2.5kg or about 5½lbs) have an increased chance of developing problems during the first few days and weeks after birth. These problems include difficulties with breathing and feeding, having an abnormal level of consciousness and an increased risk of infection. Because multiples are more likely to be born preterm and with a low birthweight they have an increased chance of experiencing these types of problems compared with singletons. Preterm and low birthweight babies also tend to have a small, but increased chance, of developing problems in the long-term such as cerebral palsy.
- Importantly, there is a large but not complete overlap between preterm birth and low birthweight; some babies who are born at term are low birthweight and some babies born preterm have a normal birthweight.
- Using information collected on the HFEA register it is possible to look at the chances of prematurity and low birthweight for babies born following IVF and ICSI and to compare these to national figures collected by the Office for National Statistics on all babies born in England and Wales; the results are similar for Scotland and Northern Ireland.
- As the results shown below indicate frozen embryo ICSI multiples tend to have slightly better outcomes in terms of prematurity compared with the national figures overall. This is thought to be mainly due to the fact that very few ICSI multiple babies are identical. Identical twins who share a single placenta and amniotic sac tend to have poorer outcomes than non-identical twins who have their own placenta and amniotic sac. Most ICSI twins result from the transfer of two embryos with less than 5% overall due to a single embryo dividing into two. Whereas about a third of spontaneously conceived twins in the UK are identical and result from the division of a single embryo.

► 10b. Chances of being born preterm (<37 weeks gestation): [5.26-5.27]

- To compare the preterm birth rate with national figures for England and Wales, those babies born as singletons from multiple pregnancies are included as singleton births.
- 8.3% of singleton live births following frozen embryo ICSI conception in 2006 were born preterm compared with 6.2% of all live singleton births in England and Wales (Moser et al, 2007)<sup>1</sup> (Figure 15).
- 41% of multiple live births following frozen embryo ICSI conception in 2006 were born preterm compared with 53% of all live multiple births in England and Wales (Moser et al, 2007)<sup>2</sup> (Figure 16).

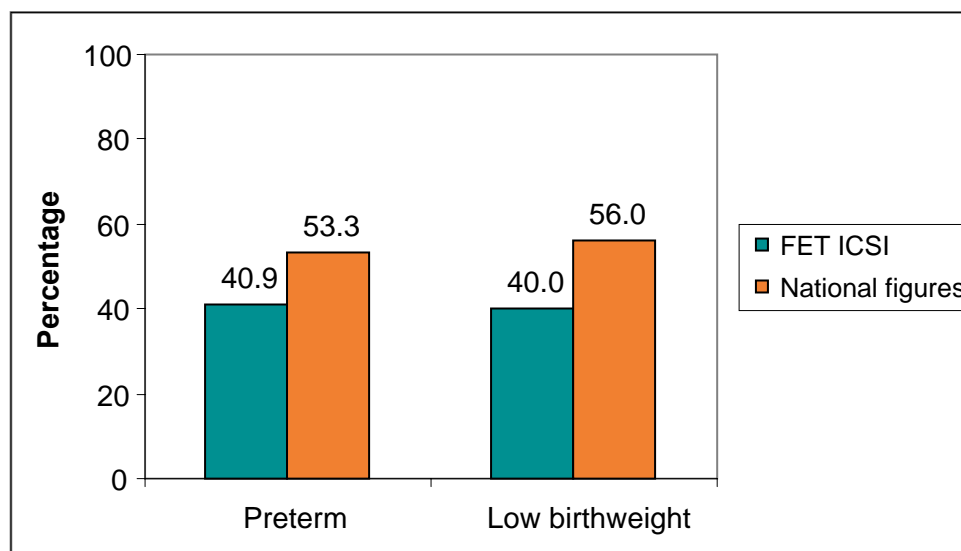
**Figure 15: Preterm and low birthweight rate for singleton births comparing frozen embryo ICSI<sup>+</sup> conceptions and England & Wales rates [5.28a]**



+ Frozen ICSI cycles (FET) where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy  
 Low birthweight <2.5kg or <5½lbs; preterm <37 weeks gestation

<sup>1</sup> Moser K, Macfarlane A, Huang Chow Y, Hilder L, Dattani N. Introducing new data on gestation-specific infant mortality among babies born in 2005 in England and Wales. Health Statistics Quarterly 2007; 35: 13-27.

**Figure 16: Preterm and low birthweight rate for multiple births comparing frozen embryo ICSI<sup>+</sup> conceptions and England & Wales rates [5.28b]**



+ Frozen ICSI cycles (FET) where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Low birthweight <2.5kg or <5½lbs; preterm <37 weeks gestation

► **10c. Chances of being born low birthweight (<2.5kg or 5½lbs): [5.28 & 5.29]**

- To compare the low birthweight (<2.5kg or 5½lbs) rate with national figures for England and Wales, those babies born as singletons from multiple pregnancies are included as singleton births.
- 3.9% of singleton live births born following frozen embryo ICSI conception in 2006 were born with a low birthweight compared with 6.0% of all live singleton births in England and Wales<sup>2</sup> (Figure 15).
- 40% of multiple live births born following frozen embryo ICSI conception in 2006 were born with a low birthweight compared with 56% of all live multiple births in England and Wales<sup>3</sup> (Figure 16).

<sup>2</sup> Office for National Statistics. Mortality statistics. Childhood, infant and perinatal. Review of the National Statistician on deaths in England and Wales, 2007. Series DH3 No. 40. Surrey: Office for National Statistics, 2009. ISSN 1469-2783. (Table 26)

## Appendix D

### ► How we gathered the data

- Clinics are required by law to provide information to the HFEA Register about all licensed fertility treatments they carry out. The Register started operating in August 1991 and is a rich source of information about fertility treatment, its outcomes and the factors that contribute to the birth of a baby following treatment.

### ► Understanding the results presented

- This analysis is of just treatment cycles involving frozen embryo transfers using embryos created following ICSI using women's own eggs in treatment cycles started at some stage during 2006. While the outcomes of some treatment started in 2006 may not be known until 2007 these treatment outcomes are nevertheless included in this analysis.
- Clinics are not always told by every patient the outcome of each treatment cycle, especially if the woman has travelled to the UK for treatment from abroad. A small number of pregnancy outcomes are therefore not included in the Register. However, since most of the pregnancy outcomes are known, it is likely that any underestimate in the outcome rates is very small.
- The information that the HFEA publishes is a snapshot of data provided to us by licensed clinics at a particular time. This information may be subject to change as individual centres notify us of amendments. Before publication, we perform a preliminary checking process on the data, and ask the clinic to confirm the accuracy, for which they remain responsible.



## IVF & ICSI results – involving fresh embryo transfers for women using donor eggs for treatment cycles started in 2006

### ► Introduction

- The information we collect about fertility treatment can be analysed in many ways. In this report we present key information about those patients having IVF or ICSI involving fresh embryo transfer:
  - where the embryos were created using donor eggs
  - where women were having treatment with the intention of conceiving immediately rather than storing or donating eggs and embryos; surrogacy treatment is excluded
  - and the treatment cycle started in 2006 resulting in births in either 2006 or 2007.
- This report does not include information about cycles of fresh or frozen IVF or ICSI where women used their own eggs or frozen embryo transfer following IVF or ICSI where donor eggs were used.
- Similar reports are available for fresh and frozen embryo transfer in IVF and ICSI where women have used their own eggs, and IVF or ICSI involving frozen embryo transfer with donor eggs.
- At some points in the report the small numbers involved mean that some of the information cannot be presented for confidentiality reasons.
- The majority of donor eggs used in these cycles will have been from donors aged 35 and under.
- Information about how the data for this report were gathered is given in the appendix together with a glossary of terms.

### ► Summary

- In 2006, 1,118 women started 1,278 cycles of treatment where the intention was:
  - to carry out a fresh embryo transfer using embryos created using donor eggs following IVF or ICSI, and
  - treatment was undertaken with the purpose of conceiving immediately.
- Of the 1,278 cycles of fresh donor IVF or ICSI started 1,183 cycles resulted in an embryo transfer (93%).
- The majority (91%) of embryo transfers involved the transfer of two embryos; 9% of cycles involved a single embryo transfer; and less than 0.5% were three embryo transfers.
- A total of 418 treatment cycles resulted in an ultrasound confirmed pregnancy which represents 33% of treatment cycles started and 378 women gave birth to at least one baby (30%).

- The chances of a baby being born following fresh donor IVF or ICSI treatment was affected by the number of embryos transferred but not by the age of the women when they were treated.
- Of the 418 women who had a confirmed ultrasound pregnancy 8% had a miscarriage.
- Of the women who conceived following fresh donor IVF or ICSI 70% conceived a singleton pregnancy and 30% conceived a multiple pregnancy. Younger women were more likely to conceive a multiple pregnancy than older women.
- Having conceived a pregnancy following fresh donor IVF or ICSI 90% of women gave birth to at least one baby (a live birth).
- Having conceived a singleton pregnancy 88% of women gave birth whereas 12% lost their pregnancy to miscarriage, an ectopic pregnancy, termination or the baby was stillborn.
- Having conceived a multiple pregnancy 80% of women gave birth to all the babies, that is both twins or all three triplets were live born; 16% gave birth to at least one baby but fewer babies than she originally conceived; whereas 4% of women had a miscarriage, an ectopic pregnancy, a termination or stillbirth and none of the babies were born alive.

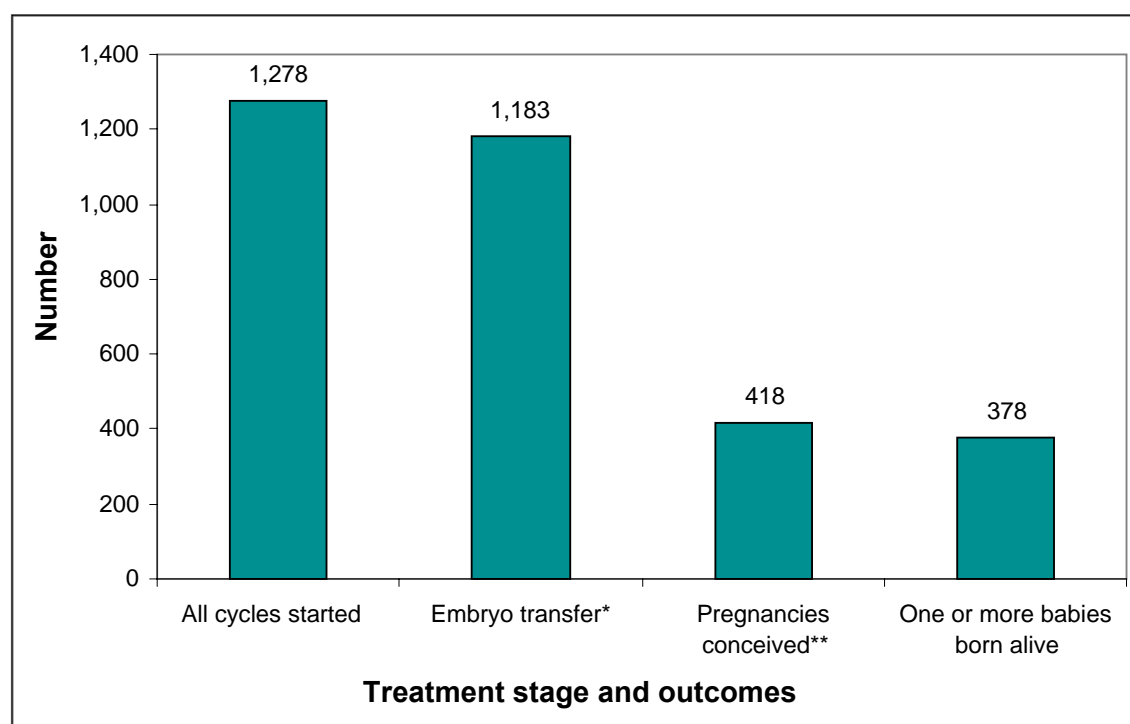
#### ► How are treatment results calculated?

- The results of IVF and ICSI treatment (both fresh and frozen) can be calculated using treatment cycles as the starting point. This gives figures which are useful to help understand what the chances of pregnancy and of having a baby are when a woman starts treatment.
- However, not all treatment cycles which are started reach the embryo transfer stage. The results of treatment can also be calculated from the point that an embryo transfer occurs. This is useful to understand what the chances of pregnancy and of having a baby are once an embryo transfer has taken place.
- In this report we show:
  - Treatment outcomes from the point of view of starting a treatment cycle and these results are given per 100 treatment cycles and
  - Treatment outcomes from the point at which the embryo transfer has been carried out and these results are given as per 100 embryo transfers.

► **1. How many women were treated with fresh donor IVF or ICSI and what were the outcomes? [6.1-6.8]**

- In 2006 1,118 women started 1,278 cycles of treatment where the intention was to carry out a fresh embryo transfer cycle using embryos created following IVF or ICSI using donated eggs and the treatment was undertaken to try to conceive straight away.
- For a variety of reasons not all cycles of treatment which are started reach the embryo transfer stage.
- The majority of cycles reaching the embryo transfer stage do not result in the conception of a pregnancy (Figure 1).

**Figure 1: Outcome of fresh donor IVF or ICSI treatment cycles<sup>+</sup> started in 2006 [6.1]**



+ Fresh IVF or ICSI cycles where women used donor eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\* Cycles in which an embryo transfer took place

\*\* Ultrasound confirmed pregnancies

**Results relating to treatment cycles:**

- Of the 1,278 cycles started :
  - 1,183 cycles resulted in an embryo transfer - 93 in every 100 treatment cycles started reached the embryo transfer stage (93%).
  - 418 cycles resulted in a pregnancy (confirmed on ultrasound) - 32 in every 100 cycles started resulted in an ultrasound confirmed pregnancy (32%) and
  - 378 cycles led to birth to one or more babies - 30 in 100 cycles started resulted in one or more live births (30%).

**Results relating to embryo transfers:**

- There were 1,183 cycles of fresh IVF or ICSI using donated eggs which reached the embryo transfer stage:
  - 418 cycles resulted in a pregnancy confirmed by ultrasound - 35 in every 100 embryo transfer procedure resulted in an ultrasound confirmed pregnancy (35%) and
  - 378 cycles led to the birth of one or more babies - 32 in every 100 embryo transfers resulted in one or more live births (32%).

