



Human  
Fertilisation &  
Embryology  
Authority

# Egg freezing in fertility treatment

**Trends and figures:  
2010-2016**



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# Executive summary

Over 1.1million in vitro fertilisation (IVF) treatment cycles have taken place since the first IVF baby, Louise Brown, was born 40 years ago. Most IVF cycles use fresh eggs. A very small number use eggs that have been collected from women and then frozen, known as 'egg freezing'. Even with the rise in awareness of egg freezing techniques, it is important to put this treatment in context. We know that although treatment numbers for egg freezing are growing, they are still very small, making up only around 1.5% of all fertility cycles carried out across the UK.

Women are freezing their own eggs for two primary reasons. Firstly, because they are undergoing medical treatment (such as chemotherapy), or have other medical conditions which reduce fertility, and want to preserve their eggs for use at a future date. Secondly, for elective (or social) reasons where women are opting to preserve their fertility as a way of increasing their chances of having a biologically-related child later in life.

The recent growth in egg freezing has led us to prepare, for the first time, a report setting out the key facts and figures. Our aim as the regulator is threefold:

- to inform public debate
- to ensure that fertility clinics offering egg freezing provide ethically appropriate treatment options, and
- to provide women considering freezing their eggs with impartial information to inform their decision.

In thinking about egg freezing, it is important to remember that fertility naturally declines as women get older, but that the rate and age at which this decline happens varies widely between women. 'Standard' fresh IVF does not offer a solution to age-related fertility decline because it cannot reverse the egg degeneration that comes with getting older.<sup>1</sup> This is why the age a woman is when she freezes her eggs is so important. The key messages from our new report include:

- Egg freezing and egg thawing are increasing across the UK, but still represent only around 1.5% of all fertility cycles carried out.
- Birth rates from frozen donor eggs are in line with fresh IVF success rates, at 30% per treatment cycle.
- Birth rates from frozen own eggs are increasing but remain below fresh IVF treatment cycles at 18% per treatment cycle.
- Increases in success rates using own eggs, while still below that of fresh IVF, offer hope to patients who need to freeze their eggs due to medical reasons.
- Egg freezing is emerging as a viable clinical technique to preserve women's fertility, providing the eggs are frozen at a clinically optimum age, and the patient is aware of the

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<sup>1</sup> Daly, I., & Bewley, S. (2013). Reproductive ageing and conflicting clocks: King Midas' touch. *Reproductive biomedicine online*, 722-32.

risks and possibility of becoming pregnant naturally. The evidence suggests that if eggs are frozen below the age of 35, the chances of success using these frozen eggs is higher than the natural conception rate as the woman gets older.

The increase in egg freezing has been accompanied by growing media coverage<sup>2</sup>. There have been calls for changes in the availability of NHS funding and for more information on women's fertility to be available to younger women and men, so they can make more informed choices about their fertility. Others have called for the law to be changed to allow women to store their frozen eggs for a longer period of time. Any change in the 10-year storage limit would be a matter for Parliament, but as the regulator, we have heard the voice of many in the sector calling for a review of the current arrangements.

Any decision to freeze eggs involves a complex set of considerations. From a clinical point of view, the optimum time to freeze eggs would be during a woman's 20s and early 30s, but success rates are not the only consideration and other factors are in play which lead patients to consider later freezing. The current 10-year legal limit on storage sets a defined period during which treatment must be completed. In addition, the younger a woman is when she freezes her eggs, the less likely she is to ever use them in treatment. This is because most women are likely to be able to conceive naturally when they decide to start a family and by electing to freeze their eggs they may have undergone the unnecessary risk of an invasive procedure.

