

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.

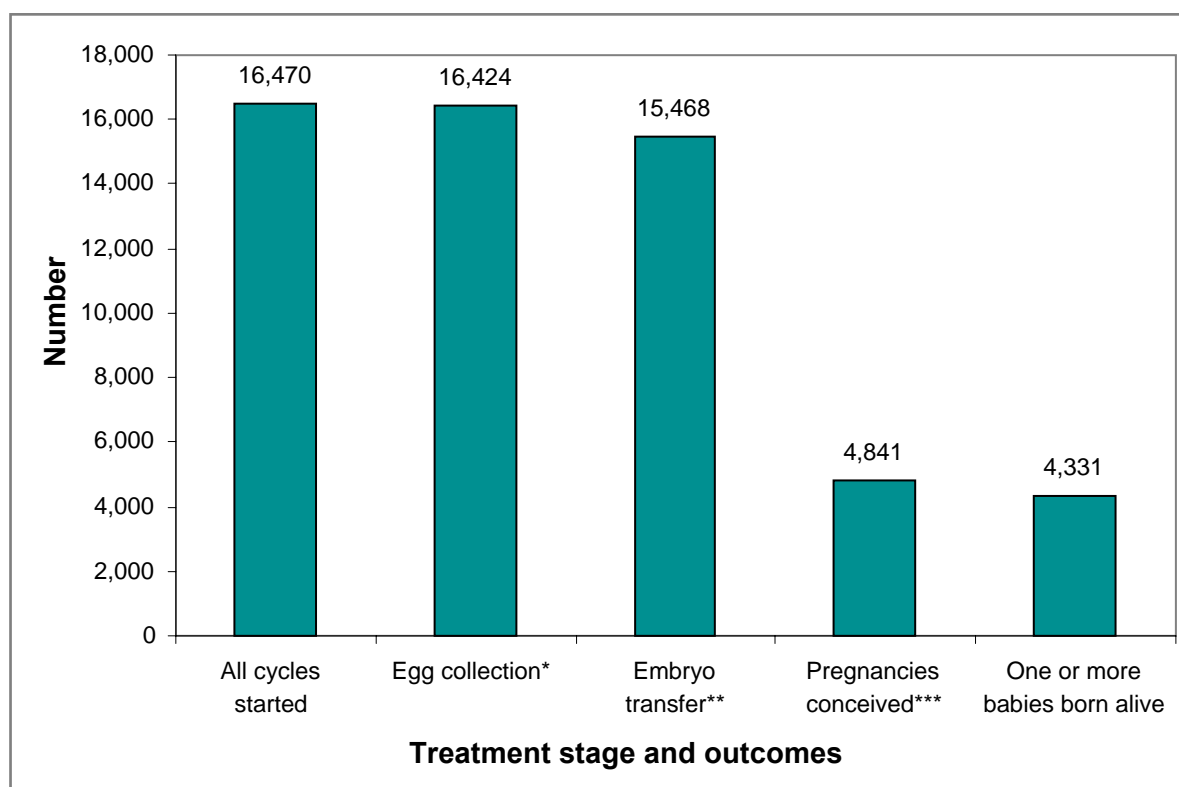
► How are treatment results calculated?

- 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⁺ 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%).

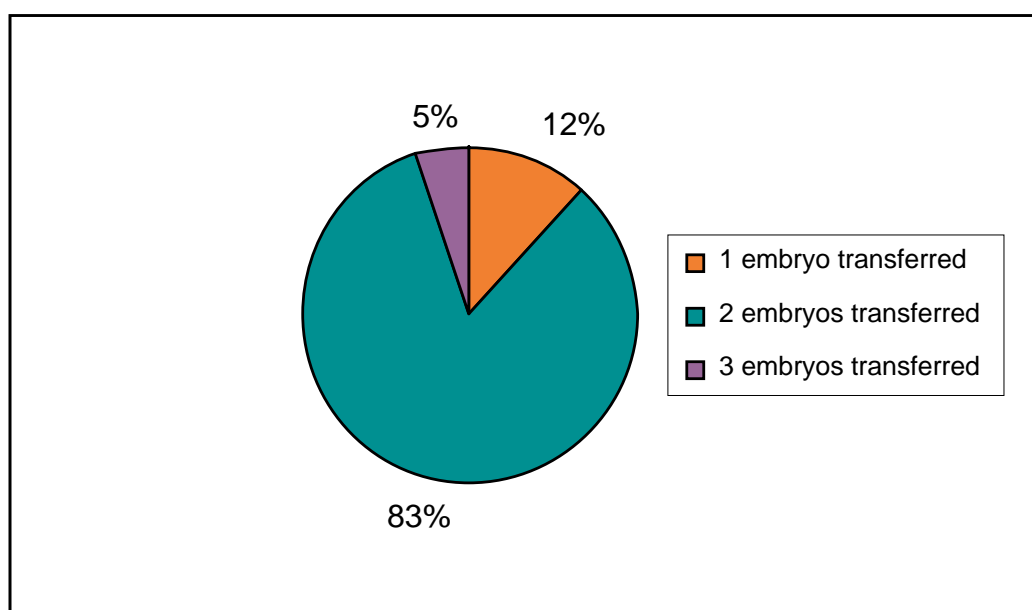
▶ 2. Why were treatment cycles cancelled? [4.9]

- 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).

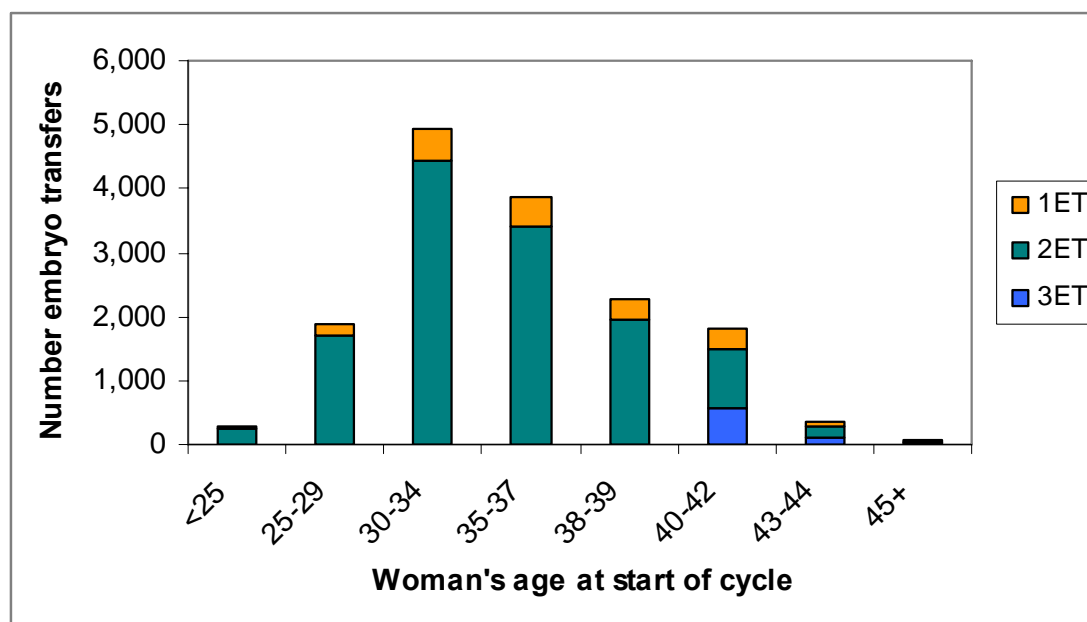
Figure 2: Number of embryos transferred in each cycle of treatment [2.24]



- 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]

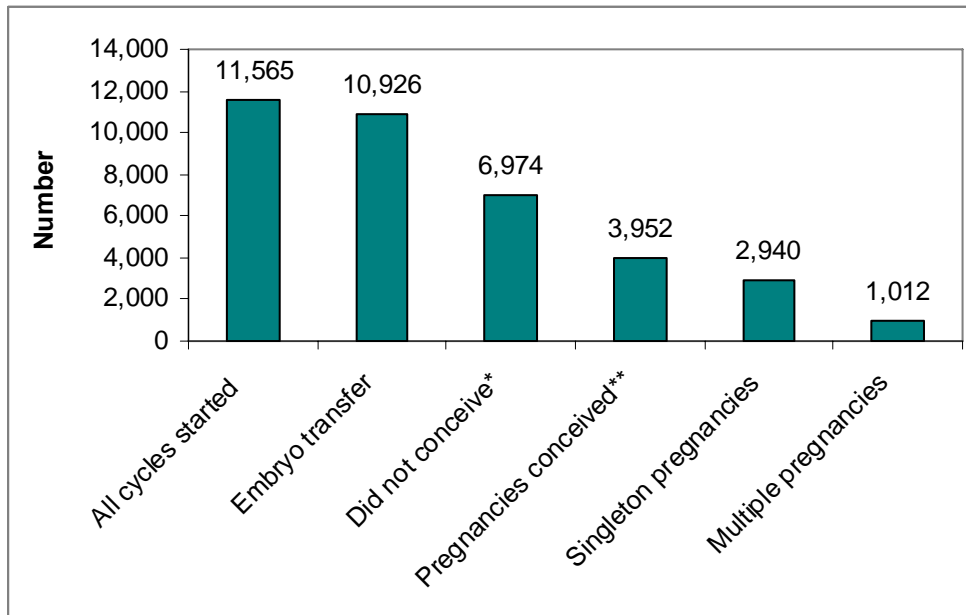


▶ 3b. At what stage of development were embryos transferred? [4.52-4.58]

- 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).