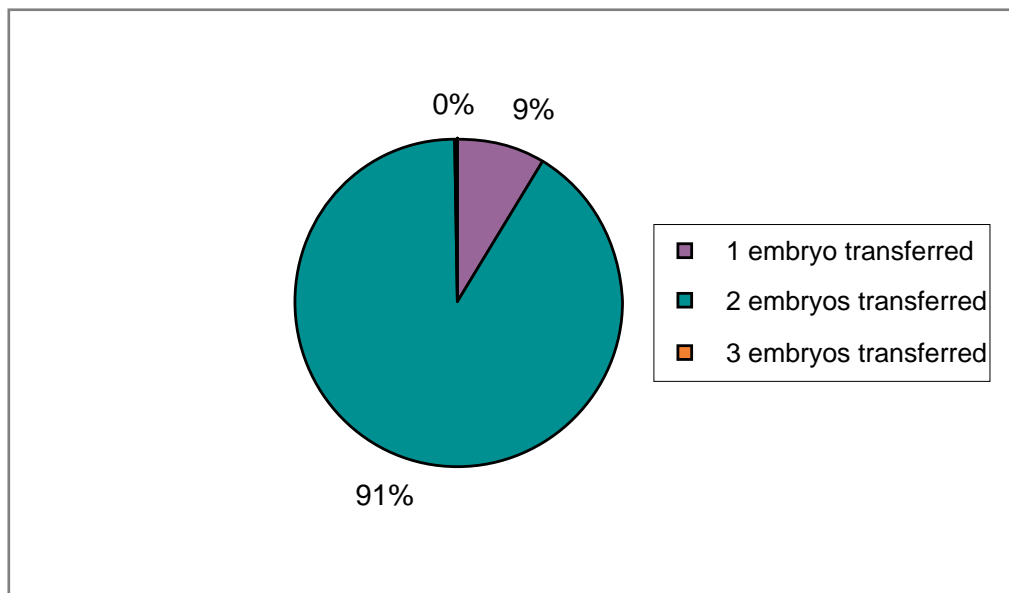
▶ **2. Why were treatment cycles cancelled? [6.9]**

- 95 cycles were cancelled before the embryo transfer stage. There were a number of reasons why cycles were cancelled, for example the donor eggs did not fertilise, the embryos did not develop properly or the patient receiving the embryos created from donated eggs was not ready to have them transferred.

▶ 3. How many embryos were transferred in each treatment cycle? [6.23]

- Overall in 2006 the majority of fresh donor IVF and ICSI embryo transfers involved the transfer of two embryos (Figure 2):
  - 9 in every 100 treatment cycles (9%) reaching the embryo transfer stage involved a single embryo transfer (1ET).
  - 91 in every 100 treatment cycles (91%) reaching the embryo transfer stage involved a double embryo transfer (2ET) and
  - Only 3 in every 1,000 treatment cycles (0.3%) reaching embryo transfer involved the transfer of three embryos (3ET).

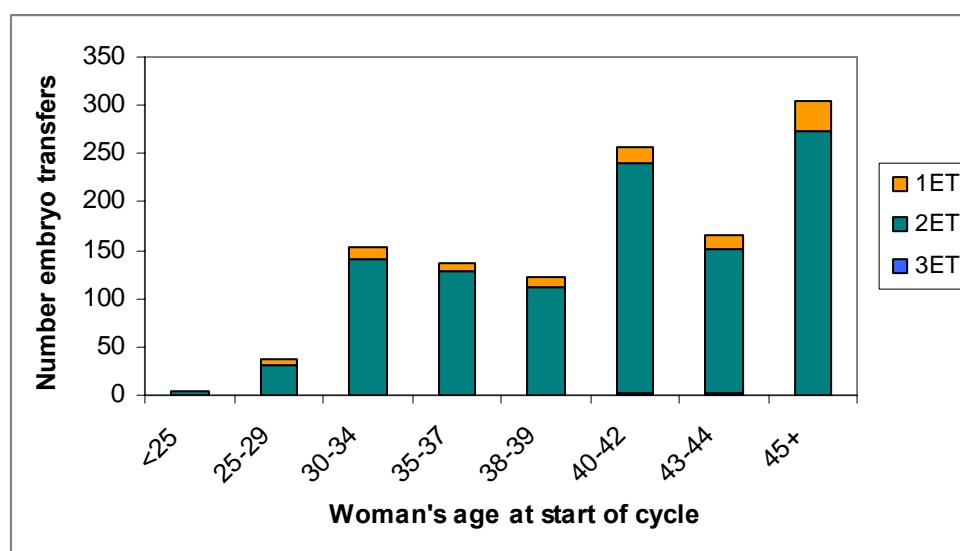
Figure 2: Number of embryos transferred in each cycle of treatment [6.24]



- Transferring a single embryo reduces the risk of a multiple pregnancy, although a small number of twins can result from spontaneous splitting of a single embryo resulting in identical twins.

- The number of fresh donor IVF and ICSI cycles increased with increasing age of the women treated (Figure 3).
- The proportion of single embryo transfer in fresh donor IVF or ICSI is not strongly related to the age of the woman:
  - About nine in every 100 women under the age of 40 yrs had a single embryo transfer (9%) whereas
  - Eight in 100 women 40 yrs and over had a single embryo transfer (8%).
- Only four cycles of fresh donor IVF or ICSI involved the transfer of three embryos and these were all carried out in women 40 years or older.

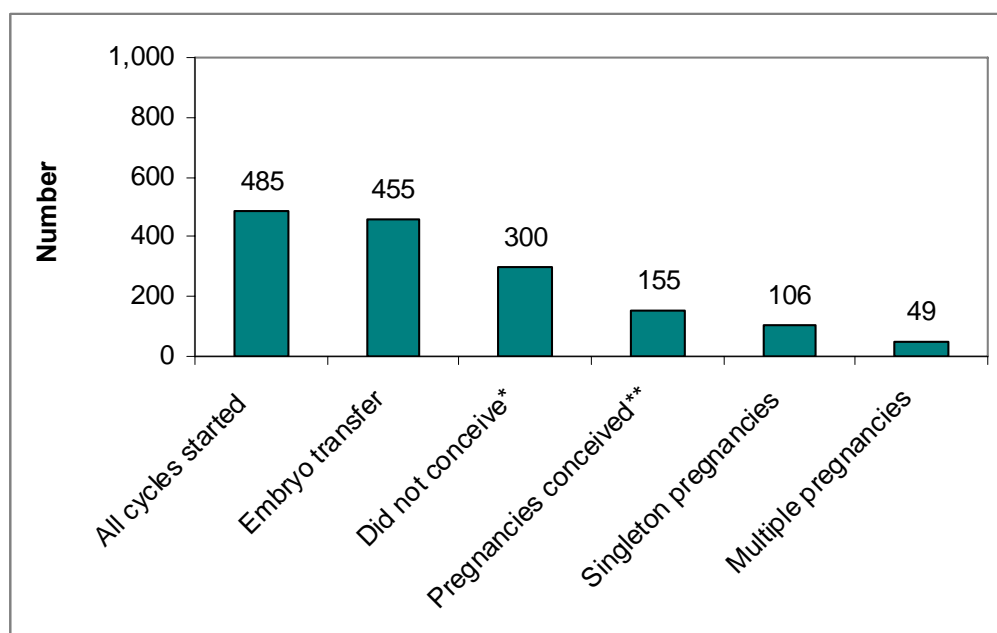
**Figure 3. Number of embryos transferred by the woman's age [6.23]**



► 4a. How does the woman's age affect the chances of pregnancy following fresh donor IVF or ICSI? [6.18]

- The outcomes following fresh donor IVF or ICSI were not strongly affected by the age of the women when she underwent treatment. This is likely to be because the majority of donor eggs used in these cycles will have been from donors aged 35 and under. The results of treatment are shown for women in two different age groups (Figures 4 and 5).

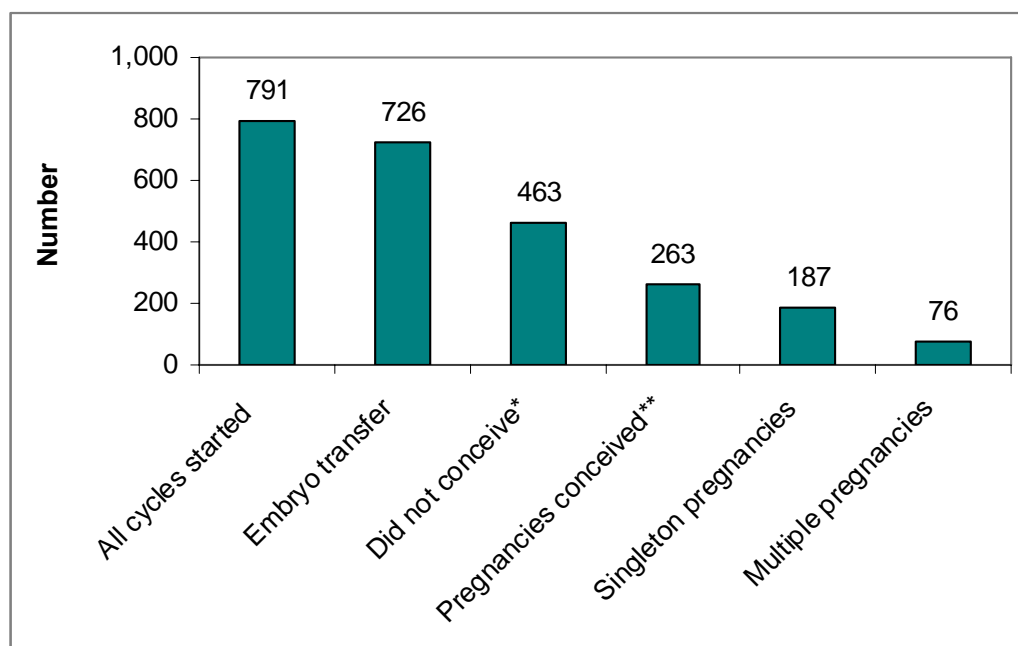
**Figure 4: Treatment outcomes for women age 39 years or younger when they started treatment in 2006 [6.18a]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

\*\*Ultrasound confirmed pregnancies

**Figure 5: Treatment outcomes for women aged 40 years and older when they started treatment in 2006 [6.18b]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

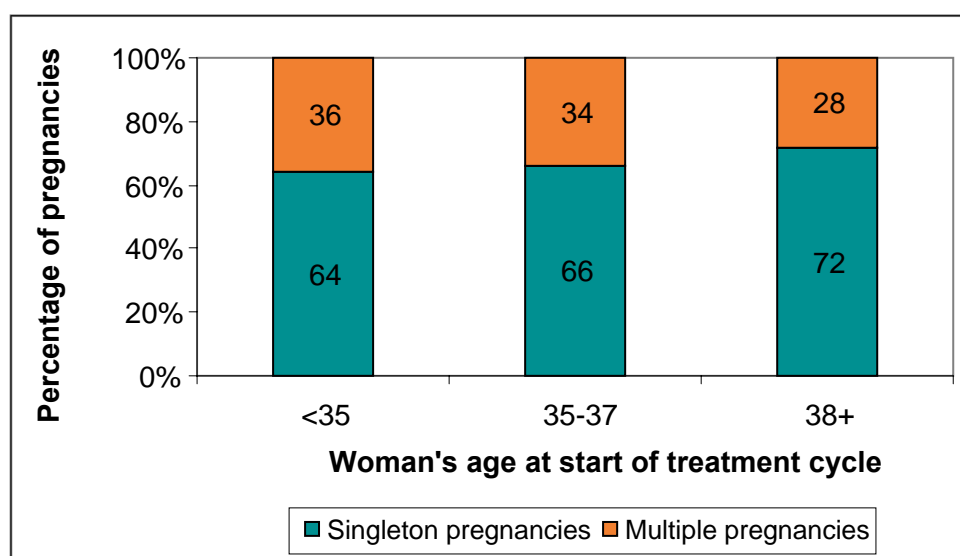
\*\*Ultrasound confirmed pregnancies



► 4b. Which women are most likely to conceive a multiple pregnancy? [6.21]

- The chance of conceiving a multiple pregnancy is affected by the age of the women when she starts treatment and the number of embryos transferred.
- Figure 6 shows the split between singleton and multiple pregnancies by the woman's age at the start of her treatment for women who became pregnant following fresh donor IVF or ICSI treatment starting in 2006.

**Figure 6: Split between singleton and multiple pregnancies by the women's age at the start of fresh donor IVF or ICSI<sup>+</sup> treatment, cycles started in 2006 [6.21]**



+ Fresh IVF or ICSI cycles where women used donor eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

The following figures only relate to the women who became pregnant following fresh donor IVF or ICSI:

- Nearly two-thirds of the women who were younger than 35 years old and conceived following fresh donor IVF or ICSI were pregnant with a singleton pregnancy;
  - 64 in every 100 women less than 35 years old who conceived was pregnant with a singleton (64%) and 36 in every 100 conceived a multiple pregnancy (36%).
- The chances of conceiving following fresh donor IVF or ICSI is not strongly related to the woman's age. This is likely to be because the majority of donor eggs used in these cycles will have been from donors aged 35 and under. However, for those who do conceive, the chance of conceiving a singleton rather than a multiple pregnancy increases as women get older.
- 72 in 100 women who were 38 years or older when they conceived were pregnant with a singleton (72%) and 28 in 100 conceived a multiple pregnancy (28%).

► **5a. What can happen to a pregnancy conceived by fresh donor IVF or ICSI– will a baby always be born? [6.10-6.17, 6.19]**

- Overall 418 women conceived a pregnancy following fresh donor IVF or ICSI treatment which started in 2006:
  - 378 of these pregnancies resulted in the birth of at least one baby (live birth);
    - 90 in every 100 women who conceived a fresh donor IVF or ICSI pregnancy gave birth to at least one baby (90%).
  - 298 of these women were pregnant with a single pregnancy:
    - 258 of these singleton pregnancies resulted in the birth of a baby (live births);
      - 88 in every 100 women who conceived a fresh donor IVF or ICSI singleton pregnancy gave birth to a baby (88%) and
      - 12 in every 100 women who conceived a fresh donor IVF or ICSI singleton pregnancy had a miscarriage, an ectopic pregnancy, a termination or the baby was stillborn (12%).
  - 125 of these women were pregnant with a multiple pregnancy:
    - 100 of the multiple pregnancies resulted in the birth of all the babies (all the babies were born alive; that is both twins or all three triplets);
      - 80 in every 100 women who conceived a fresh donor IVF or ICSI multiple pregnancy gave birth to all the babies (80%).
    - 20 of the multiple pregnancies resulted in the birth of at least one baby, that is one of the twins and one or two of the triplets;
      - 16 in every 100 women who conceived a fresh donor IVF or ICSI multiple pregnancy gave birth to at least one baby but fewer babies than she was originally pregnant with (16%).
    - The multiple pregnancies that resulted in miscarriage, an ectopic pregnancy, a termination, or a stillbirth and none of the babies were born alive, have not been presented here because the numbers involved are too small.