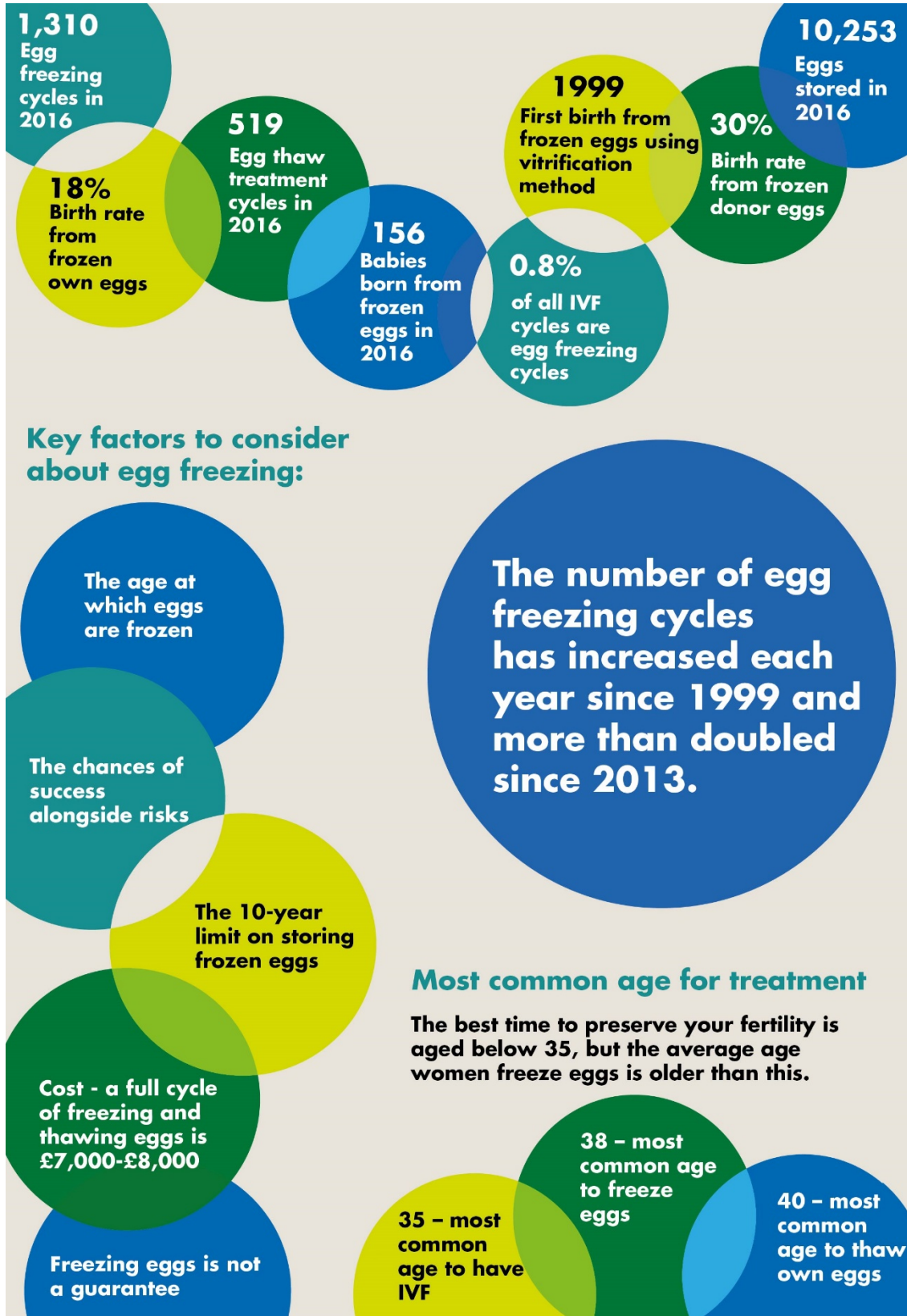
Conversely, if a woman freezes her eggs in her late 30s, when her fertility is already in decline, the process may be more invasive and expensive, more cycles may be needed to collect the preferred number of eggs, and the birth rate is lower, but she is more likely to return to use her frozen eggs. In making these difficult decisions, clinics have a responsibility to ensure patients are well-informed of the procedures, benefits, costs and risks of egg freezing and are well-supported to make informed knowledgeable decisions on their reproductive future. To assist women in making this difficult decision, we have produced a [short guide](#) to the issues involved.

The figures in this report suggest that some clinics are providing egg freezing treatments to women over the age of 40. In cases over the age of 35, we know there is a steep decline in fertility and this has an impact on both natural conception and IVF success rates. Our job is to ensure that the law is upheld and that patients can be assured of a standard of care when they go to any clinic in the UK. Part of that role is to ensure that clinics are ethically responsible when they advise patients of their treatment options. Where women over the age of 40 are freezing their eggs, the likelihood of a pregnancy from these eggs would be very slim, and we would caution against this being a sensible option for this group of women.

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<sup>2</sup> In response to the recent Royal College of Obstetricians and Gynaecologists (RCOG) paper on social egg freezing.

# Egg freezing in numbers



# About the HFEA

We are the independent regulator of fertility treatment in the UK. Part of our role is to collect data from every licensed fertility clinic about the tens of thousands of treatment cycles they perform each year. We hold this information in our database called the Register.