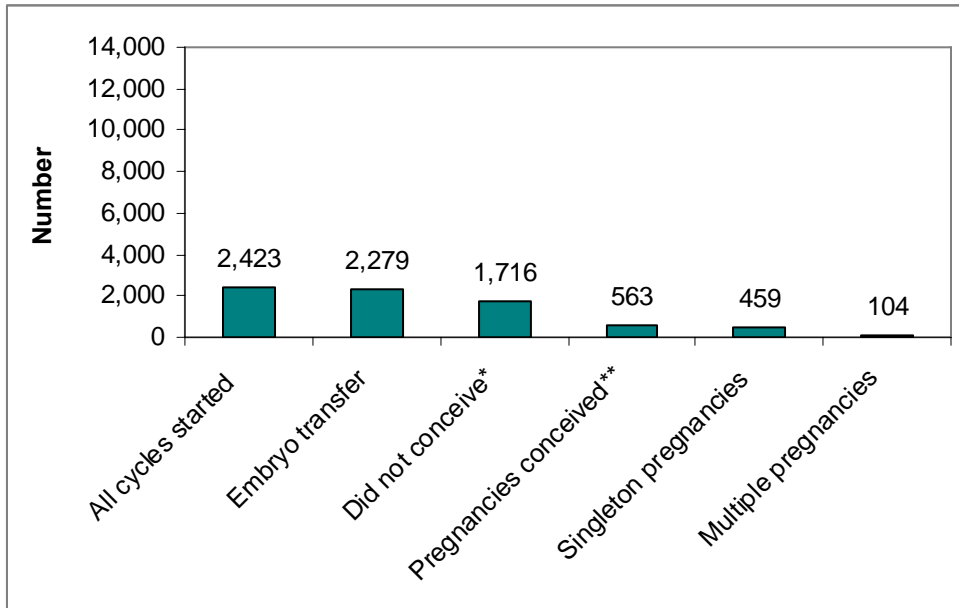
Figure 4: Treatment outcomes for women age 37 years or younger when they started treatment in 2006 [4.18a]



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

**Ultrasound confirmed pregnancies

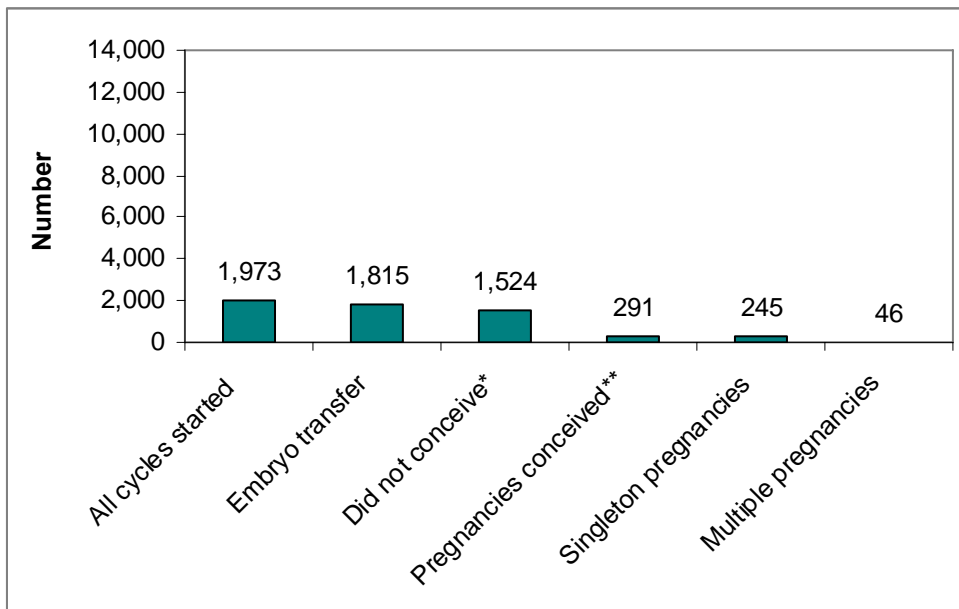
Figure 5: Treatment outcomes for women aged 38 to 39 years when they started treatment in 2006 [4.18b]



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

**Ultrasound confirmed pregnancies

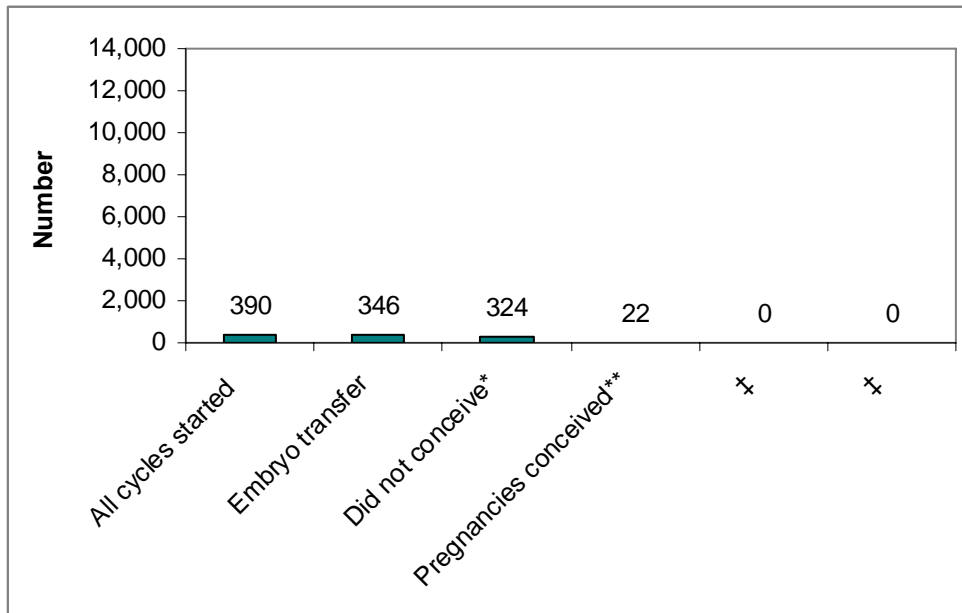
Figure 6: Treatment outcomes for women aged 40 to 42 years when they started treatment in 2006 [4.18c]



* 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]



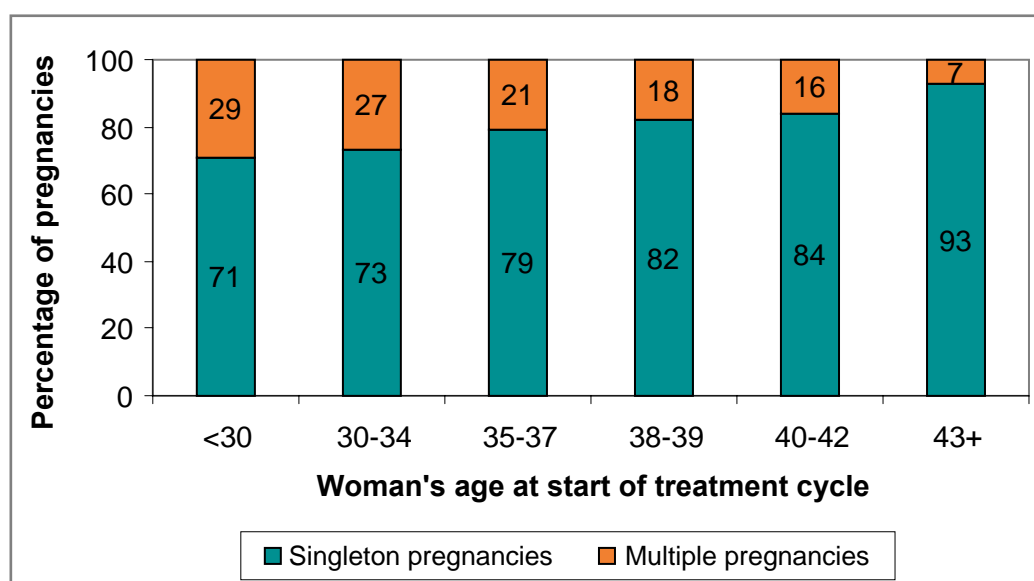
* Did not conceive a pregnancy confirmed on ultrasound, although a pregnancy test may have been positive