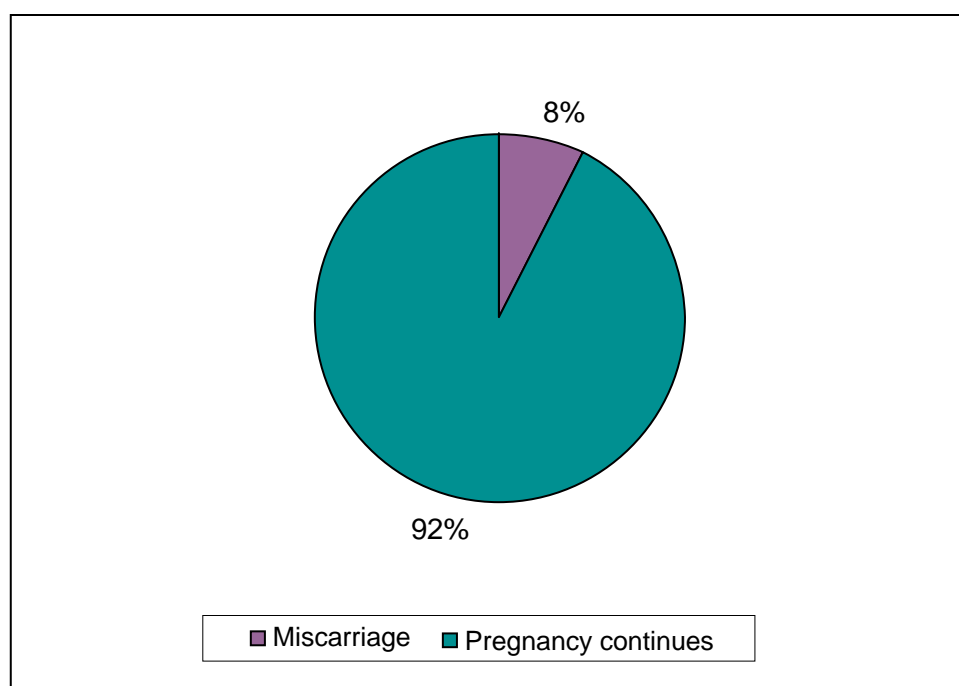
► **5b. What is the risk of miscarriage following fresh donor IVF or ICSI? [6.20]**

- A total of 418 women became pregnant following fresh donor IVF or ICSI treatment which started in 2006; this includes only those pregnancies confirmed by an ultrasound scan.
- A total of 84 of these women miscarried the pregnancy - 8 in every 100 women with an ultrasound confirmed pregnancies (8%) experienced a miscarriage, usually in early pregnancy.

**Risk of miscarriage by the woman's age**

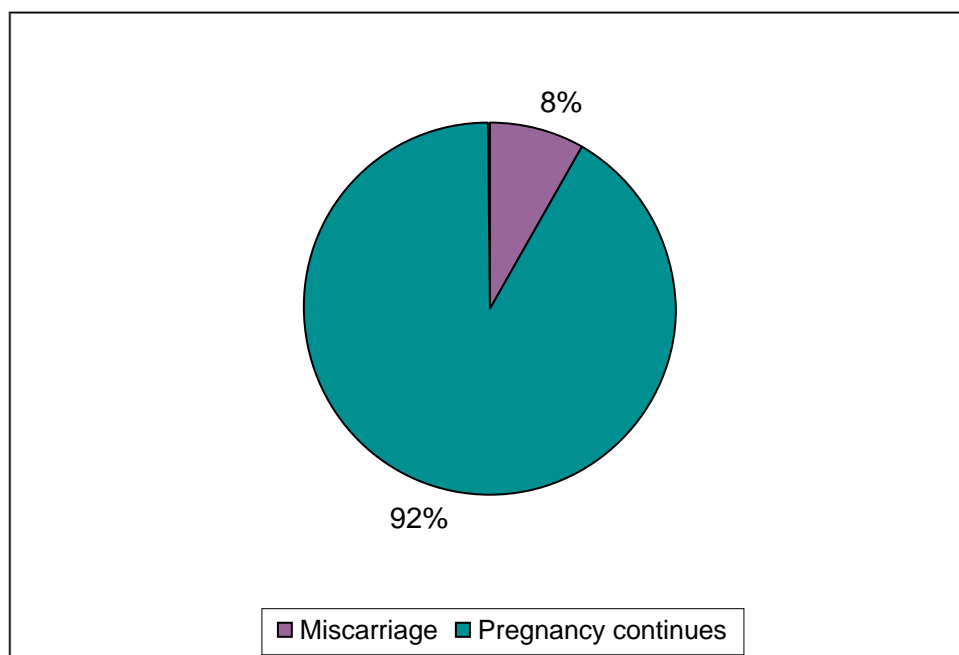
- The risk of miscarriage following fresh donor IVF or ICSI treatment appears to be unrelated to the age of woman when she was treated (Figures 7 and 8). However, it should be noted that these results are based on relatively small numbers and require confirmation by the combination of data over a longer period than a single year before we can be confident of the results.

**Figure 7: Risk of miscarriage for pregnancies\* conceived by women aged 37 years and younger [6.20a]**



\*Ultrasound confirmed pregnancies, excludes those pregnancies with only a positive blood test and not confirmed on ultrasound

**Figure 8: Risk of miscarriage for pregnancies\* conceived by women aged 38 years and older [6.20b]**



\*Ultrasound confirmed pregnancies, excludes those pregnancies with only a positive blood test and not confirmed on ultrasound

#### Risk of miscarriage in singleton and multiple pregnancies

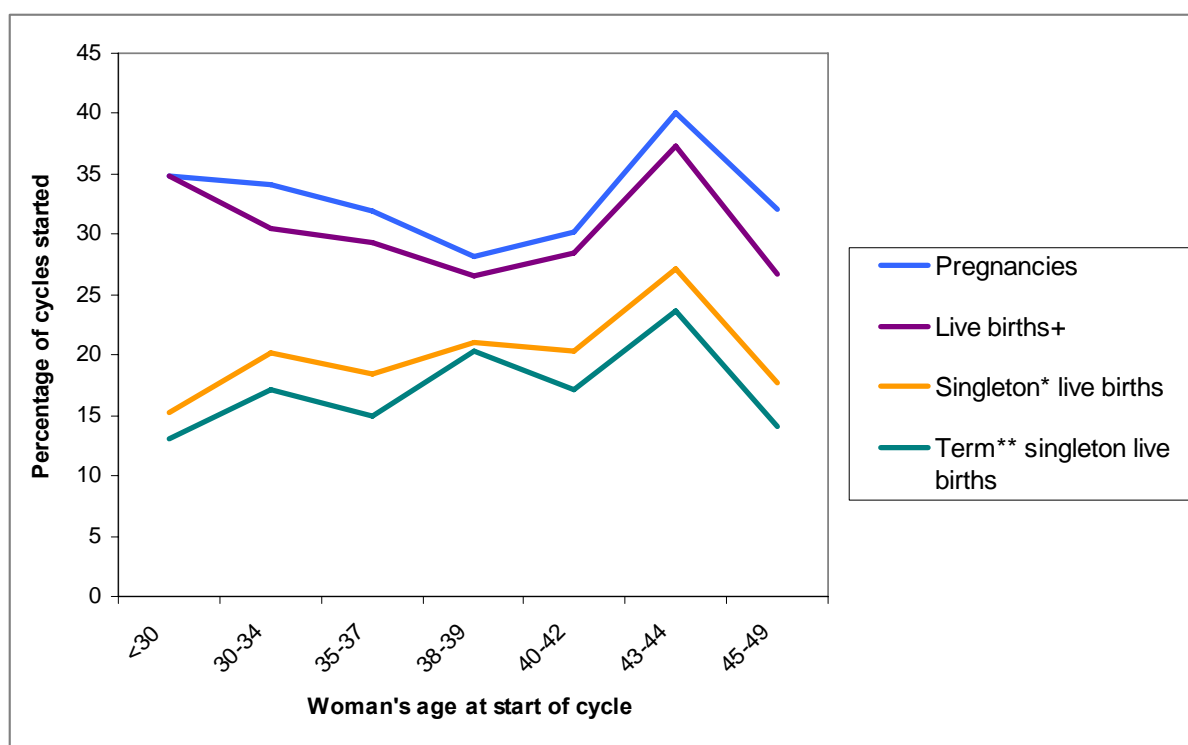
- A total of 418 women became pregnant following fresh donor IVF or ICSI treatment which started in 2006; this includes only those pregnancies confirmed by an ultrasound scan.
- Of the 418 women:
  - 293 women were pregnant with a single fetus (70%) and
  - 125 women were pregnant with a multiple pregnancy (30%).
- It is important to know that even though a pregnancy may be conceived as a multiple pregnancy, sometimes one of the fetuses miscarries (and this may or may not be accompanied by bleeding), resulting in the birth of only one baby from a pregnancy that started as a multiple pregnancy
- The risk of miscarriage was different for women who were carrying a singleton pregnancy compared with a multiple pregnancy:
  - 10 in every 100 women pregnant with a singleton had a miscarriage (10%) whereas
  - 4 in every 100 women with a multiple pregnancy experienced a miscarriage and lost the pregnancy completely (4%). However, a further 16 in every 100 women (16%) with a multiple pregnancy experienced the loss of one of the fetuses and delivered fewer babies than she was originally pregnant with, for example a woman pregnant with twins delivered a single live baby.

► 6. How does a woman's age affect birth outcomes following fresh donor IVF or ICSI? [6.10-6.16]

Results starting from the point a treatment cycle begins:

- The effects of the woman's age on the chances of becoming pregnant and delivering a baby are shown in Figure 9 as a proportion of the treatment cycles started in 2006.

**Figure 9: Pregnancy and birth outcomes for treatment cycles started in 2006 [6.10-6.16a]**



+ Live births - pregnancies resulting in the delivery of one or more live births

\*Singleton live births - live births resulting from singleton pregnancies, excludes multiple pregnancies which result in just one live birth

\*\* Term – refers to a live birth born following a full-term pregnancy at 37 or more weeks gestation of pregnancy

- It should be noted that these results are based on relatively small numbers of women in each age group. Given the small numbers involved there is little evidence of a significant difference in outcome by the age of the woman when she was treated.

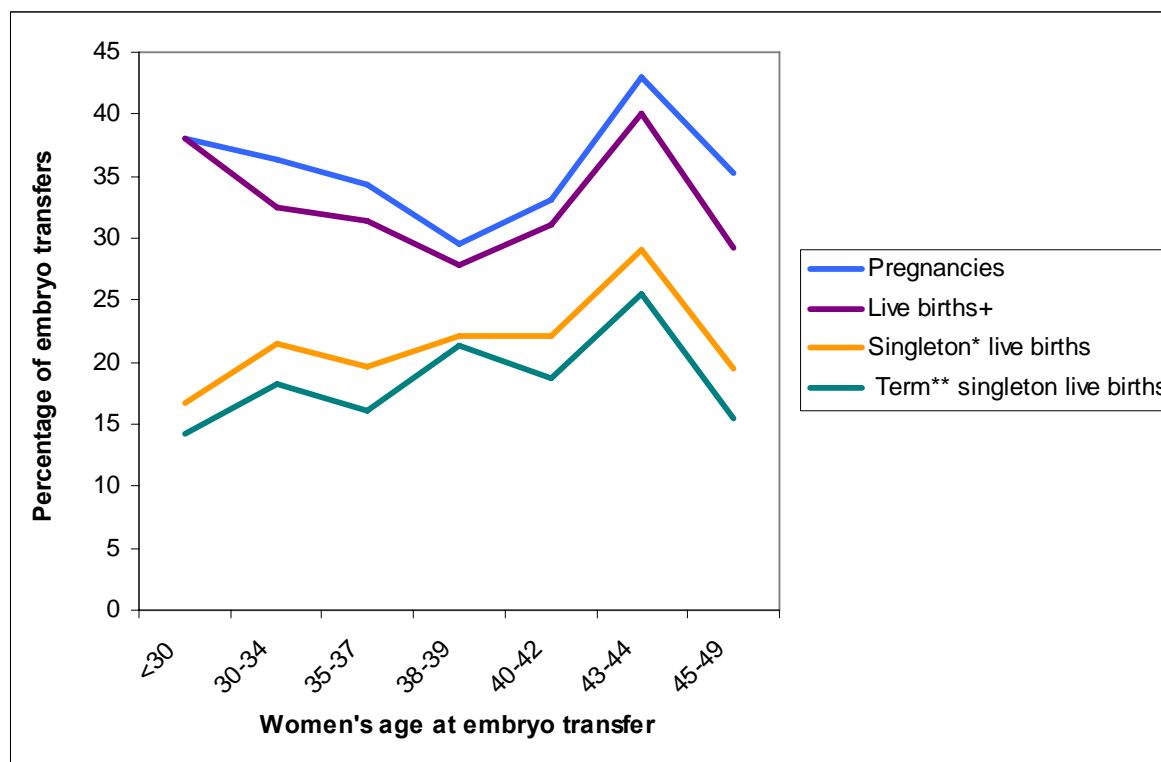
This is likely to be because the majority of donor eggs used in these cycles will have been from donors aged 35 and under. For these reasons we report the results for all ages overall rather than in age groups, as we have in the other reports in this series. Given the small numbers involved caution must be taken in the interpretation of these results.

- Overall 1,278 cycles of treatment were started which resulted in:
  - 418 ultrasound confirmed pregnancies;
    - 33 in every 100 treatment cycles started (33%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 378 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 30 in every 100 treatment cycles started (30%) resulted in the birth of at least one baby.
  - 258 singleton pregnancies which resulted in a live birth;
    - 20 in every 100 treatment cycles started (20%) led to a singleton pregnancy which resulted in the birth of a baby.
  - 219 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 17 in every 100 treatment cycles started (17%) resulted in a live birth born at term.

#### Results starting from the point of embryo transfer:

- For a variety of reasons (see section 2) not all treatment cycles which are begun reach the stage of embryo transfer. The results of treatment from the point that an embryo transfer has been carried out are shown below. These figures are useful to help understand what the chances of pregnancy and of having a baby are once an embryo transfer has taken place.
- The effects of the woman's age on the chances of becoming pregnant and delivering a baby are shown from the point of embryo transfer as a proportion of the embryo transfers for treatment started in 2006 (Figure 10).