## Key terms used in this report

Term	Description
<b>Birth rate per embryo transferred (PET)</b>	The birth rate PET is the number of births divided by the sum of embryos transferred for treatment cycles starting in that year.
<b>Birth rate per treatment cycle (PTC)</b>	The birth rate PTC is the percentage of treatment cycles started in that year which resulted in a live birth.
<b>Cycle</b>	All treatment cycles plus storage, donation and freezing cycles that are conducted at a fertility clinic.
<b>Donor insemination (DI)</b>	Donor insemination is a treatment where donor sperm is placed directly into the womb.
<b>Egg freezing</b>	When a patient has eggs collected and frozen with the intention of using them in the future.
<b>Egg thawing</b>	A treatment where patients use previously frozen eggs in an IVF treatment cycle.
<b>In vitro fertilisation (IVF)</b>	IVF is a treatment where a woman's eggs are fertilised with sperm in a lab.
<b>Treatment cycle</b>	Only those cycles where the patient recorded on their registration form that they intended to become pregnant (compare to the cycle term above).

# About egg freezing

## Egg freezing

Egg freezing (also known as “oocyte cryopreservation”) is a procedure to store a woman’s eggs for use in future fertility treatment.

The process involves stimulating, collecting, freezing and then storing a woman’s eggs. The way eggs are collected for egg freezing is the same as IVF and involves injecting hormones to stimulate the ovaries over a few weeks to produce multiple eggs. When the eggs have matured, they are collected from the patient and then frozen. Typically, the process takes around two weeks.

There are two methods for freezing eggs: the long established ‘slow cooling’ method, or the more recently developed flash-freezing method known as ‘vitrification’. The traditional method is slower and carries a higher risk of ice crystals forming, which can damage the egg and result in a lower birth rate.<sup>3</sup> The newer vitrification method is significantly more effective and is now being used widely.<sup>4</sup>

## Egg thawing

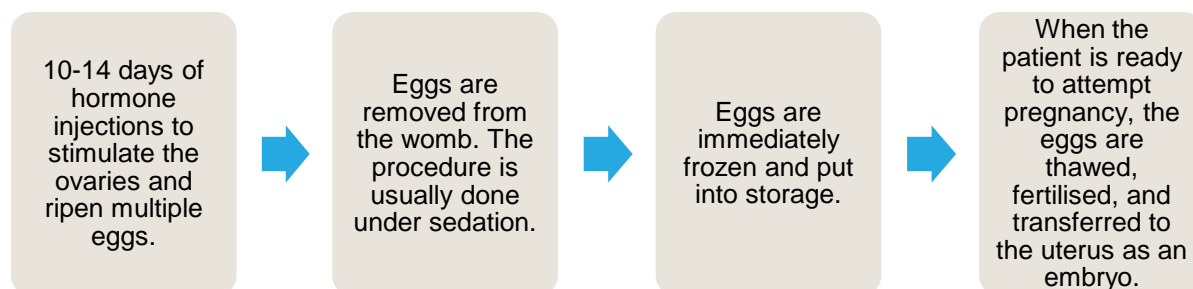
When a woman uses frozen eggs in an IVF treatment cycle this is referred to as ‘egg thawing’. The frozen eggs being thawed and used in treatment can either be a patient’s own eggs or from a donor.

The eggs are thawed and then fertilised through a procedure called ‘intracytoplasmic sperm injection’ (ICSI), where sperm is injected directly into the egg with a needle. If fertilised, the embryo is transferred to the woman’s uterus.

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<sup>3</sup> Jang, T., et al (2017). Cryopreservation and its clinical applications. *Integrative medicine research*, 12-18.

<sup>4</sup> Rienzi, L., et al. (2017). Oocyte, embryo and blastocyst cryopreservation in ART: systematic review and meta-analysis comparing slow-freezing versus vitrification to produce evidence for the development of global guidance. *Human reproduction update*, 139-55.

**Figure 1: The egg freezing and thawing process**

## The UK legal framework for egg freezing

All fertility clinics in the UK must comply with the Human Fertilisation and Embryology (HFE) Act 1990 (as amended), the HFE Act 2008, and a number of related pieces of legislation. Freezing eggs can be carried out by any clinic provided they have a licence from us to do so.

The law sets out that the standard storage period for eggs and sperm is 10 years. After 10 years, any eggs that a patient still has frozen must be destroyed. There is the option to extend storage to 55 years, when patients are, or likely to become, prematurely infertile. The diagnosis for premature infertility must be made by a written statement from a medical practitioner.