**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⁺ 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%).

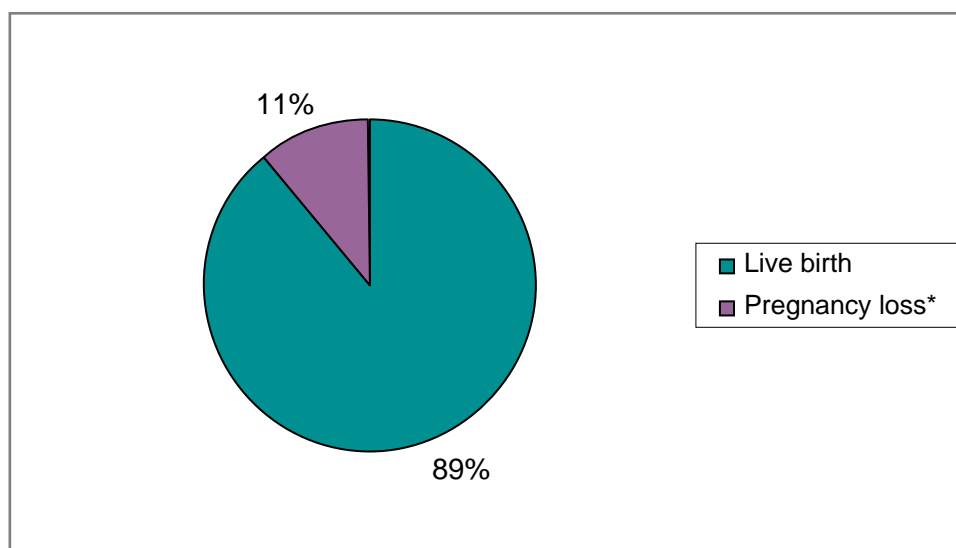
► 5a. What can happen to a pregnancy conceived by ICSI – will a baby always be born? [4.10-4.17, 4.19]

- 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

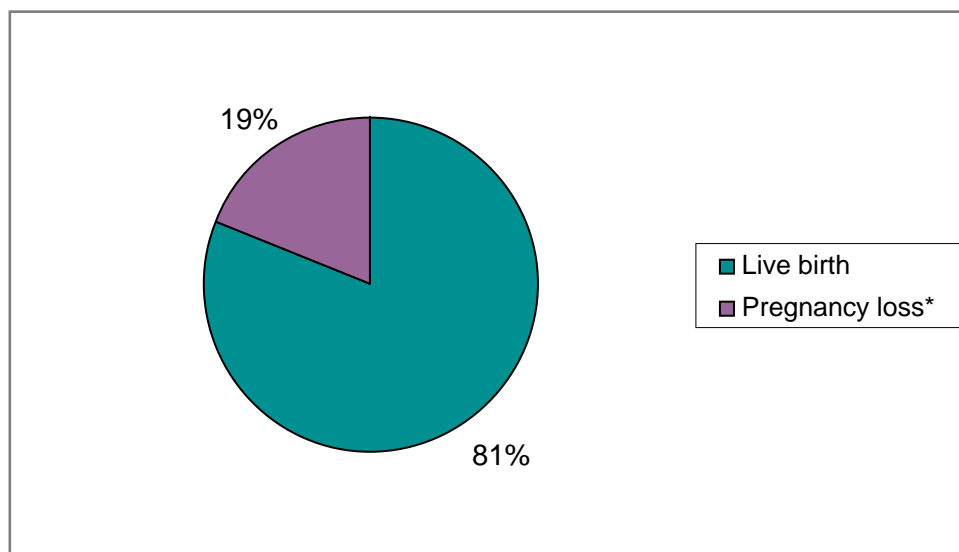
- Women pregnant with a singleton who were aged 37 years or younger at the start of the treatment cycles were more likely to have a baby than women who were aged 38 years and over:
 - 89 in every 100 women **aged 37 years or younger** with a singleton pregnancy following ICSI gave birth to a baby (89%). 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]

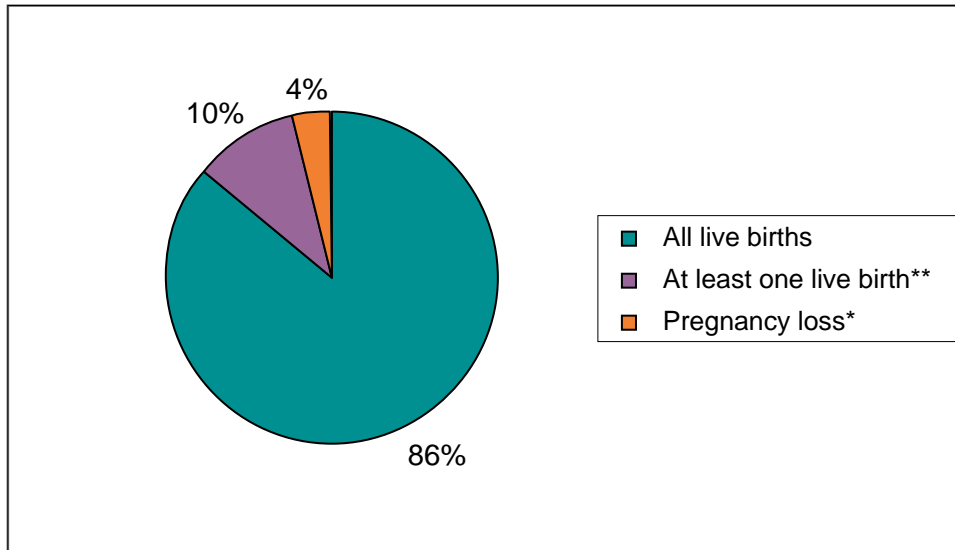


* Pregnancy lost to miscarriage, ectopic pregnancy, termination or stillbirth

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%).

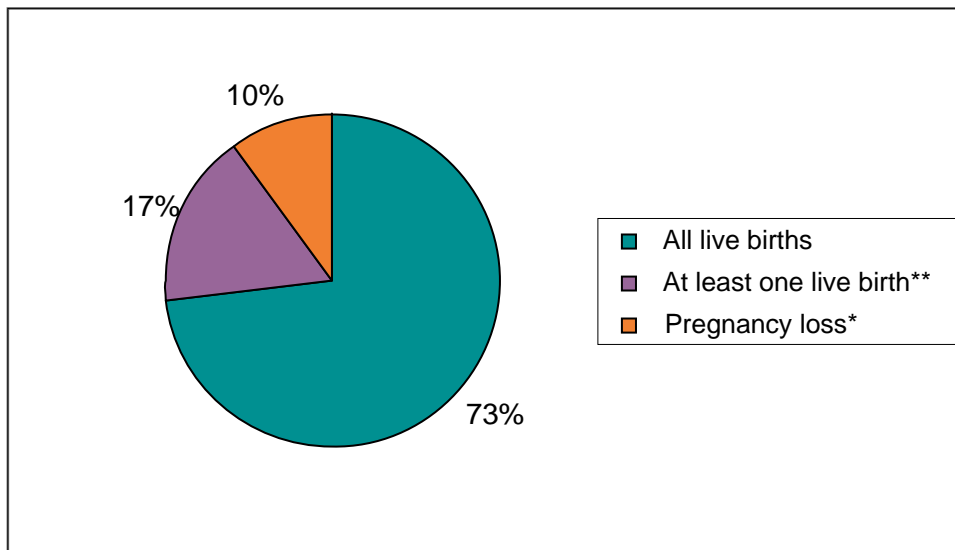
Figure 11: Multiple pregnancy outcomes following ICSI treatment for women aged 37yrs of younger at the start of the treatment cycle [4.19c]