**Figure 10: Pregnancy and birth outcomes for fresh donor IVF or ICSI embryo transfers as part of treatment started 2006 [6.10-6.16b]**



+ Live births - pregnancies resulting in the delivery of one or more live births

\*Singleton live births - live births resulting from singleton pregnancies, excludes multiple pregnancies which result in just one live birth

\*\* Term – refers to a live birth born following a full-term pregnancy at 37 or more weeks gestation of pregnancy

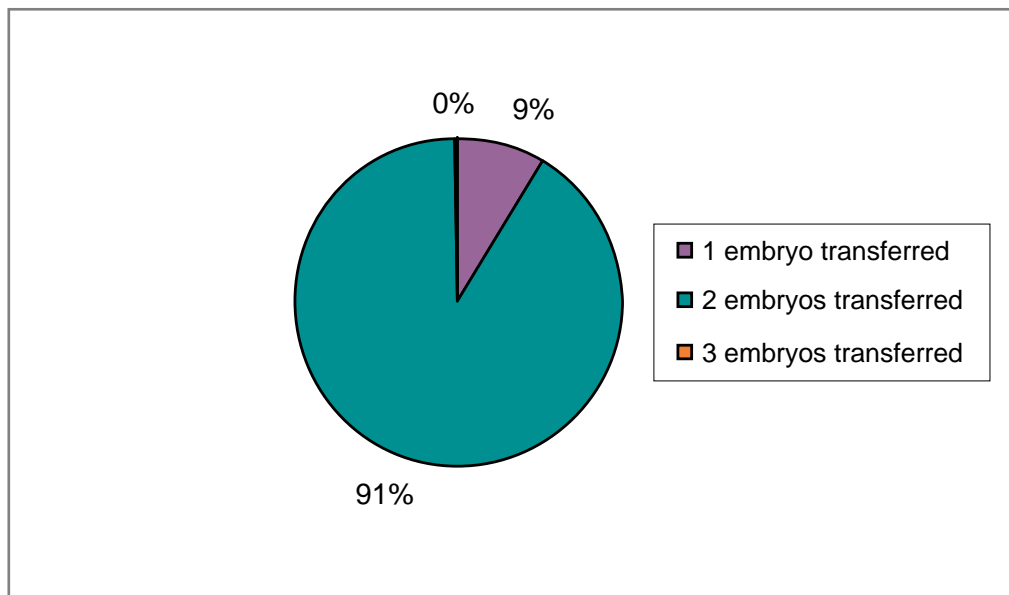
- Overall 1,183 embryo transfers were carried out following fresh donor IVF or ICSI which resulted in:
  - 418 ultrasound confirmed pregnancies;
    - 35 in every 100 embryo transfers (35%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 378 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 32 in every 100 embryo transfers (32%) resulted in the birth of at least one baby.
  - 258 singleton pregnancies which resulted in a live birth;
    - 22 in every 100 (22%) embryo transfers led to a singleton pregnancy which resulted in the birth of a baby.
  - 219 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 19 in every 100 embryo transfers (19%) resulted in a live birth born at term.

- ▶ **7. Are the outcomes of treatment affected by whether the sperm used comes from the woman's partner or a donor? [6.43]**
- In 2006 only 77 (6%) of the 1,278 cycles of fresh donor IVF or ICSI involved the use of donor sperm. The other 1,201 (94%) of cycles involved the use of the woman's partner's sperm. Because of the very small numbers involved it is not possible to present the treatment outcomes when donor sperm has been used. Since the vast majority of cycles involve the use of partner sperm the results overall give a close indication of the outcomes following fresh donor IVF or ICSI where the woman's partner's sperm was used to fertilise the donated eggs.



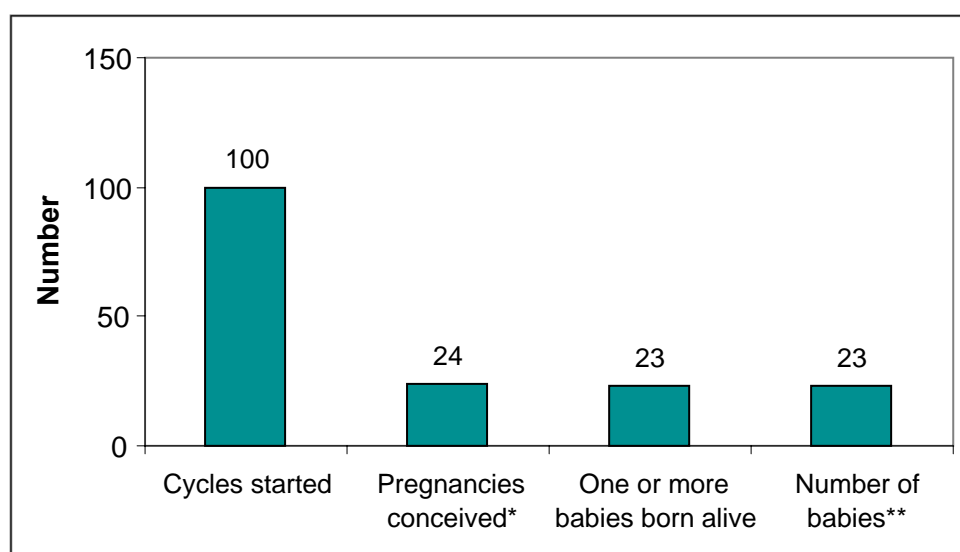
- ▶ 8. What is the effect of the number of embryos transferred on the number of babies born? [6.24]
- 1,183 cycles of fresh donor IVF or ICSI treatment which started in 2006 reached the embryo transfer stage, of these (Figure 11):
    - 9% involved the transfer of a single embryo (SET).
    - 91% involved the transfer of two embryos (DET) – a double embryo transfer.
    - Less than 0.5% involved the transfer of three embryos.

Figure 11: Number of embryos transferred in each cycle of treatment [6.24]



- The 100 single embryos transfers (SET) led to 24 pregnancies and 23 women gave birth to 23 babies (live births) (Figure 12):
  - 76 in every 100 single embryo transfer procedure did not lead to an ultrasound confirmed pregnancy (76%) whereas
  - 24 in every 100 single embryo transfer led to a pregnancy (24%).
  - 23 in every 100 women who had a single embryo transfer gave birth to a baby (23%).

**Figure 12: Outcome of fresh donor IVF or ICSI treatment cycles<sup>+</sup> involving single embryo transfer (SET) started in 2006 [6.24b]**



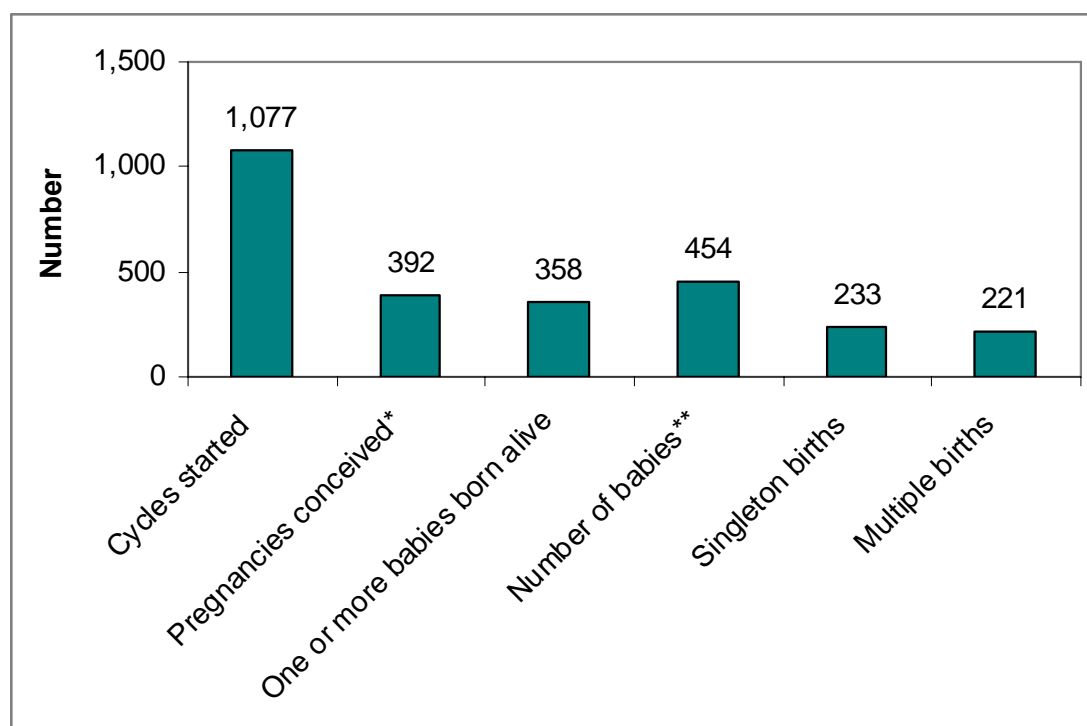
+ Fresh IVF or ICSI cycles where women used donor eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Ultrasound confirmed pregnancies

\*\* The total number of babies born alive – which include a small number of multiples

- 1,077 double embryo transfers (DET) led to 392 pregnancies and 358 women gave birth to at least one baby. In total 454 babies were born (live births) and 221 of them were multiple births (Figure 13):
  - 64 in every 100 double embryo transfer procedures did not lead to an ultrasound confirmed pregnancy (64%) whereas
  - 36 in every 100 double embryo transfers led to a pregnancy (36%).
  - 33 in every 100 women who had a double embryo transfer gave birth to at least one baby (33%).
  - 32 in every 100 of the pregnancies following double embryo transfer were multiple pregnancies (32%).
  - 49 in every 100 of the babies born following double embryo transfer were born as one of a multiple birth (49%).

**Figure 13: Outcome of fresh donor IVF or ICSI treatment cycles<sup>+</sup> involving double embryo transfer (DET) started in 2006 [6.24c]**



+ Fresh IVF or ICSI cycles where women used donor eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

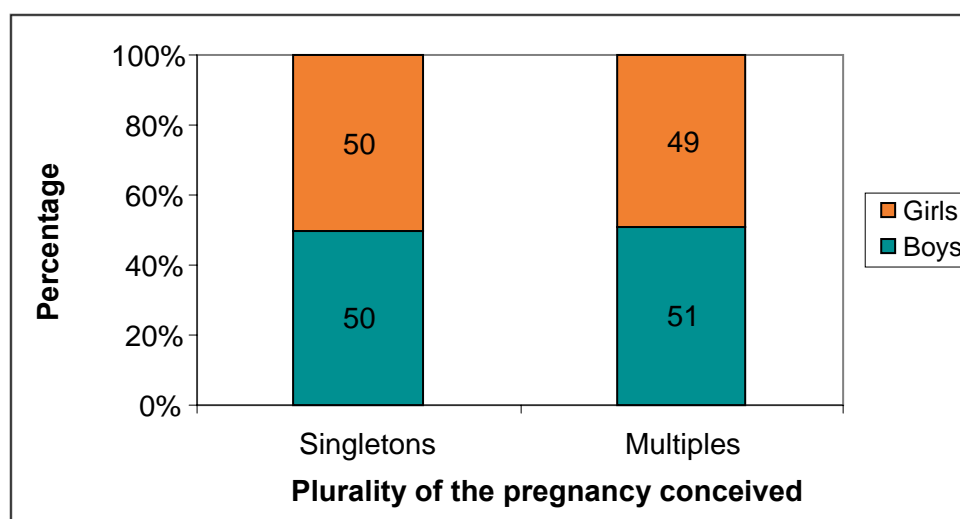
\*Ultrasound confirmed pregnancies

\*\* The total number of babies born alive

► **9. How many boys and girls are born following fresh donor IVF or ICSI?**  
[6.51]

- Following fresh donor IVF or ICSI treatment which started in 2006 454 babies were born alive and of these just over half (51%) were boys and just less than half (49%) were girls.
- Just over half of the babies were born to women carrying a singleton pregnancy and of these half (50%) were boys and half (50%) were girls (Figure 14).
- For the babies born from a multiple pregnancy the split between boys and girls was 51% boys and 49% girls (Figure 14).

**Figure 14: Sex of the babies\* born following fresh donor IVF or ICSI<sup>+</sup> started in 2006 [6.51]**



+ Fresh IVF or ICSI cycles where women used donor eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Includes only babies born alive

## Appendix E

### ► How we gathered the data

- Clinics are required by law to provide information to the HFEA Register about all licensed fertility treatments they carry out. The Register started operating in August 1991 and is a rich source of information about fertility treatment, its outcomes and the factors that contribute to the birth of a baby following treatment.

### ► Understanding the results presented

- This analysis is of just treatment cycles involving fresh embryo transfers using embryos created following IVF or ICSI using donor eggs in treatment cycles started at some stage during 2006. While the outcomes of some treatment started in 2006 may not be known until 2007 these treatment outcomes are nevertheless included in this analysis.
- Clinics are not always told by every patient the outcome of each treatment cycle, especially if the woman has travelled to the UK for treatment from abroad. A small number of pregnancy outcomes are therefore not included in the Register. However, since most of the pregnancy outcomes are known, it is likely that any underestimate in the outcome rates is very small.
- The information that the HFEA publishes is a snapshot of data provided to us by licensed clinics at a particular time. This information may be subject to change as individual centres notify us of amendments. Before publication, we perform a preliminary checking process on the data, and ask the clinic to confirm the accuracy, for which they remain responsible.

## IVF & ICSI results – involving frozen embryo transfers for women using donor eggs for treatment cycles started in 2006

### ► Introduction

- The information we collect about fertility treatment can be analysed in many ways. In this report we present key information about those patients having IVF or ICSI involving frozen embryo transfer:
  - where the embryos were created using donor eggs
  - where women were having treatment with the intention of conceiving immediately rather than storing or donating eggs and embryos; surrogacy treatment is excluded
  - and the treatment cycle started in 2006 resulting in births in either 2006 or 2007.
- This report does not include information about cycles of fresh or frozen IVF or ICSI where women used their own eggs or fresh embryo transfer following IVF or ICSI where donor eggs were used.
- Similar reports are available for fresh and frozen embryo transfer in IVF and ICSI where women have used their own eggs, and IVF or ICSI involving fresh embryo transfer with donor eggs.
- At some points in the report the small numbers involved mean that some of the information cannot be presented for confidentiality reasons.
- The majority of donor eggs used in these cycles will have been from donors aged 35 and under.
- Information about how the data for this report were gathered is given in the appendix together with a glossary of terms.

### ► Summary

- In 2006 343 women started 520 cycles of treatment where the intention was to carry out a frozen embryo transfer using embryos created using donor eggs following IVF or ICSI, and treatment was undertaken with the purpose of conceiving immediately.
- Of the 520 cycles of frozen donor IVF or ICSI started 476 cycles resulted in an embryo transfer (92%).
- The majority (74%) of embryo transfers involved the transfer of two embryos; 25% of cycles involved a single embryo transfer; and 1% were three embryo transfers.
- A total of 124 treatment cycles resulted in an ultrasound confirmed pregnancy which represents 24% of treatment cycles started and 108 women gave birth to at least one baby (21%).
- The chances of a baby being born following frozen donor IVF or ICSI was affected by the number of embryos transferred but not by the age of the women when they were treated.