## Reasons for egg freezing

Egg freezing is a treatment that may be offered for a variety of reasons, which are often split into two categories: medical and non-medical (often called 'elective' or 'social' egg freezing).

### Medical egg freezing

Egg freezing techniques were originally developed for use in medical egg freezing, as it offered younger patients the opportunity to preserve their eggs for future use. The main medical reason for egg freezing is for patients who are diagnosed with cancer that may affect their fertility due to chemotherapy or the removal of reproductive organs. Other medical reasons include patients who are undergoing gender reassignment or other conditions such as severe endometriosis.<sup>5</sup>

### Elective egg freezing

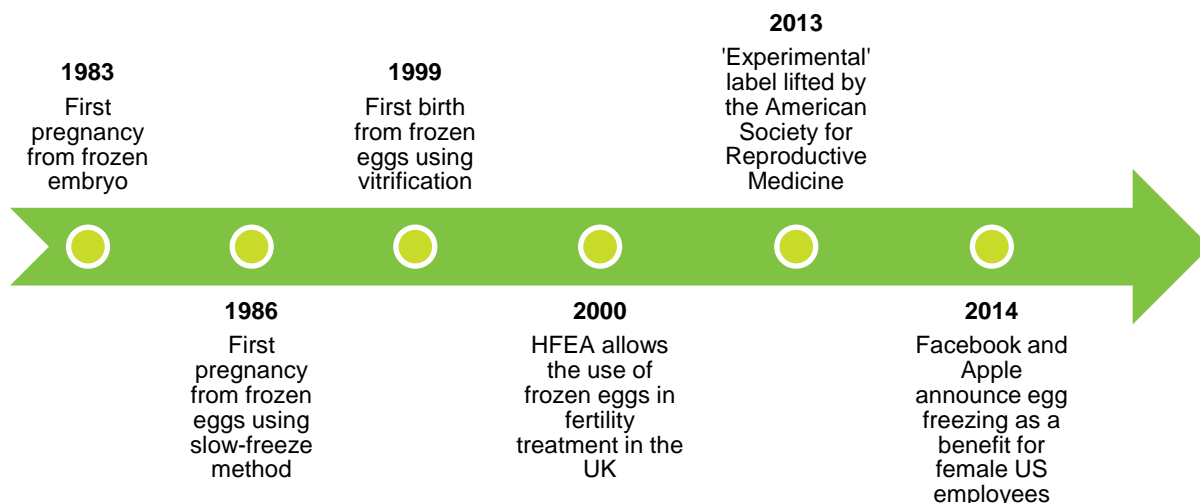
In cases of elective egg freezing, women do not necessarily have a known medical problem that puts them at a higher risk of infertility, but they want to increase their chances of having a child later in life when the quality of fresh eggs will have deteriorated. However, success rates show egg freezing does not represent a definitive solution to delayed reproduction, particularly for patients who do not freeze their eggs until their late 30s and 40s.

<sup>5</sup> Elizur, S. E., et al (2009). Cryopreservation of oocytes in a young woman with severe and symptomatic endometriosis: a new indication for fertility preservation. *Fertility and sterility*, 293e1-293e3.



There is considerable public interest in the rising number of women electing to freeze their eggs with the aim of using them later in life. Elective egg freezing is thought to be driven by shifts in socioeconomic and reproductive behaviour, with more women postponing parenthood for a complex combination of reasons that can include waiting for the right partner, educational and career aspirations, and greater economic barriers such as accessing the housing market.<sup>6</sup>

**Figure 2: Timeline of egg freezing**<sup>7, 8, 9</sup>



<sup>6</sup> Lockwood, G. M. (2011). Social egg freezing: the prospect of reproductive 'immortality' or a dangerous delusion? *Reproductive biomedicine online*, 334-40.

<sup>7</sup> Trounson, A., & Mohr, L. (1983). Human pregnancy following cryopreservation, thawing and transfer of an eight-cell embryo. *Nature*, 707-709.

<sup>8</sup> Chen, C. (1986). Pregnancy after human oocyte cryopreservation. *The Lancet*, 884-6.

<sup>9</sup> Kuleshova, L., et al (1999). Birth following vitrification of a small number of human oocytes: case report. *Human Reproduction*, 3077-9.

# Statistics on egg freezing

## Summary

Even with the rise in awareness of egg freezing techniques, it is important to put this treatment in context. Treatment numbers for egg freezing and thawing are growing but are still very small, making up only around 1.5% of all fertility cycles carried out across the UK.