*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

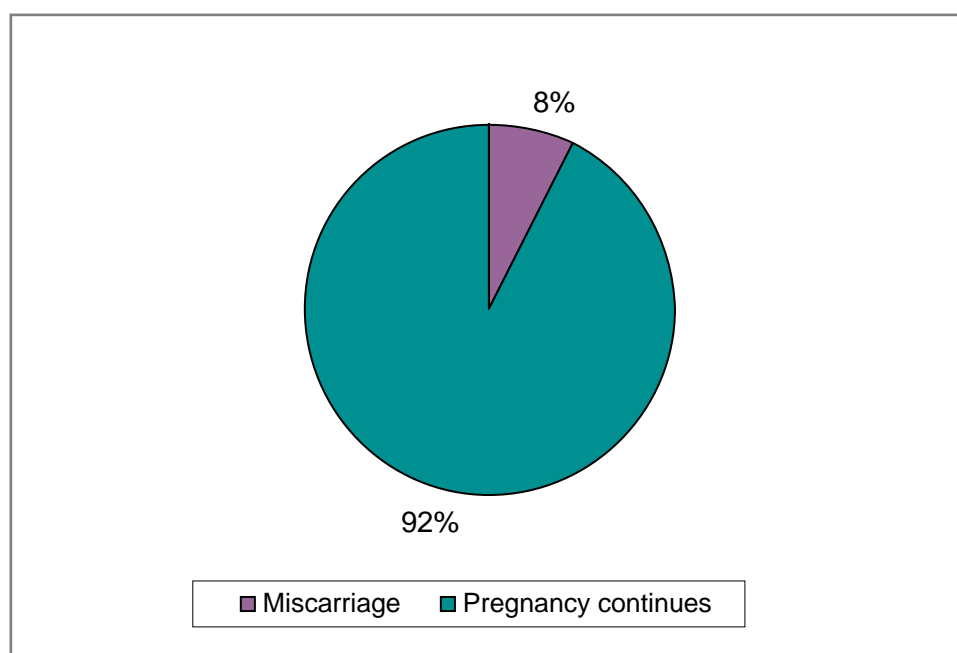
► 5b. What is the risk of miscarriage following ICSI? [4.20]

- 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

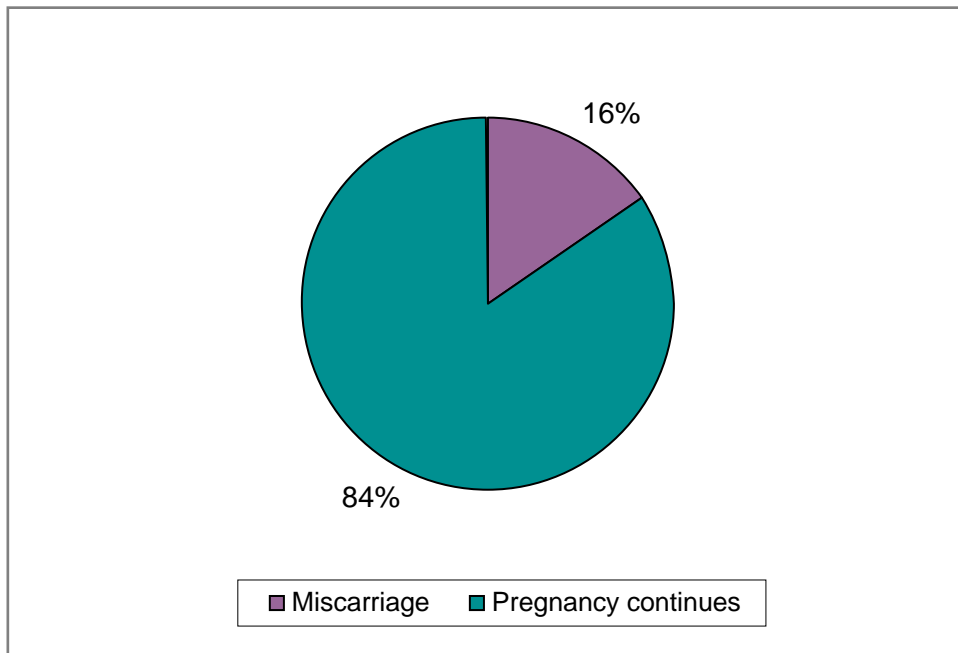
- Women who were older when they were treated were more likely to miscarry than younger women (Figures 13 and 14):
 - Eight in every 100 women who were 37 years old or younger when they started treatment (8%) miscarried the pregnancy whereas
 - 16 in every 100 women who were 38 years or older when treated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

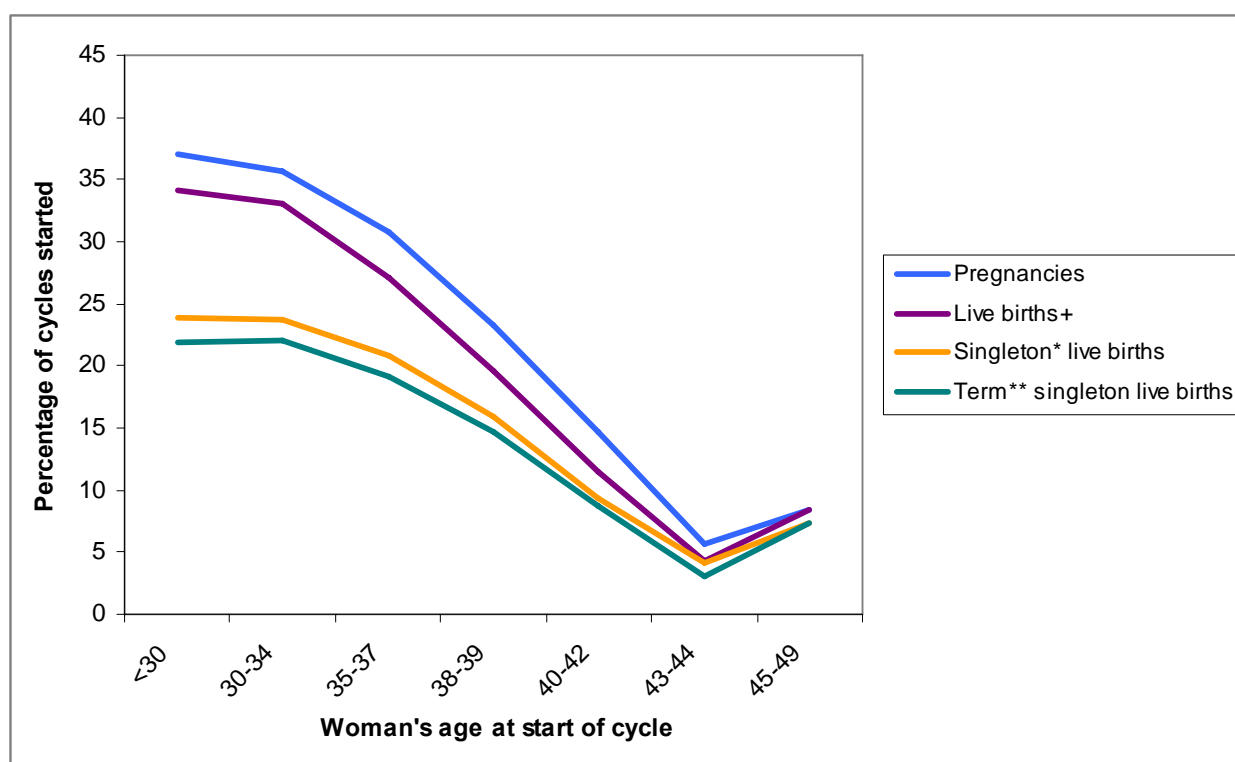
Please note that because of the small number of triplet pregnancies the results relating to miscarriage are not presented here because of confidentiality issues.