- Of the 124 women who had a confirmed ultrasound pregnancy 13% had a miscarriage, an ectopic pregnancy, a termination, or the baby was stillborn.
- Of the women who conceived following frozen donor IVF or ICSI 79% conceived a singleton pregnancy and 21% conceived a multiple pregnancy.
- Having conceived a pregnancy following frozen donor IVF or ICSI 87% of women gave birth to at least one baby (a live birth).

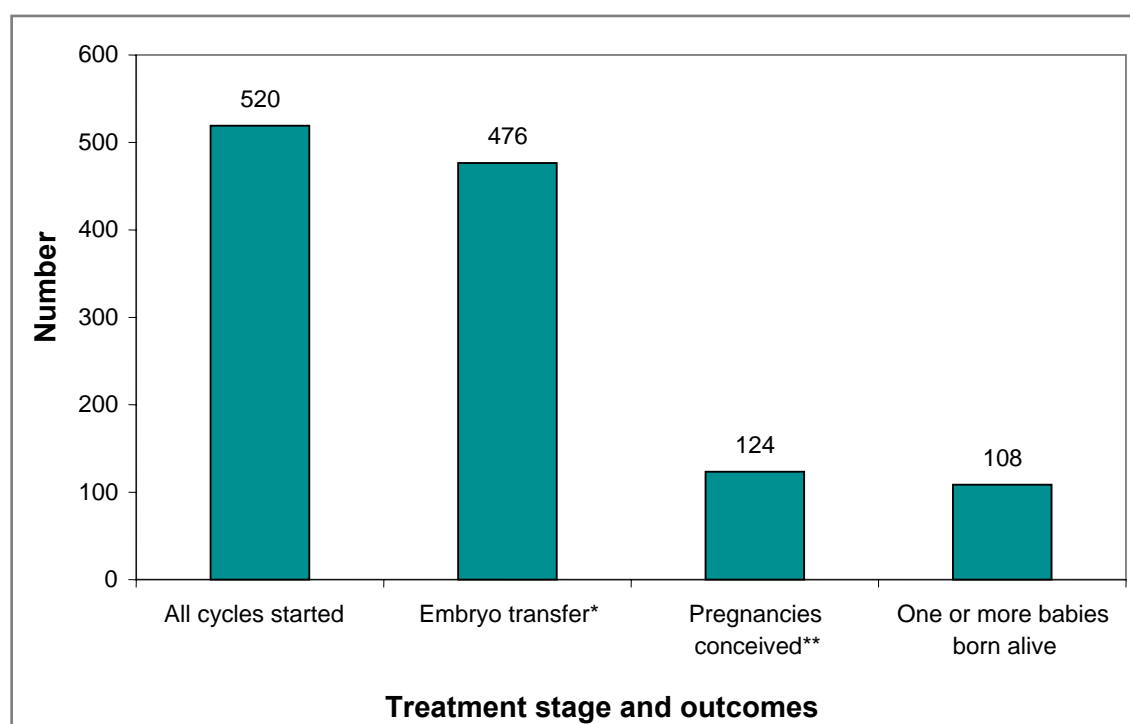
#### ► How are treatment results calculated?

- The results of IVF and ICSI (both fresh and frozen) can be calculated using treatment cycles as the starting point. This gives figures which are useful to help understand what the chances of pregnancy and of having a baby are when a woman starts treatment.
- However, not all treatment cycles which are started reach the embryo transfer stage. The results of treatment can also be calculated from the point that an embryo transfer occurs. This is useful to understand what the chances of pregnancy and of having a baby are once an embryo transfer has taken place.
- In this report we show:
  - Treatment outcomes from the point of view of starting a treatment cycle and these results are given per 100 treatment cycles and
  - Treatment outcomes from the point at which the embryo transfer has been carried out and these results are given as per 100 embryo transfers.

► 1. How many women were treated with frozen donor IVF or ICSI and what were the outcomes? [7.1-7.8]

- In 2006 343 women started 520 cycles of treatment where the intention was to carry out a frozen embryo transfer cycle using embryos created following IVF or ICSI using donated eggs and the treatment was undertaken to try to conceive straight away.
- For a variety of reasons not all cycles of treatment which are started reach the embryo transfer stage.
- The majority of cycles reaching the embryo transfer stage do not result in a pregnancy (Figure 1).

Figure 1: Outcome of frozen donor IVF or ICSI cycles<sup>+</sup> started in 2006 [7.1]



+ Frozen IVF or ICSI cycles where women used donor eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\* Cycles in which an embryo transfer took place

\*\* Ultrasound confirmed pregnancies



**Results relating to treatment cycles:**

- Of the 520 cycles started :
  - 476 cycles resulted in an embryo transfer; 92 in every 100 treatment cycles started reached the embryo transfer stage (92%).
  - 124 cycles resulted in a pregnancy (confirmed on ultrasound); 24 in every 100 cycles started resulted in an ultrasound confirmed pregnancy (24%)  
and
  - 108 cycles led to birth to one or more babies; 21 in 100 cycles started resulted in one or more live births (21%).

**Results relating to embryo transfers:**

- There were 476 cycles of frozen IVF or ICSI using donated eggs which reached the embryo transfer stage:
  - 124 cycles resulted in a pregnancy confirmed by ultrasound; 26 in every 100 embryo transfer procedure resulted in an ultrasound confirmed pregnancy (26%)  
and
  - 108 cycles led to the birth of one or more babies; 23 in every 100 embryo transfers resulted in one or more live births (23%).

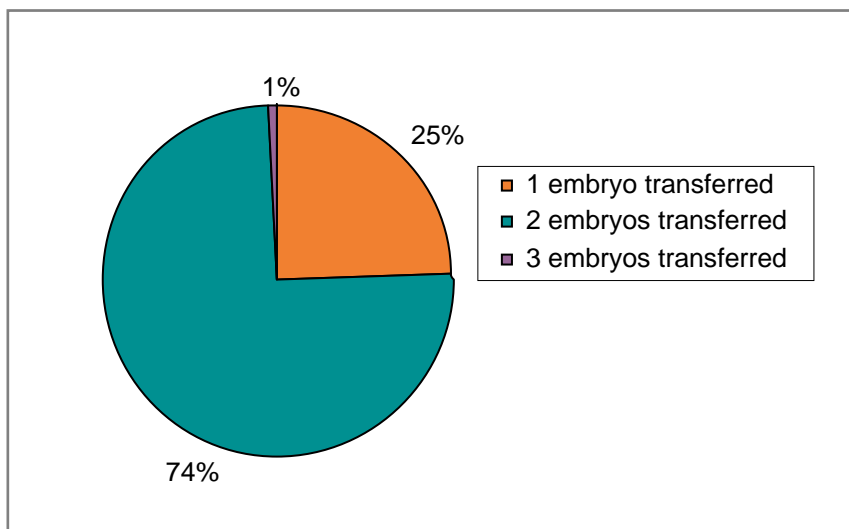
► **2. Why were treatment cycles cancelled? [7.9]**

- 44 cycles were cancelled before the embryo transfer stage. The main reason that cycles were cancelled were because when the frozen embryos were taken out of storage they were damaged during the thawing process and were not of sufficiently good quality to be transferred.

► 3. How many embryos were transferred in each treatment cycle? [7.23]

- Overall in 2006 the majority of frozen donor IVF and ICSI embryo transfers involved the transfer of two embryos (Figure 2):
  - 25 in every 100 treatment cycles (25%) reaching the embryo transfer stage involved a single embryo transfer (1ET).
  - 74 in every 100 treatment cycles (74%) reaching the embryo transfer stage involved a double embryo transfer (2ET) and
  - Only 1 in every 100 treatment cycles (1%) reaching embryo transfer involved the transfer of three embryos (3ET).

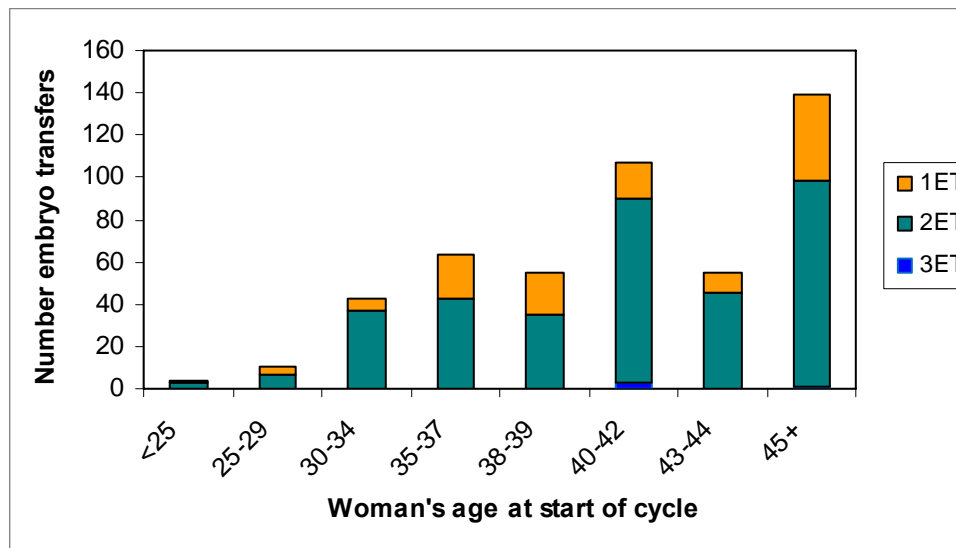
Figure 2: Number of embryos transferred in each cycle of treatment [7.24]



- Transferring a single embryo reduces the risk of a multiple pregnancy, although a small number of twins can result from spontaneous splitting of a single embryo resulting in identical twins.

- The number of frozen donor IVF and ICSI cycles increased with increasing age of the women treated (Figure 3).
- The proportion of single embryo transfer in frozen donor IVF or ICSI is not closely related to the age of the woman:
  - About 29 in every 100 women under the age of 40 yrs had a single embryo transfer (29%).
  - whereas
  - About 23 in 100 women 40 yrs and over had a single embryo transfer (23%).
- Only four cycles of frozen donor IVF or ICSI involved the transfer of three embryos and these were all carried out in women 40 years or older.

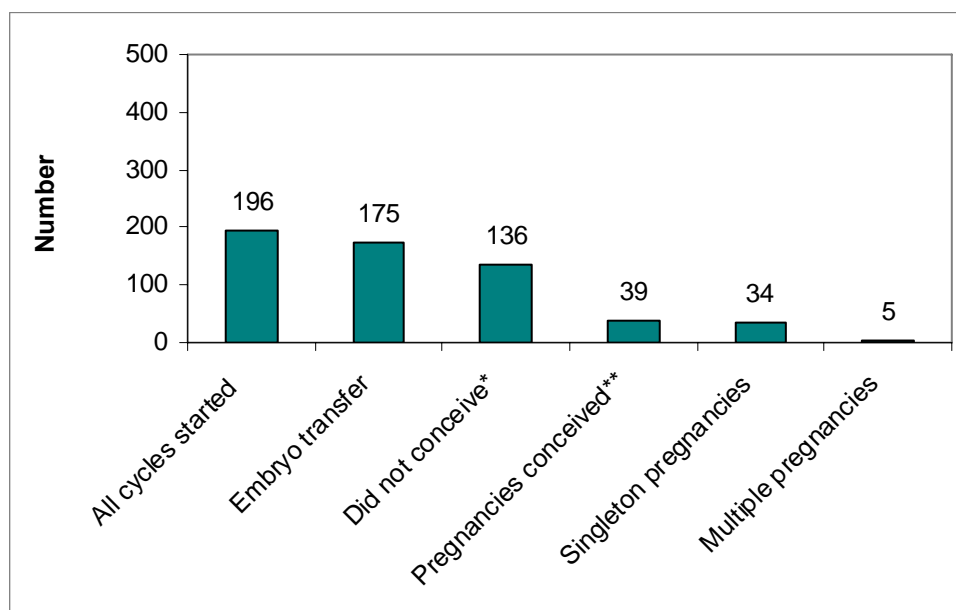
**Figure 3: Number of embryos transferred by the woman's age [7.23]**



► 4. How does the woman's age affect the chances of pregnancy following frozen donor IVF or ICSI? [7.18]

- The outcomes following frozen donor IVF or ICSI were not strongly affected by the age of the women when she underwent treatment. This is likely to be because the majority of donor eggs used in these cycles will have been from donors aged 35 and under. The results of treatment are shown for women in two different age groups (Figures 4 and 5).