Throughout this report, we differentiate between success rates using donor eggs, and those using a woman's own eggs. Egg thaw treatment cycles using donor eggs have significantly higher success rates than for patients using their own eggs. This is true for both NHS-funded and privately-funded patients. The higher rate associated with donor eggs is because, in almost all cases, women must meet certain criteria in order to donate. These criteria include clinical factors associated with increased fertility, such as a healthy body mass index (BMI), age restrictions, and other lifestyle factors (eg, alcohol intake and smoking).<sup>10</sup>

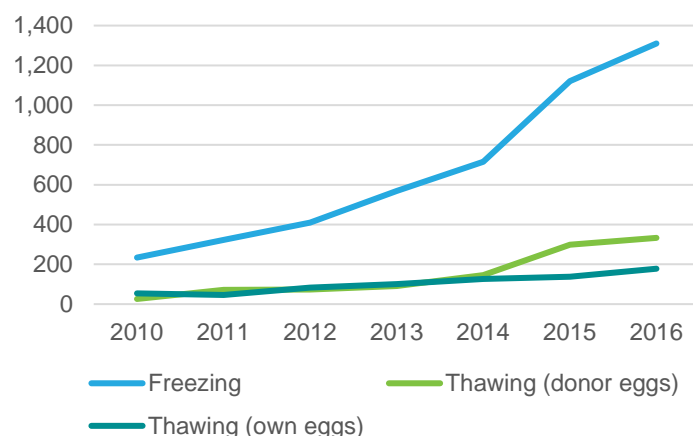
Overall, success rates from IVF treatment cycles that use frozen eggs (an egg thaw cycle) are broadly in line with success rates from fresh IVF treatments, although this is not yet the case where frozen own eggs are used. There are a number of factors that affect success rates in egg thaw treatment cycles, most notably the age of the patient when their own, or their donor's, eggs are frozen. This means it matters far less what age a woman is when she uses the eggs; what is more important is the age the patient is when the eggs are frozen.

## Numbers of egg freezing and egg thawing cycles

In 2016, there were 1,310 egg freezing cycles, a 17% increase from 2015.<sup>11</sup> This increase builds on recent trends; the number of egg freezing cycles in the UK has more than doubled since 2013.

There are fewer egg thawing treatment cycles than there are egg freezing cycles, suggesting that although more women are freezing their

Figure 3: Treatment numbers for freezing and thawing cycles



<sup>10</sup> [www.nice.org.uk/guidance/cg156/chapter/Recommendations#access-criteria-for-ivf](http://www.nice.org.uk/guidance/cg156/chapter/Recommendations#access-criteria-for-ivf)

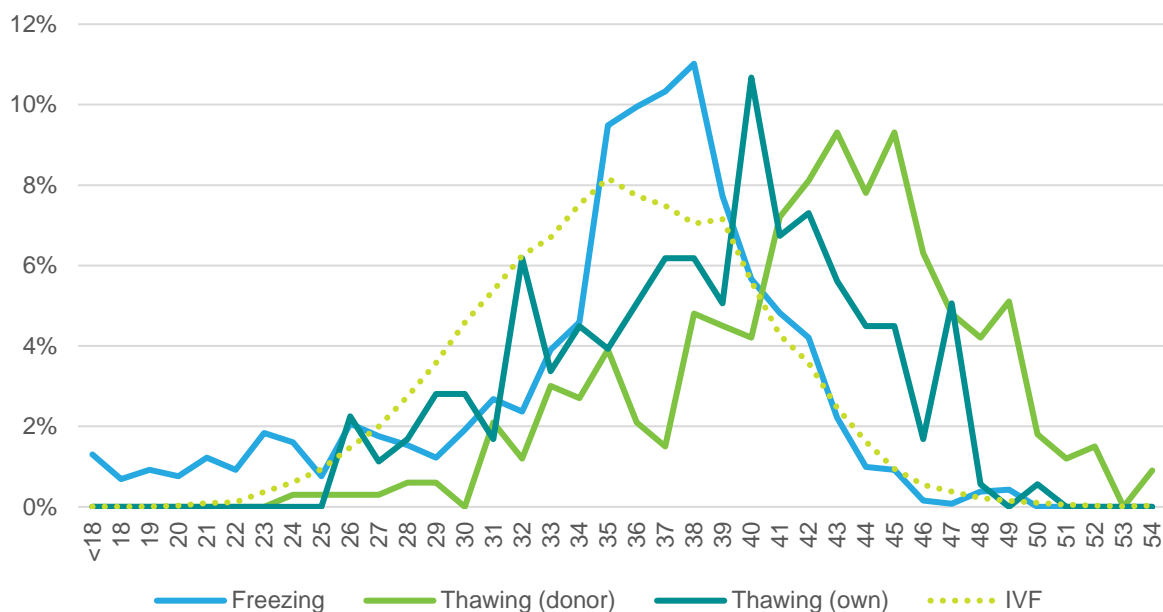
<sup>11</sup> This number refers to patients who have undergone treatment with the specific intention of freezing eggs by selecting 'egg storage' under 'reason for treatment' on the patient treatment form. There are small differences between the numbers in this report and those in the Fertility treatment: trends and figures 2014-2016 report due to the nature of our live Register database.