► 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

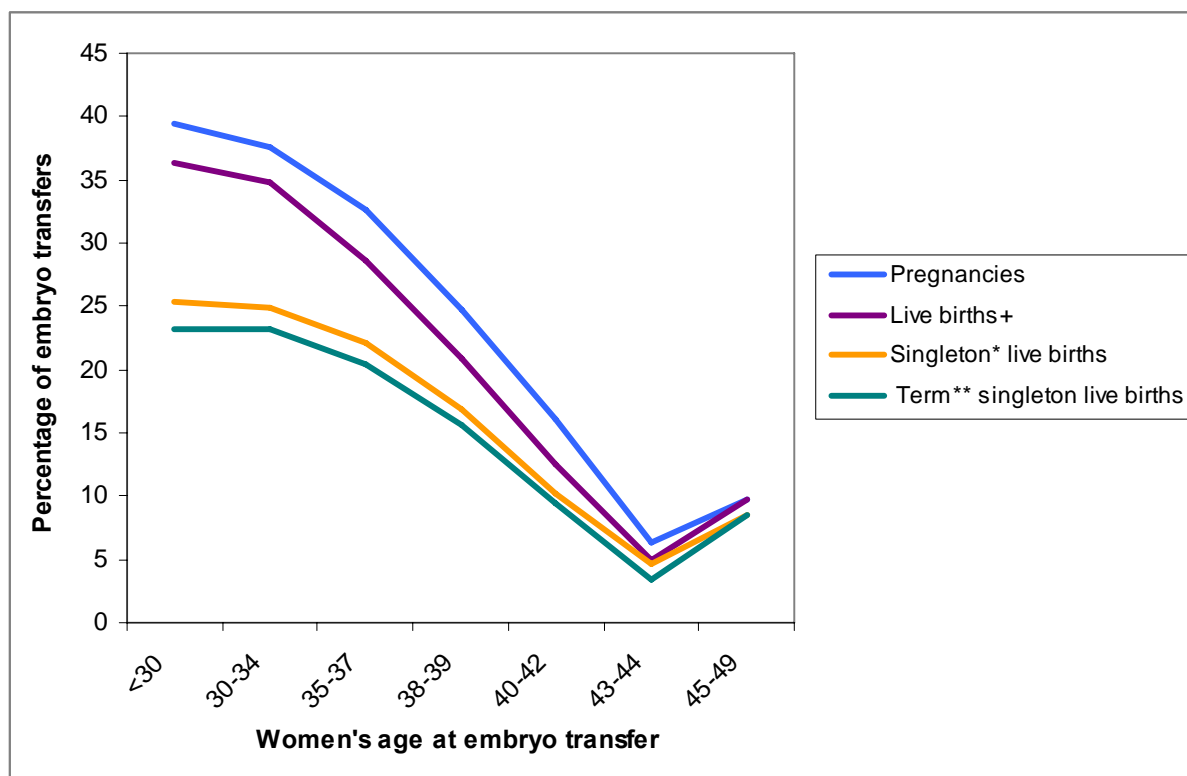
- The results for women less than 38 years of age are broadly similar and so are presented for all women under this age combined. Whereas, the results for women 38 years and older change markedly for every year increase in age. For this reason the results for these women are presented below in more detail.
- 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.

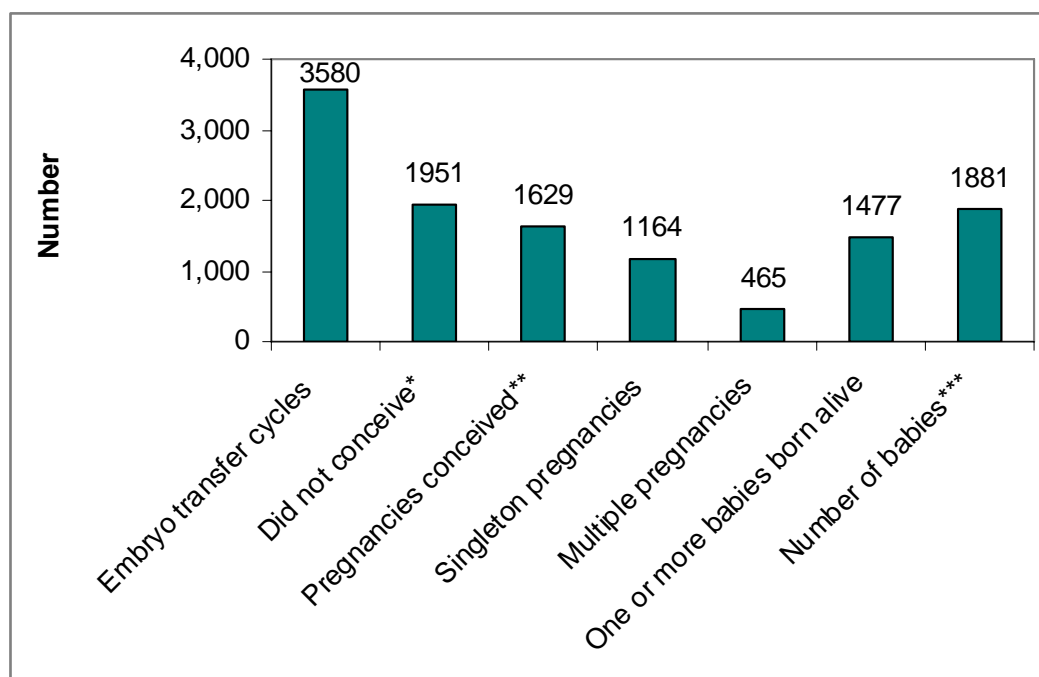
- Women who were **aged 38 to 39** when they started treatment had 2,279 embryo transfers between them which resulted in:
 - 563 ultrasound confirmed pregnancies;
 - 25 in every 100 embryo transfers (25%) resulted in a pregnancy confirmed on an ultrasound scan.
 - 476 pregnancies which resulted in the 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 or 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

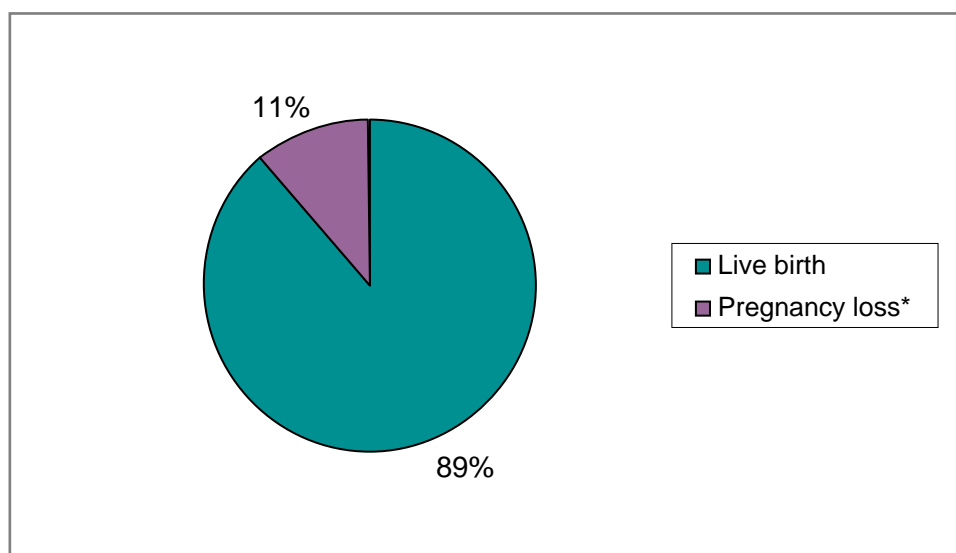
** Ultrasound confirmed pregnancies

***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%).

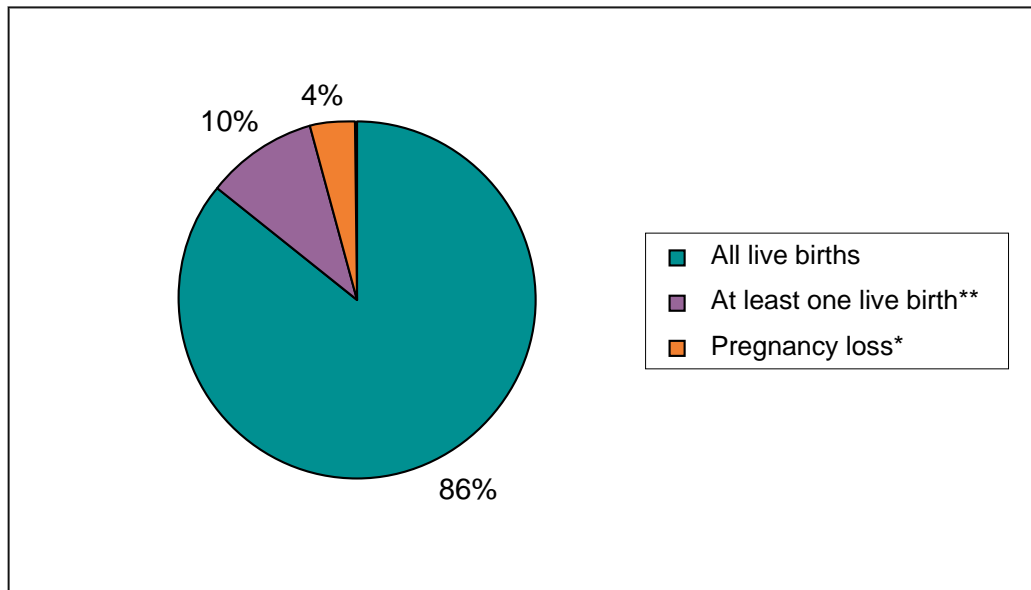
Figure 18: Singleton pregnancy outcomes following ICSI for women aged 37 years or younger who had extra embryos available, for treatment started in 2006 [4.37b]