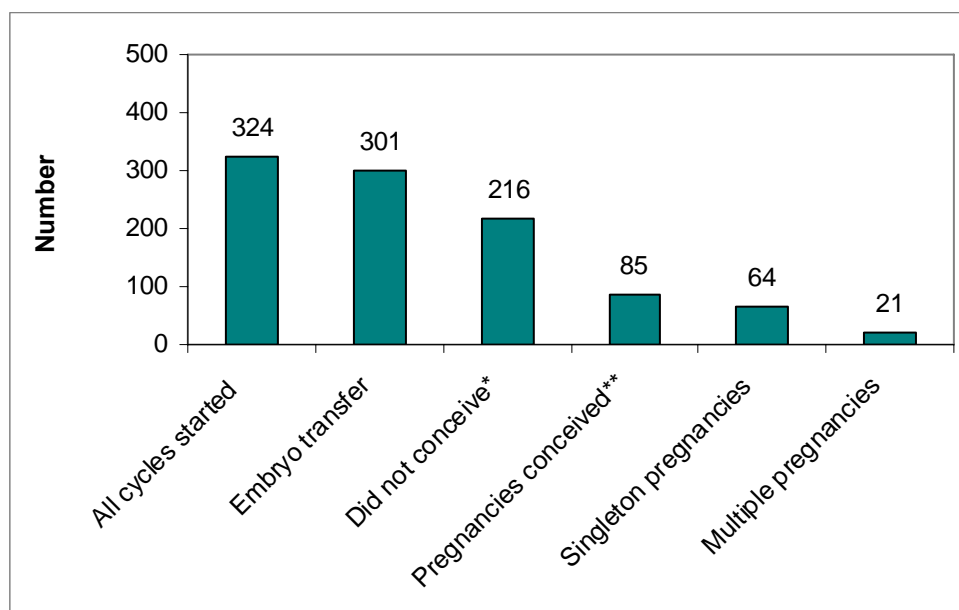
**Figure 4: Treatment outcomes for women age 39 years or younger when they started treatment in 2006 [7.18a]**



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

\*\*Ultrasound confirmed pregnancies

Figure 5: Treatment outcomes for women aged 40 years and older when they started treatment in 2006 [7.18b]



\* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

\*\*Ultrasound confirmed pregnancies

► 5. What can happen to a pregnancy conceived by frozen donor IVF or ICSI will a baby always be born? [7.10-7.17, 7.19]

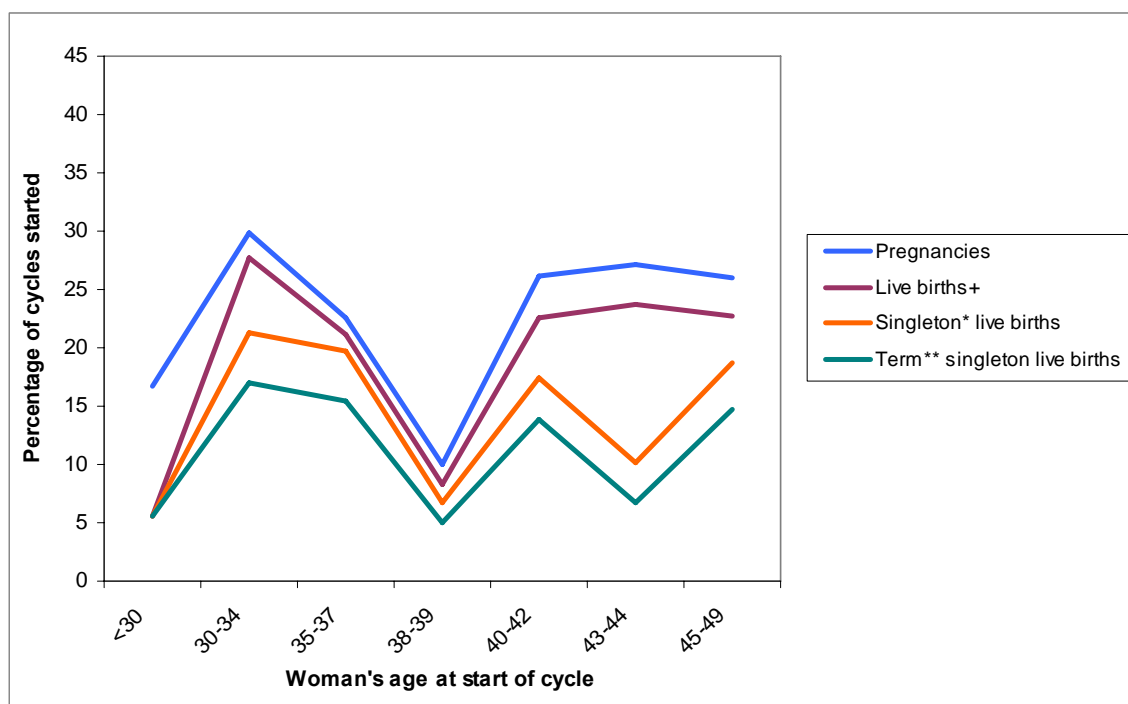
- Overall 124 women conceived a pregnancy following frozen donor IVF or ICSI treatment which started in 2006:
  - 108 of these pregnancies resulted in the birth of at least one baby (live birth);
    - 87 in every 100 women who conceived a frozen donor IVF or ICSI pregnancy gave birth to at least one baby (87%).
  - 98 of these women were pregnant with a single pregnancy:
    - 79 in 100 pregnancies following frozen donor IVF or ICSI were singleton pregnancies (79%).
    - 83 of these singleton pregnancies resulted in the birth of a baby (live births);
      - 85 in every 100 women who conceived a frozen donor IVF or ICSI singleton pregnancy gave birth to a baby (85%) and
  - 11 in every 100 women who conceived a frozen donor IVF or ICSI singleton pregnancy had a miscarriage, an ectopic pregnancy, a termination or the baby was stillborn (11%).
  - 26 of these women were pregnant with a multiple pregnancy:
    - 21 in 100 pregnancies following frozen donor IVF or ICSI were multiple pregnancies (21%).
    - the outcomes of these multiple pregnancies have not been presented here because the numbers involved are too small.

► 6. How does a woman's age affect birth outcomes following frozen donor IVF or ICSI? [7.10-7.16]

Results starting from the point a treatment cycle begins:

- The effects of the woman's age on the chances of becoming pregnant and delivering a baby are shown in Figure 6 as a proportion of the treatment cycles started in 2006.

**Figure 6: Pregnancy and birth outcomes for treatment cycles started in 2006 [7.10-7.16a]**



+ Live births - pregnancies resulting in the delivery of one or more live births

\*Singleton live births - live births resulting from singleton pregnancies, excludes multiple pregnancies which result in just one live birth

\*\* Term – refers to a live birth born following a full-term pregnancy at 37 or more weeks gestation of pregnancy

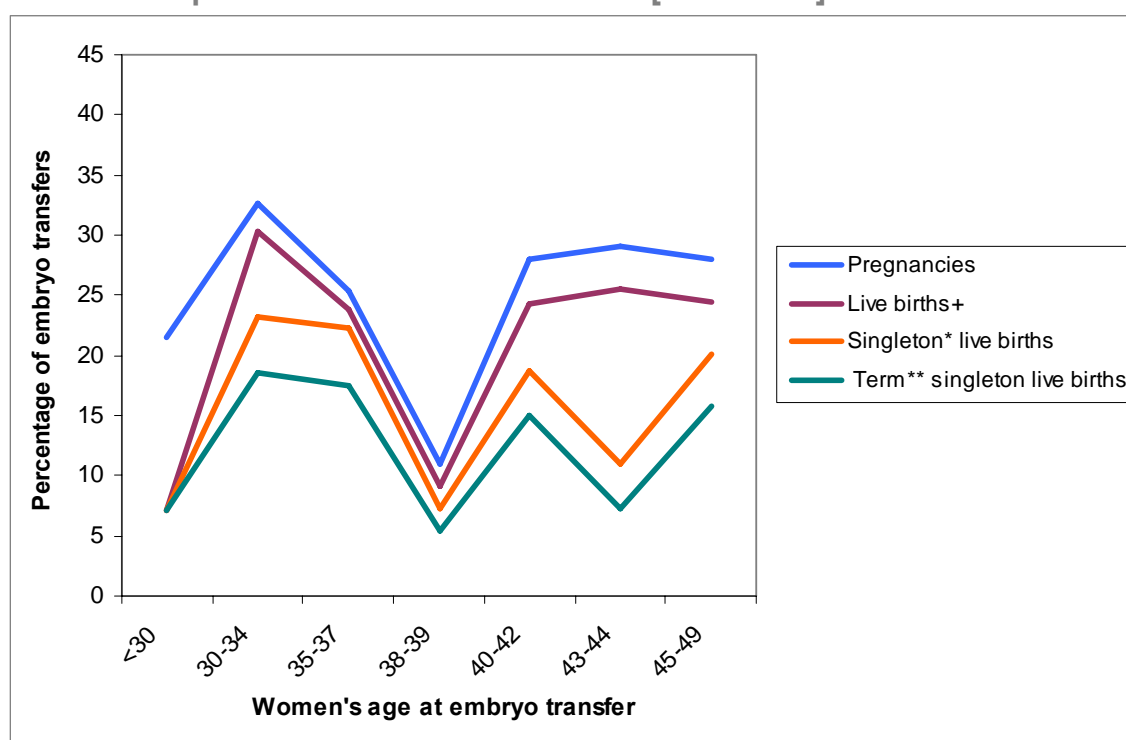
- It should be noted that these results are based on relatively small numbers of women in each age group. Given the small numbers involved there is little evidence of a significant difference in outcome by the age of the woman when she was treated. This is likely to be because the majority of donor eggs used in these cycles will have been from donors aged 35 and under. For these reasons we report the results for all ages overall rather than in age groups, as we have in the other reports in this series. Given the small numbers involved caution must be taken in the interpretation of these results.
- Overall 520 cycles of treatment were started which resulted in:
  - 124 ultrasound confirmed pregnancies;
    - 24 in every 100 treatment cycles started (24%) resulted in a pregnancy confirmed on an ultrasound scan.

- 108 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
  - 21 in every 100 treatment cycles started (21%) resulted in the birth of at least one baby.
- 83 singleton pregnancies which resulted in a live birth;
  - 16 in every 100 treatment cycles started (16%) led to a singleton pregnancy which resulted in the birth of a baby.
- 42 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
  - 8 in every 100 treatment cycles started (8%) resulted in a live birth born at term.

#### Results starting from the point of embryo transfer:

- For a variety of reasons (see section 2) not all treatment cycles which are begun reach the stage of embryo transfer. The results of treatment from the point that an embryo transfer has been carried out are shown below. These figures are useful to help understand what the chances of pregnancy and of having a baby are once an embryo transfer has taken place.
- The effects of the woman's age on the chances of becoming pregnant and delivering a baby are shown from the point of embryo transfer as a proportion of the embryo transfers for treatment started in 2006 (Figure 7).

**Figure 7: Pregnancy and birth outcomes for frozen donor IVF or ICSI embryo transfers as part of treatment started 2006 [7.10-7.16b]**



+ Live births - pregnancies resulting in the delivery of one or more live births

\*Singleton live births - live births resulting from singleton pregnancies, excludes multiple pregnancies which result in just one live birth

\*\* Term – refers to a live birth born following a full-term pregnancy at 37 or more weeks gestation of pregnancy



- Overall 473 embryo transfers were carried out following frozen donor IVF or ICSI which resulted in:
  - 124 ultrasound confirmed pregnancies;
    - 26 in every 100 embryo transfers (26%) resulted in a pregnancy confirmed on an ultrasound scan.
  - 108 pregnancies which resulted in the birth of one or more babies (live births of which some were singletons, twins or triplets);
    - 23 in every 100 embryo transfers (23%) resulted in the birth of at least one baby.
  - 83 singleton pregnancies which resulted in a live birth;
    - 17 in every 100 (17%) embryo transfers led to the conception of a singleton pregnancy which resulted in the birth of a baby.
  - 42 singleton pregnancies which resulted in the birth of a baby (live birth) following a full-term pregnancy;
    - 9 in every 100 embryo transfers (9%) resulted in a live birth born at term.

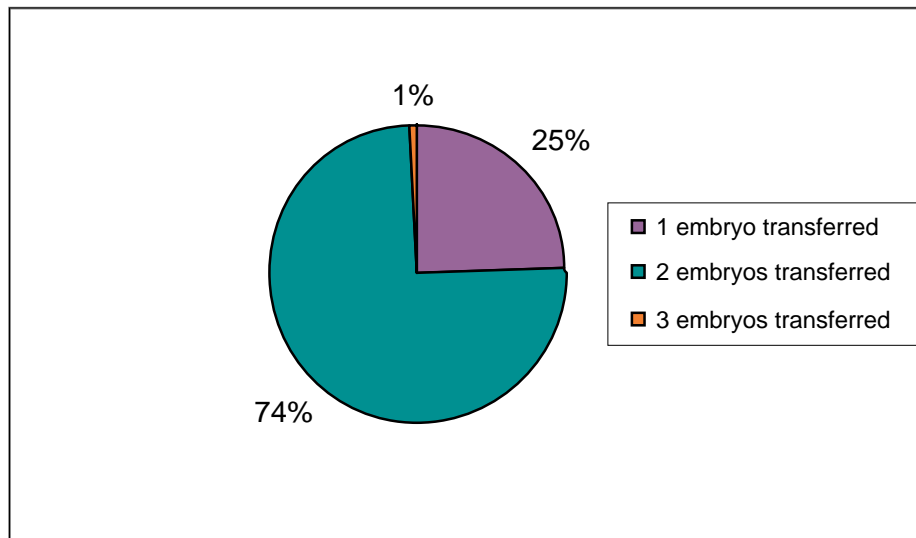
► **7. Are the outcomes of treatment affected by whether the sperm used comes from the woman's partner or a donor? [7.43]**

- In 2006 only 97 (19%) of the 520 cycles of frozen donor IVF or ICSI involved the use of donor sperm. The other 423 (81%) of cycles involved the use of the woman's partner's sperm. Because of the very small numbers involved it is not possible to present the treatment outcomes when donor sperm has been used. Since the majority of cycles involve the use of partner sperm the results overall give a close indication of the outcomes following frozen donor IVF or ICSI where the woman's partner's sperm was used to fertilise the donated eggs.

► 8. What is the effect of the number of embryos transferred on the number of babies born? [7.24]

- 520 cycles of frozen donor IVF or ICSI which started in 2006 reached the embryo transfer stage, of these (Figure 8):
  - 25% involved the transfer of a single embryo (SET).
  - 74% involved the transfer of two embryos (DET) – a double embryo transfer.
  - 1% involved the transfer of three embryos.

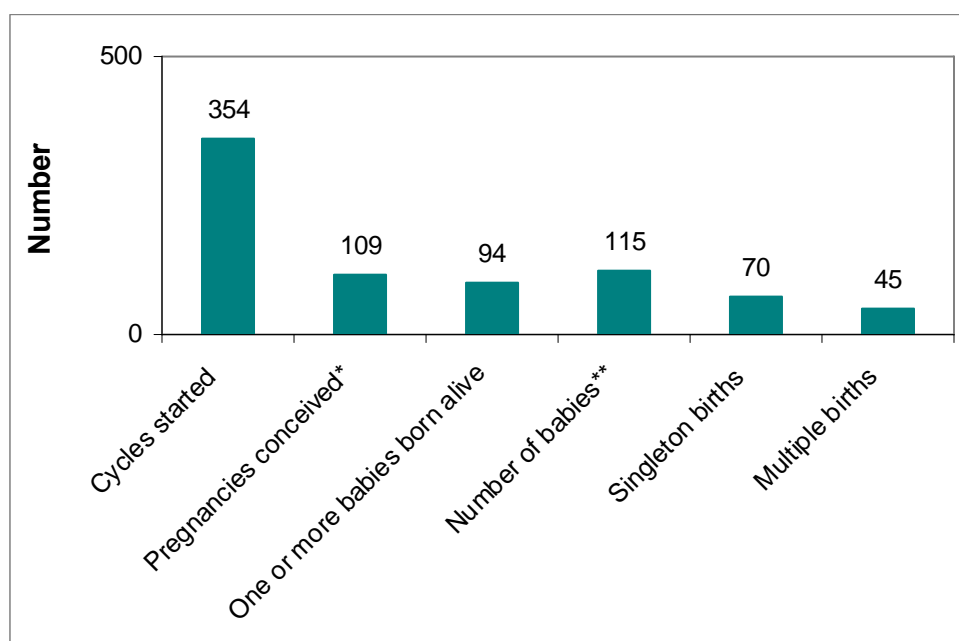
Figure 8: Number of embryos transferred in each cycle of treatment [7.24]



- The outcomes of single embryo transfers have not been presented here because the numbers involved are too small.

- 354 double embryo transfers (DET) led to 109 pregnancies and 94 women gave birth to at least one baby. In total 115 babies were born (live births) and 45 of them were multiple births (Figure 9), that is:
  - 69 in every 100 double embryo transfer procedures did not lead to the conception of an ultrasound confirmed pregnancy (69%) whereas
  - 31 in every 100 double embryo transfers led to a pregnancy (31%).
  - 27 in every 100 women who had a double embryo transfer gave birth to at least one baby (27%).

**Figure 9: Outcome of frozen donor IVF or ICSI cycles\* involving double embryo transfer (DET) started in 2006 [7.24c]**



+ Frozen IVF or ICSI cycles where women used donor eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

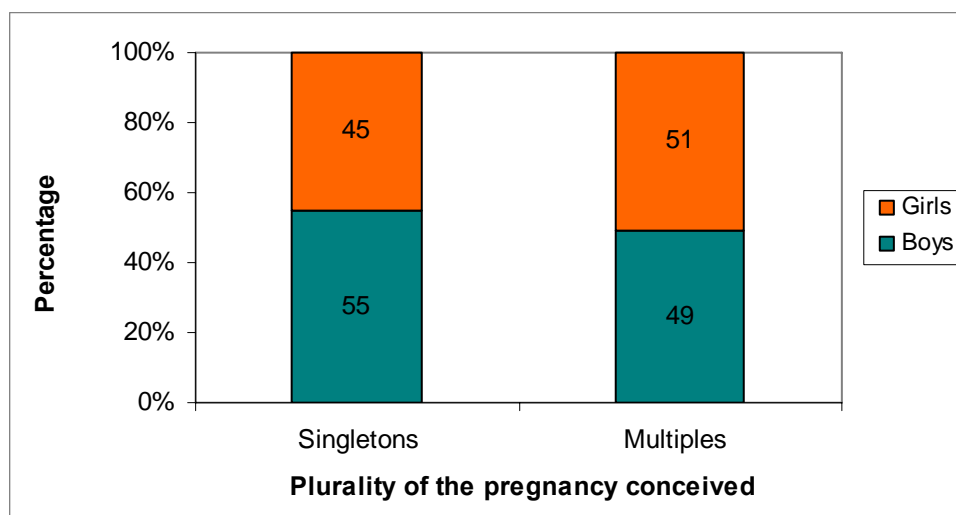
\*Ultrasound confirmed pregnancies

\*\* The total number of babies born alive

► **9. How many boys and girls are born following frozen donor IVF or ICSI?**  
[7.51]

- Following frozen donor IVF or ICSI which started in 2006 130 babies were born alive and of these just over half (53%) were boys and just less than half (47%) were girls.
- Nearly two-thirds of the babies were born to women carrying a singleton pregnancy and of these just over half (53%) were boys and just less than half (45%) were girls (Figure 10).
- For the babies born from a multiple pregnancy the split between boys and girls was 49% boys and 51% girls (Figure 10).

**Figure 10: Sex of the babies\* born following frozen donor IVF or ICSI+ started in 2006 [7.51]**



+ Frozen IVF or ICSI cycles where women used donor eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

\*Includes only babies born alive

## Appendix F

### ► How we gathered the data

- Clinics are required by law to provide information to the HFEA Register about all licensed fertility treatments they carry out. The Register started operating in August 1991 and is a rich source of information about fertility treatment, its outcomes and the factors that contribute to the birth of a baby following treatment.

### ► Understanding the results presented

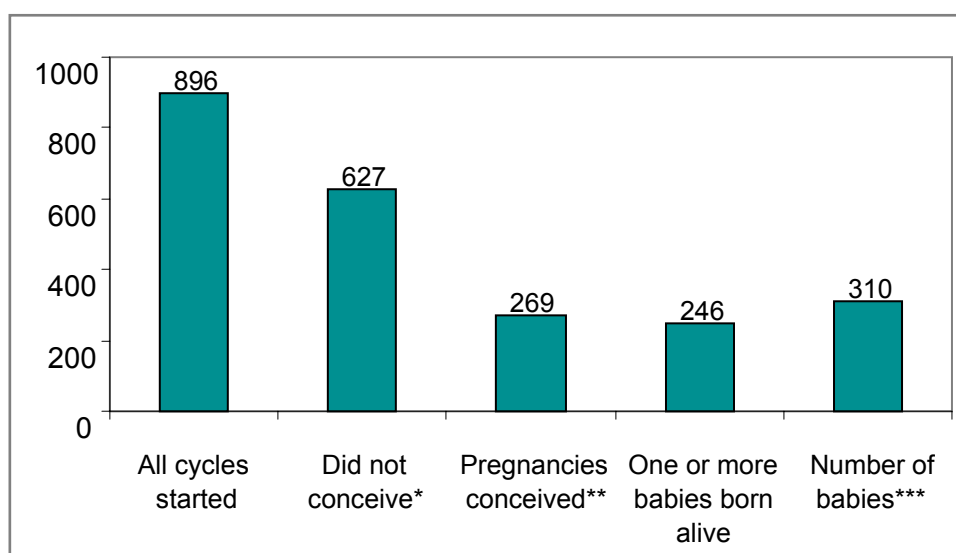
- This analysis is of just treatment cycles involving frozen embryo transfers using embryos created following IVF or ICSI using donor eggs in treatment cycles started at some stage during 2006. While the outcomes of some treatment started in 2006 may not be known until 2007 these treatment outcomes are nevertheless included in this analysis.
- Clinics are not always told by every patient the outcome of each treatment cycle, especially if the woman has travelled to the UK for treatment from abroad. A small number of pregnancy outcomes are therefore not included in the Register. However, since most of the pregnancy outcomes are known, it is likely that any underestimate in the outcome rates is very small.
- The information that the HFEA publishes is a snapshot of data provided to us by licensed clinics at a particular time. This information may be subject to change as individual centres notify us of amendments. Before publication, we perform a preliminary checking process on the data, and ask the clinic to confirm the accuracy, for which they remain responsible.

## Other treatments:

### Treatment involving donor sperm

- During 2006 896 fresh treatment cycles of IVF or ICSI were started which involved the use of donor sperm (Figure 1).
- Of these 896 cycles:
  - 627 did not result in the conception of a pregnancy - 70 in 100 cycles did not lead to a pregnancy (70%).
  - 269 led to a pregnancy confirmed on ultrasound - 30 in 100 cycles resulted in a confirmed pregnancy (30%).
  - 246 women gave birth (live birth) to one or more babies (some as multiple births) - 27 in 100 cycles resulted in the birth of at least one baby from the pregnancy (27%)
- and
- a total of 310 babies were born following treatment involving donor sperm.

**Figure 1: Outcome of IVF or ICSI treatment cycles involving donor sperm started in 2006 [8.1]**



\*Includes some cycles where a pregnancy test may have been positive but the pregnancy was not confirmed on ultrasound

\*\* Ultrasound confirmed pregnancies

\*\*\*Total number of babies born alive – includes multiple births

- Of the 269 ultrasound confirmed pregnancies:
  - 198 women were pregnant with single pregnancy - 74 in 100 pregnancies were singletons (74%)
  - and
  - 71 women had a multiple pregnancy - 26 in 100 pregnancies were multiples (26%).

## Egg sharing arrangements

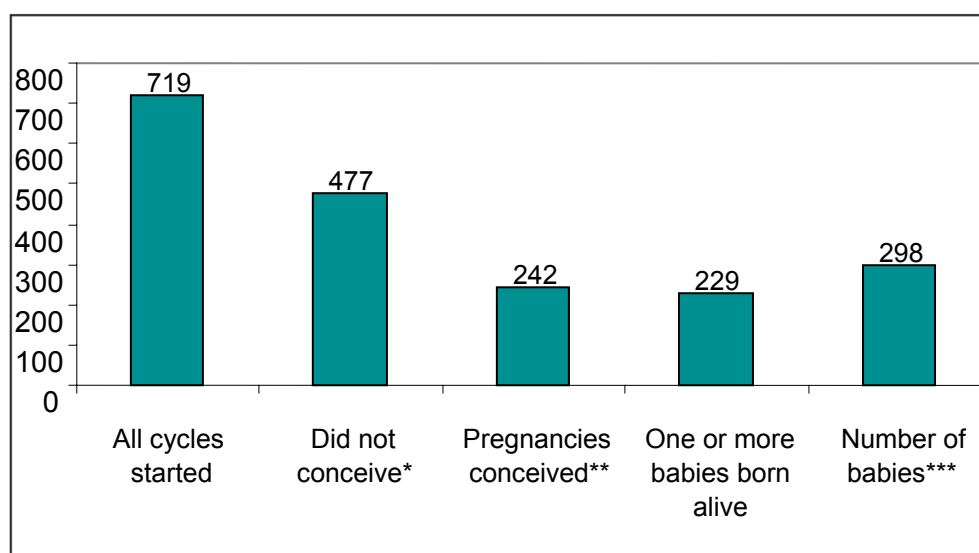
- Some clinics operate egg sharing arrangements which mean that prior to treatment women agree that if they produce a large number of eggs they will share some of their eggs with up to two other women.
- In 2006 606 women underwent 719 cycles of IVF or ICSI where they agreed at the outset of treatment to an egg sharing arrangement.
- Treatment outcomes following an egg sharing agreement can be looked at from the point of view of the women who donate eggs in the arrangement and the women who are the egg recipients in such an arrangement.
- To avoid confusion in the presentation of the treatment outcomes here, the women who agree to share their eggs in an egg sharing arrangement will be referred to as the 'egg donor'. These results are shown in section a. below.
- Results relating to the treatment outcomes for women who received a donated egg - referred to here as the 'egg recipients' – are shown in section b. below.

### ► a. Treatment outcomes for the women who donate eggs in an egg sharing arrangement (the egg donor)

- The treatment outcomes of the egg donors will be examined in this section.
- Of the 719 cycles of treatment in which women undertook to be an egg donor 2006 (Figure 2):
  - 477 of the cycles did not result in the conception of a pregnancy for the egg donor - 66 in 100 cycles did not result in conception (66%).
  - 242 cycles resulted in the conception of a pregnancy confirmed on ultrasound - 34 in 100 cycles led to conception (34%).
  - 229 women gave birth to one or more babies (some of which were multiple births) - 32 in 100 cycles resulted in the birth of at least one baby (32%).
  - in total 298 babies were born (live births).

- These outcomes can be compared to cycles where a woman's own eggs were used in a fresh (rather than frozen) cycle of treatment where:
  - 26 in 100 cycles of treatment resulted in the conception of a pregnancy confirmed on ultrasound (26%)
  - and
  - 23 in 100 cycles led to the birth of at least one baby (23%).
- Because of the relatively small numbers of women involved it is not possible to identify the factors which led to apparently better treatment outcomes for women who are the donors in an egg sharing arrangement compared with women overall. This will need to be explored further using information from several years combined, but this may, for example, be related to the age of the women involved.

**Figure 2: Outcome of IVF or ICSI treatment cycles for the women involved in donating eggs in an egg sharing arrangement , treatment started in 2006 [8.4]**



\*Includes some cycles where a pregnancy test may have been positive but the pregnancy was not confirmed on ultrasound

\*\* Ultrasound confirmed pregnancies

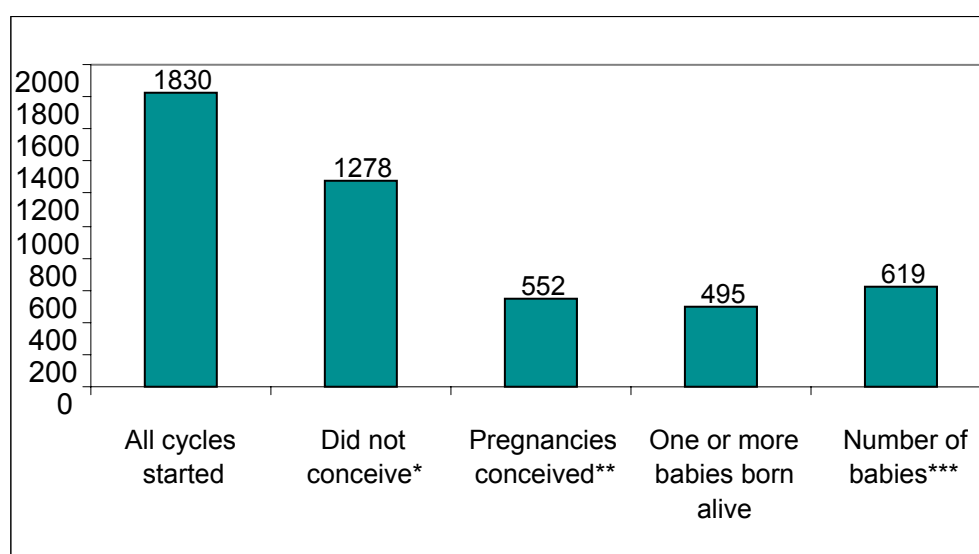
\*\*\*Total number of babies born alive – includes multiple births



► **b. Treatment outcomes for the women who are the recipients of donated eggs (the egg recipient)**

- Because of the way in which the information is collected in the HFEA register it is not possible for us to distinguish between eggs which are donated for use by other women as part of an egg sharing arrangement which was agreed before treatment started, and those eggs which are donated once treatment has started where the woman produces more eggs available than she needs. This section looks at women who received eggs from both sources.
- In 2006 1,830 IVF or ICSI cycles were started in which donated eggs were used in the treatment cycle by 1,485 women (the egg recipients) (Figure 3).
- Of the 1,830 cycles of treatment in which women were egg recipients:
  - 1,278 of the cycles did not result in the conception of a pregnancy - 70 in 100 cycles did not result in conception (70%).
  - 552 cycles resulted in the conception of a pregnancy confirmed on ultrasound - 30 in 100 cycles led to conception (30%).
  - 495 women gave birth to one or more babies (some of which were multiple births) - 27 in 100 cycles led to the birth of at least one baby (27%).
  - In total 619 babies were born (live births).

**Figure 3: Outcome of IVF or ICSI treatment cycles for the women who used donated eggs (egg recipients) in their treatment which started in 2006 [8.5]**



\*Includes some cycles where a pregnancy test may have been positive but the pregnancy was not confirmed on ultrasound

\*\* Ultrasound confirmed pregnancies

\*\*\*Total number of babies born alive – includes multiple births

## Surrogacy

- In 2006 there were 85 cycles of IVF or ICSI carried out in a surrogacy arrangement and 61 women surrogates received treatment:
  - 16 surrogate pregnancies resulted from the 85 cycles of treatment - 19 in 100 cycles of surrogacy led to the conception of a pregnancy (19%).
  - 10 of the women gave birth to at least one baby and a total of 15 babies were born (live births).