*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]

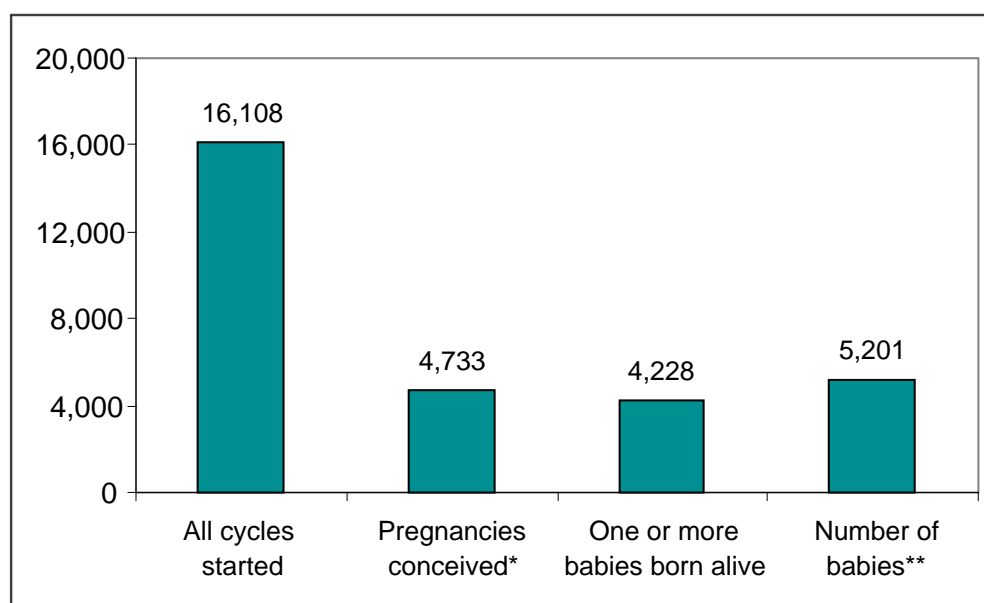


*Pregnancy entirely lost to miscarriage, ectopic pregnancy, termination or stillbirth

**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⁺ treatment cycles using partner sperm, cycles started in 2006 [4.43a]



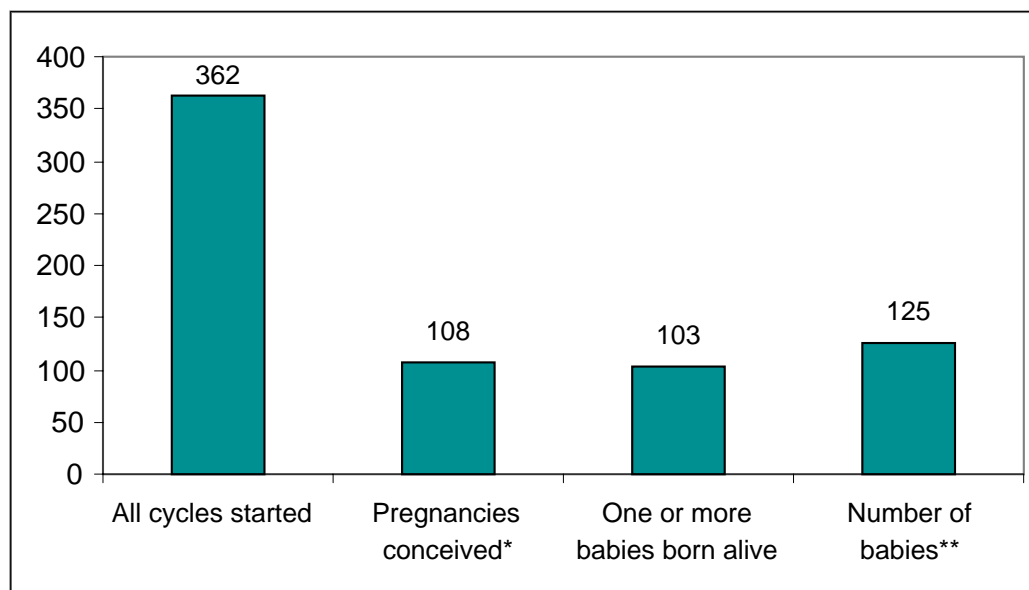
+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

*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⁺ 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

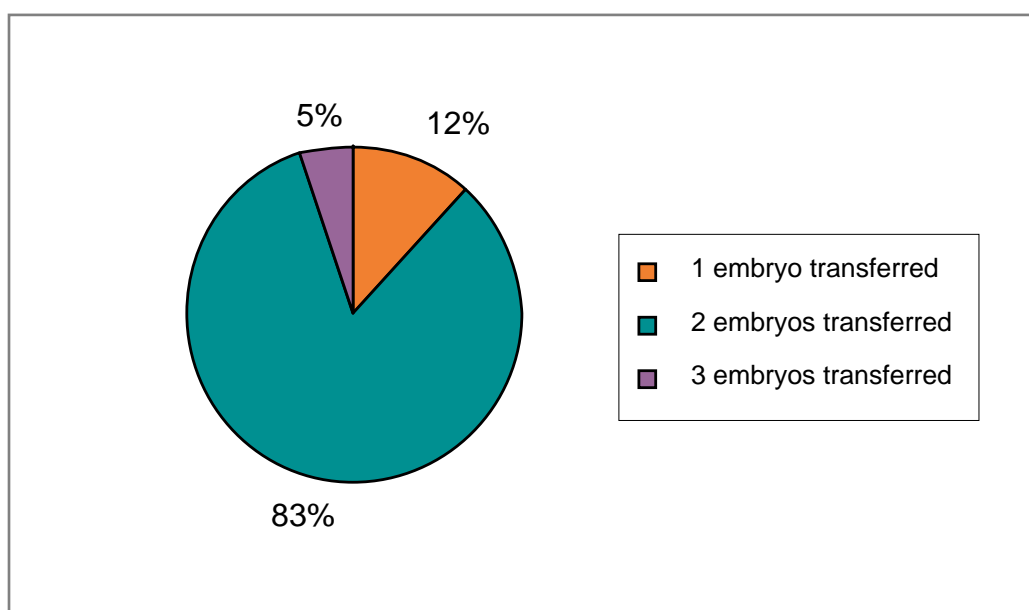
*Ultrasound confirmed pregnancies

** 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).

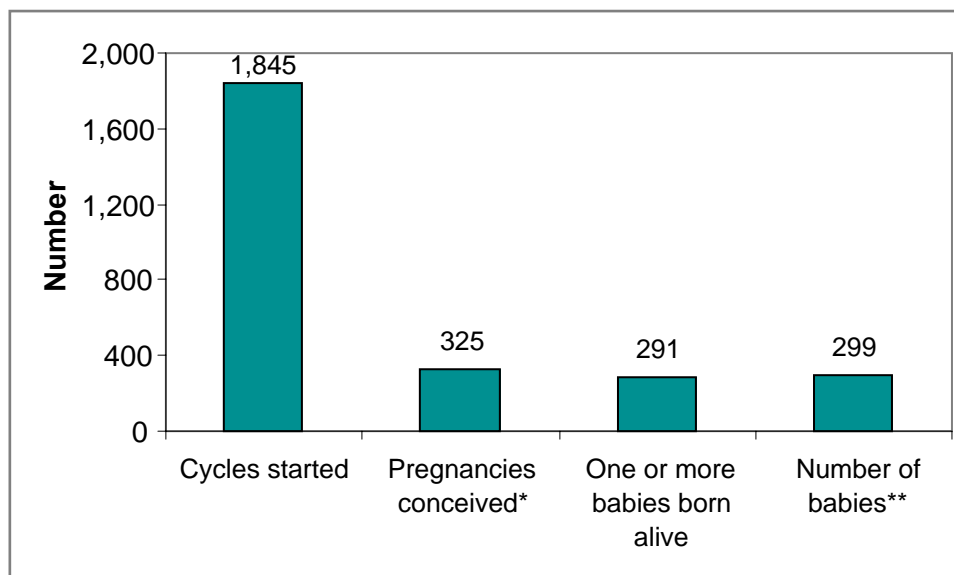
Figure 22: Number of embryos transferred in each cycle of treatment [4.24]



- 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⁺ involving single embryo transfer (SET) started in 2006 [4.24b]



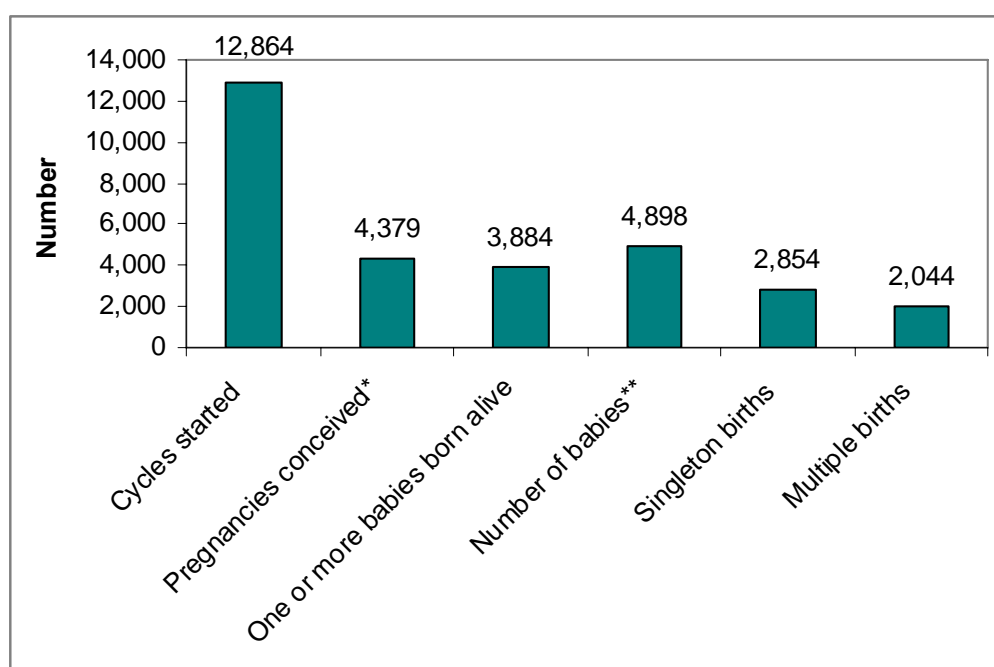
+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

*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⁺ involving double embryo transfer (DET) started in 2006 [4.24c]



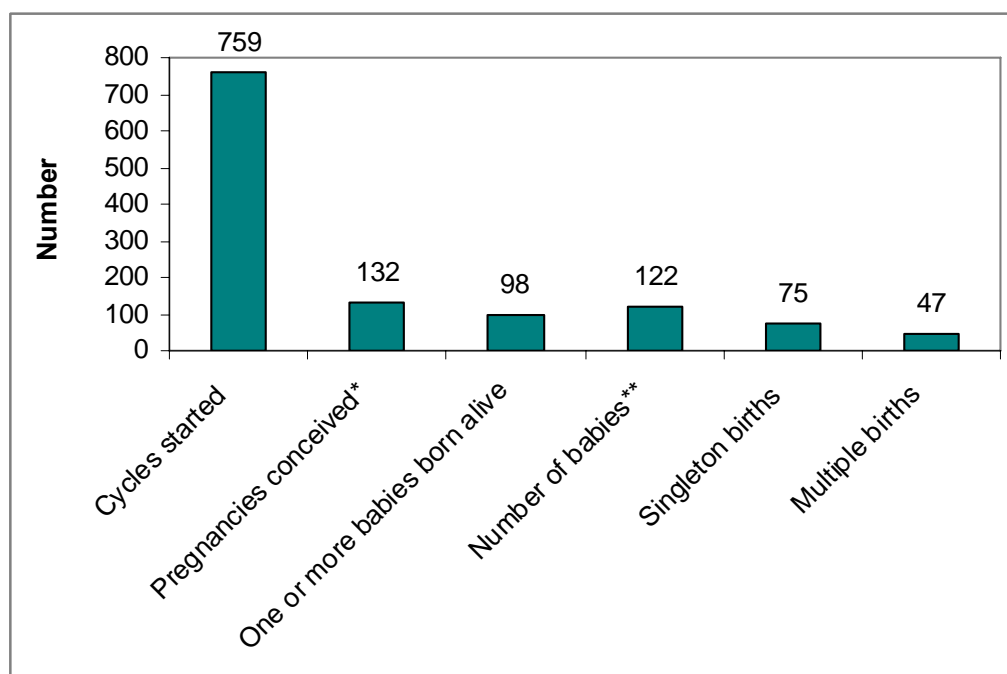
+ Fresh ICSI cycles where women used their own eggs and treatment was undertaken to try to conceive immediately; excludes treatment for storage, donation and surrogacy

*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⁺ 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