## Storage of eggs and embryos

### ► a. Egg storage

- In 2006 56 cycles were started in order to store eggs by 52 women and a total of 550 eggs were frozen.

### ► b. Embryo storage

- In 2006 a total of 174 IVF or ICSI treatment cycles were carried out for 161 women with the original intention of storing embryos, rather than trying to conceive in that treatment cycle.
- A total of 973 embryos were stored with an average of 9 embryos stored per cycle.
- The overview section of this report gives details of all embryos stored following treatment started in 2006.

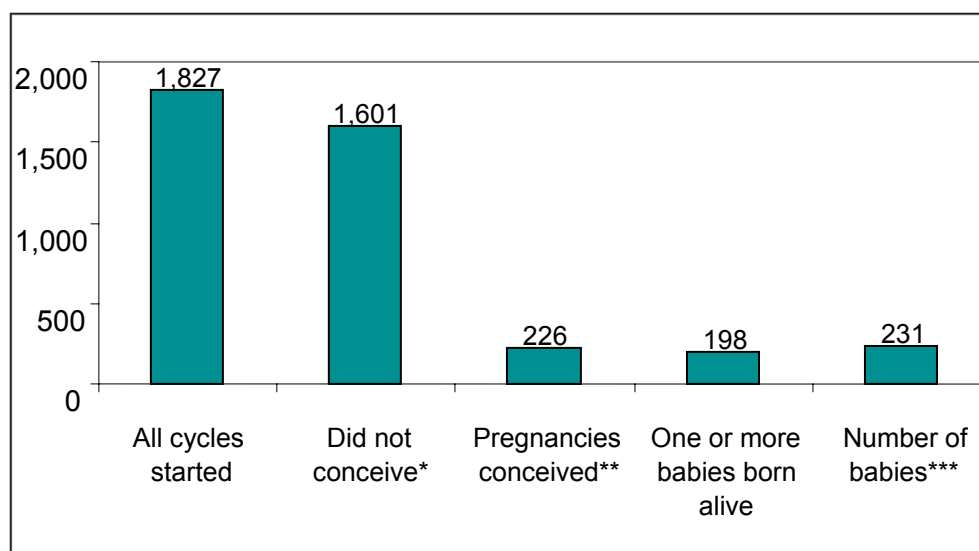
## Donor insemination (DI)

- In 2006 a total of 2,076 women underwent 4,236 cycles of donor insemination (DI) treatment with women receiving an average of 2 cycles of treatment each.
- Of the 2,076 cycles:
  - 1,827 cycles involved ovarian stimulation treatment  
and
  - 2,409 cycles were un-stimulated, natural cycles.

## Stimulated donor insemination

- Of the 1,827 cycles of stimulated donor insemination (Figure 4):
  - 1,601 did not result in the conception of a pregnancy - 88 in 100 cycles did not lead to a pregnancy (88%)
  - and
  - 226 led to a pregnancy confirmed on ultrasound - 12 in 100 cycles resulted in a confirmed pregnancy (12%).
  - 198 women gave birth (live birth) to one or more babies (some as multiple births) - 11 in 100 cycles resulted in the birth of at least one baby from the pregnancy (11%)
  - and
  - a total of 231 babies were born following treatment involving stimulated donor insemination.
  - 15 in 100 pregnancies conceived following simulated donor insemination were multiple pregnancies (15%).

**Figure 4: Outcome of stimulated donor insemination for treatment which started in 2006 [8.2]**



\*Includes some cycles where a pregnancy test may have been positive but the pregnancy was not confirmed on ultrasound

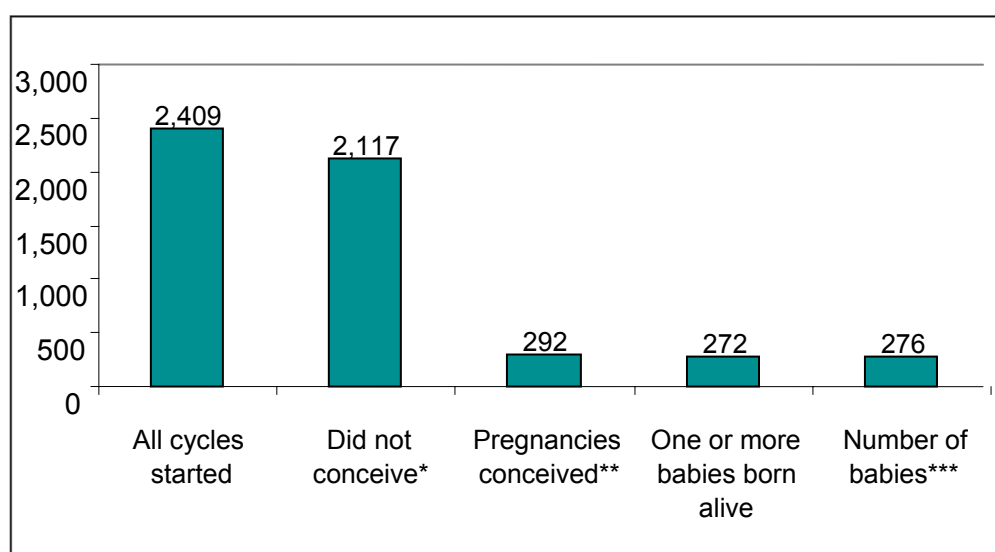
\*\* Ultrasound confirmed pregnancies

\*\*\*Total number of babies born alive – includes multiple births

## Un-stimulated, natural cycle donor insemination

- Of the 2,409 cycles of un-stimulated donor insemination (Figure 5):
  - 2,117 did not result in the conception of a pregnancy - 88 in 100 cycles did not lead to a pregnancy (88%)
  - and
  - 292 led to a pregnancy confirmed on ultrasound - 12 in 100 cycles resulted in a confirmed pregnancy (12%).
  - 272 women gave birth (live birth) to one or more babies (some as multiple births) - 11 in 100 cycles resulted in the birth of at least one baby from the pregnancy (11%)
  - and
  - a total of 276 babies were born following treatment involving donor insemination.
  - 1 in 100 pregnancies conceived following un-stimulated, natural cycle, donor insemination were multiple pregnancies (1%).

**Figure 5: Outcome of un-stimulated, natural cycle, donor insemination for treatment which started in 2006 [8.3]**



\*Includes some cycles where a pregnancy test may have been positive but the pregnancy was not confirmed on ultrasound

\*\* Ultrasound confirmed pregnancies

\*\*\*Total number of babies born alive – includes multiple births

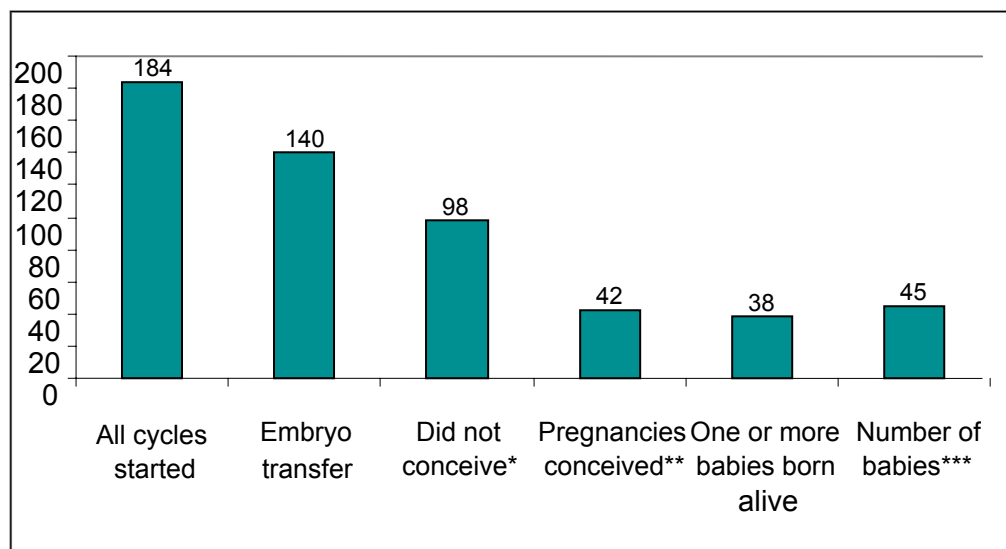
## Natural cycle un-stimulated IVF

- In 2006 175 natural (unstimulated) IVF cycles were started by 148 women which produced a total of 6 pregnancies.

## Pre-implantation genetic diagnosis (PGD)

- In 2006 184 cycles of infertility treatment were started with the intention of carrying out pre-implantation genetic diagnosis (PGD) on the embryos created.
- Of the 184 cycles started 44 cycles did not proceed to embryo transfer because:
  - 10 cycles resulted in abnormal fertilisation or fertilisation did not take place.
  - 2 cycles resulted in a risk of ovarian hyper-stimulation syndrome (OHSS) and the cycles were cancelled
  - and
  - 32 cycles had a positive result on genetic testing (PGD positive) so none were suitable for transfer.
- Of the 140 cycles which proceeded to embryo transfer (Figure 6):
  - 98 embryo transfers did not result in the conception of an ultrasound confirmed pregnancy - 70 in 100 embryo transfers did not result in a pregnancy (70%)
  - 42 embryo transfers resulted in conception of an ultrasound confirmed pregnancy - 30 in 100 embryo transfer cycles led to the women becoming pregnant (30%)
  - 38 of the women gave birth to at least one baby - 27 in 100 embryo transfer cycles following PGD resulted in the birth of at least one baby (27% of cycles that reached embryo transfer)
  - and a total of 45 babies were born (live births).

**Figure 6: Outcome of IVF or ICSI treatment cycles involving pre-implantation genetic diagnosis (PGD) started in 2006 [8.7]**



\*Includes some cycles where a pregnancy test may have been positive but the pregnancy was not confirmed on ultrasound

\*\* Ultrasound confirmed pregnancies

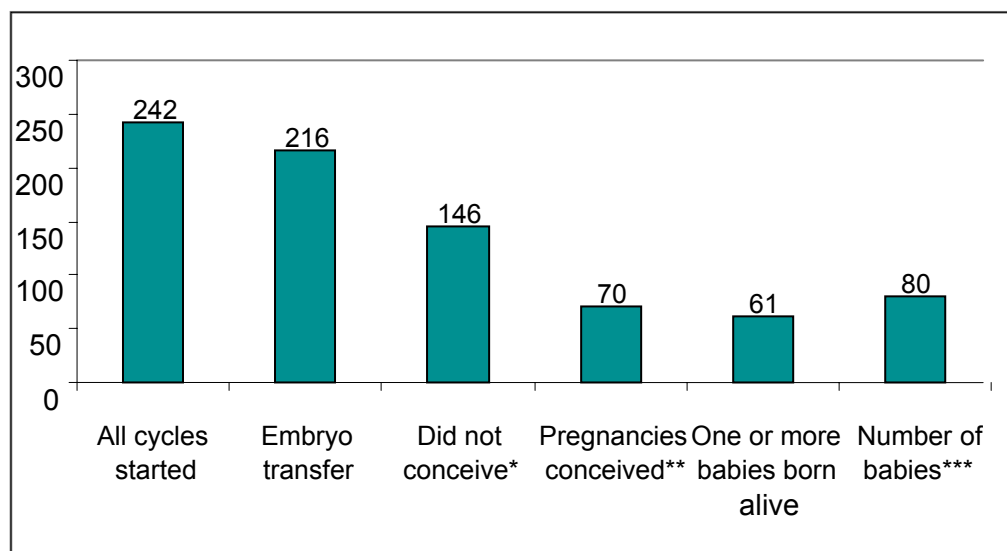
\*\*\*Total number of babies born alive – includes multiple births

### Pre-implantation genetic screening (PGS)

- In 2006 242 cycles of infertility treatment were started with the intention of carrying out pre-implantation genetic screening (PGS) on the embryos created.
- Of the 242 cycles started 26 cycles did not proceed to embryo transfer because:
  - 8 cycles resulted in abnormal fertilisation or fertilisation did not take place
  - 3 cycles resulted in a series of problems
 and
  - 15 cycles had a positive result on genetic testing (PGS positive).
- Of the 216 cycles which proceeded to embryo transfer (Figure 7):
  - 146 embryo transfers did not result in the conception of an ultrasound confirmed pregnancy (although a pregnancy test may have been positive) - 68 in 100 embryo transfers did not result in a pregnancy (68%)
  - 70 embryo transfers resulted in conception of an ultrasound confirmed pregnancy - 32 in 100 embryo transfer cycles led to the women becoming pregnant (32%)

- 61 of the women gave birth to at least one baby - 28 in 100 embryo transfer cycles following PGS resulted in the birth of at least one baby (28% of cycles that reached embryo transfer)
- and a total of 80 babies were born (live births).

**Figure 7: Outcome of IVF or ICSI treatment cycles involving pre-implantation genetic screening (PGS) started in 2006 [8.7]**



\*Includes some cycles where a pregnancy test may have been positive but the pregnancy was not confirmed on ultrasound

\*\* Ultrasound confirmed pregnancies

\*\*\*Total number of babies born alive – includes multiple births

## Glossary

**Live birth** ► birth event of at least one baby that shows any sign of life.\*

**Low birthweight** ► refers to the birth of a baby with a birthweight of less than 2.5kg (which is about 5½lbs).

**Multiple birth** ► birth event where more than one baby is born, whether alive or stillborn.\*

**Neonatal death** ► death of a baby within four completed weeks after birth.

**Neonatal death rate** ► this is also called the neonatal mortality rate and is calculated as the number of babies who die within the first four completed weeks after birth in the first four weeks after birth per 1,000 live births.

**Preterm birth** ► this is also sometimes called prematurity and refers to the birth of a baby before 37 completed weeks' gestation of pregnancy.

**Stillbirth** ► birth of a baby at more than 23 weeks gestation showing no signs of life.

**Stillbirth rate** ► this is calculated as the number of babies born after 23 weeks gestation of pregnancy who did not show any signs of life after birth per 1,000 total births (stillbirths + live births).

**Term birth** ► this refers to the birth of a baby following a pregnancy of 37 weeks gestation or more, which is regarded as the normal length of pregnancy.

\*The definition of a 'live birth' and a 'multiple birth' reflect the Office of National Statistics definitions. These differ from the definitions used in the HFEA Choose a Fertility Clinic.