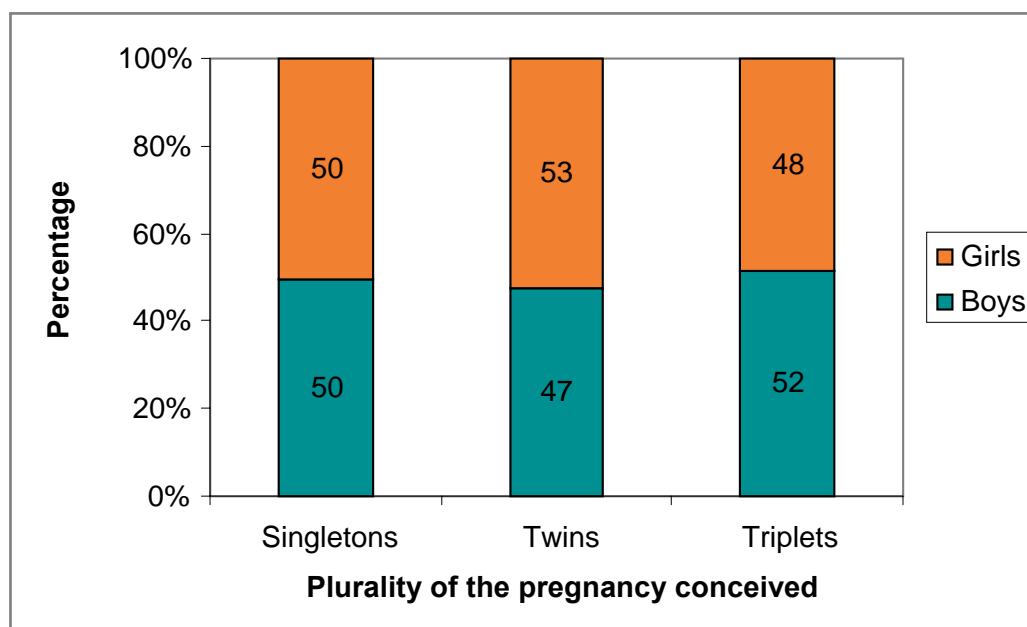
*Ultrasound confirmed pregnancies

** 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⁺ 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:

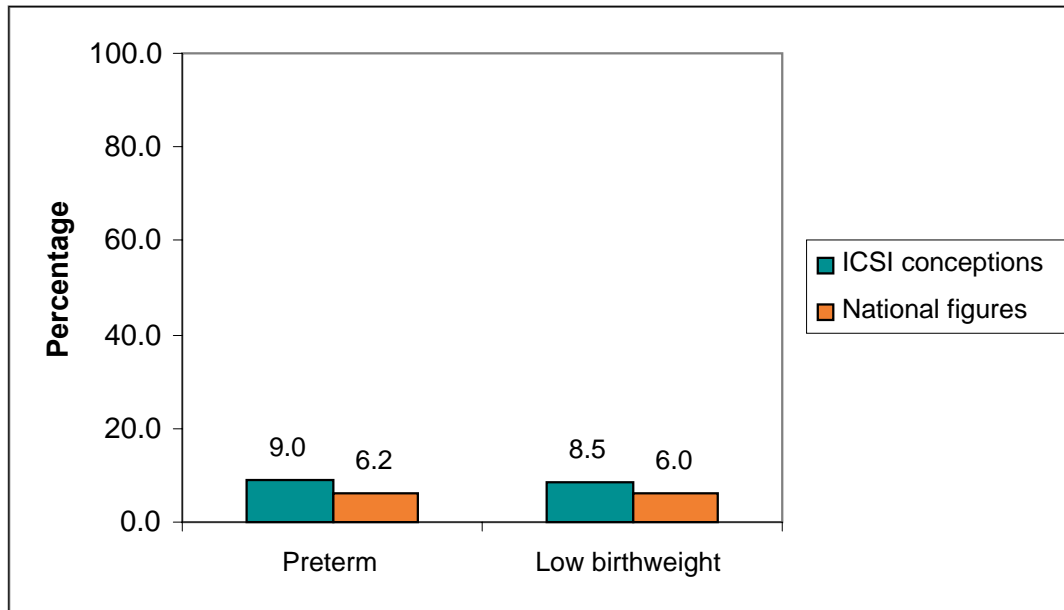
- Of the 3,219 singleton pregnancies resulting in a live birth, 2,976 were delivered following a full-term pregnancy and 234 were delivered preterm (the data for gestational age was missing for 9 pregnancies):
 - 93 in 100 women delivered at the end of a full-term pregnancy (93%)
and
 - 7 in 100 delivered 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)¹ (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)² (Figure 28).

¹ 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.

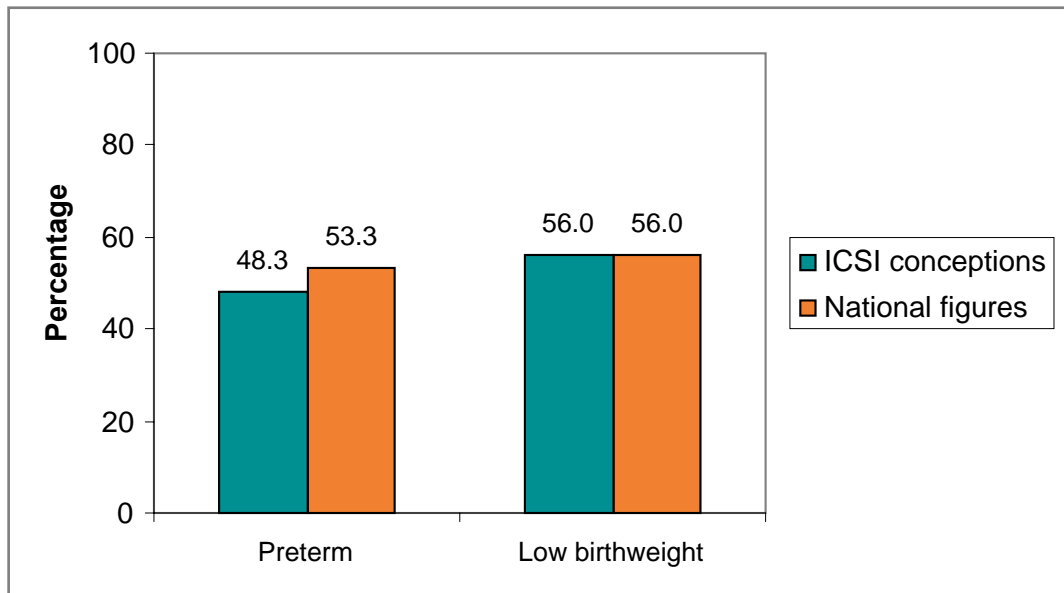
Figure 27: Preterm and low birthweight rate for singleton births comparing ICSI⁺ conceptions and England & Wales rates [4.28a]



+ 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⁺ 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 Wales² (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 Wales³ (Figure 28).

² 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 births³ (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 births¹ (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 births¹ (Figure 30).

³ 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⁺ conceptions and England & Wales rates [4.30a]

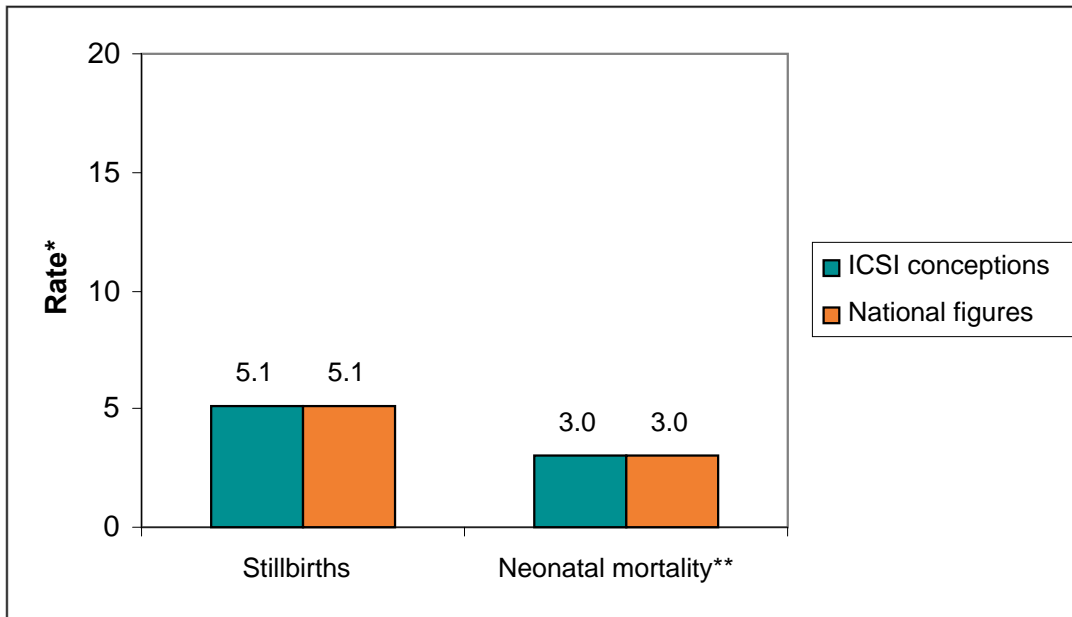
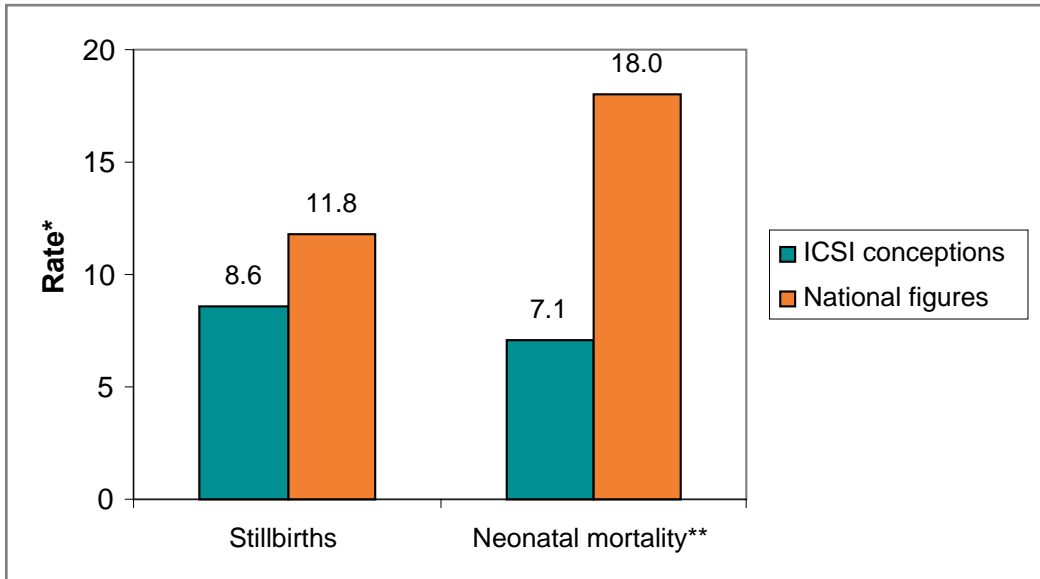


Figure 30: Stillbirth and neonatal death rate for multiple births comparing ICSI⁺ conceptions and England & Wales rates [4.30b]



+ 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.