eggs, many of them have not yet decided to try for a pregnancy. In 2016, there were 519 egg thawing cycles across the UK, up from 448 in 2015 (+16%). Of these egg thawing cycles, 65% used donor eggs and 35% used the patient's own eggs. We will likely continue to see increases over the next few years in the number of women using frozen eggs in treatment.

## The demographics of egg freezing and egg thawing cycles

### Age

**Figure 4: Age of egg freezing, egg thawing and IVF patients (2016)**



Most women who froze their eggs in 2016 were in their mid to late 30s and early 40s. However, the most common ages for the treatments differ. The most common age to have IVF was 35, whereas the most common age to freeze eggs was 38. The most common age to use frozen eggs in treatment is older than this, at age 40.

There are similar proportions of women aged 38 and over freezing eggs and having IVF treatment from fresh eggs, however, in IVF, a high proportion of cycles in this age group take place using donor eggs. There are many women freezing eggs into their 40s and even 50s. Given the scientific consensus around age-related fertility decline, it is not clear why patients of this age are freezing eggs and we would caution against this being a sensible option for this group of women.

The age of women thawing eggs is higher than IVF overall, with the most common age to thaw eggs being 40 for women using their own eggs and ages 43-45 for women using frozen donor eggs. Some women are using their frozen eggs into their 50s and it is important patients are aware of the risks of pregnancies later in life.

## Partner status

In 2016, most women freezing eggs were registered with a male partner (53%), or no partner (46%), with a minority registered with a female partner (around 1%). Women who have frozen their eggs are much more likely to have no partner compared to standard IVF treatment (46% compared to 2%).

Most women using frozen eggs in a thaw treatment cycle were registered with a male partner (91% in 2016), which is similar to IVF overall. There was a higher proportion of patients registered with no partner at 8% compared with IVF overall which was only 2%. There is no significant difference in partner status between women using frozen donor eggs and their own frozen eggs in treatment.

## Medical and 'elective' egg freezing

**Figure 5: Number of NHS and privately-funded egg freezing cycles**

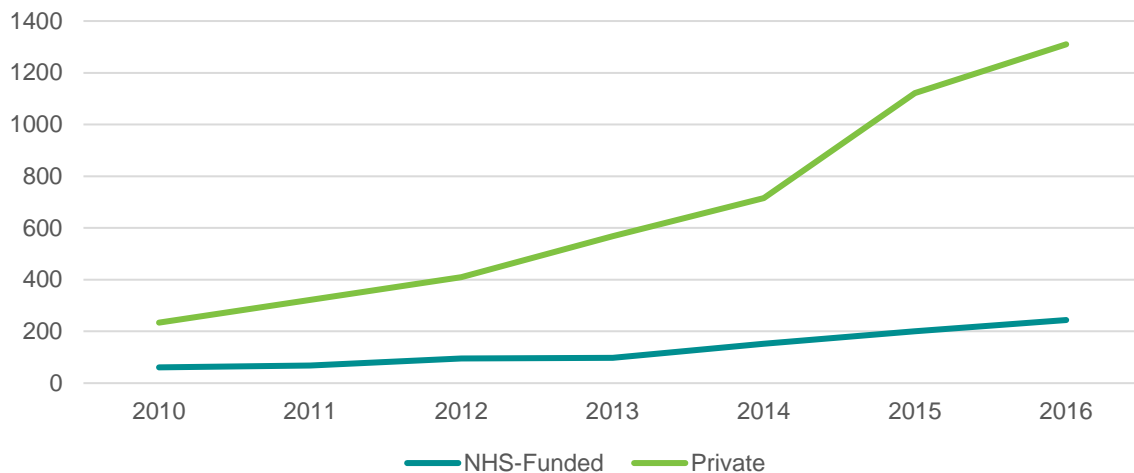


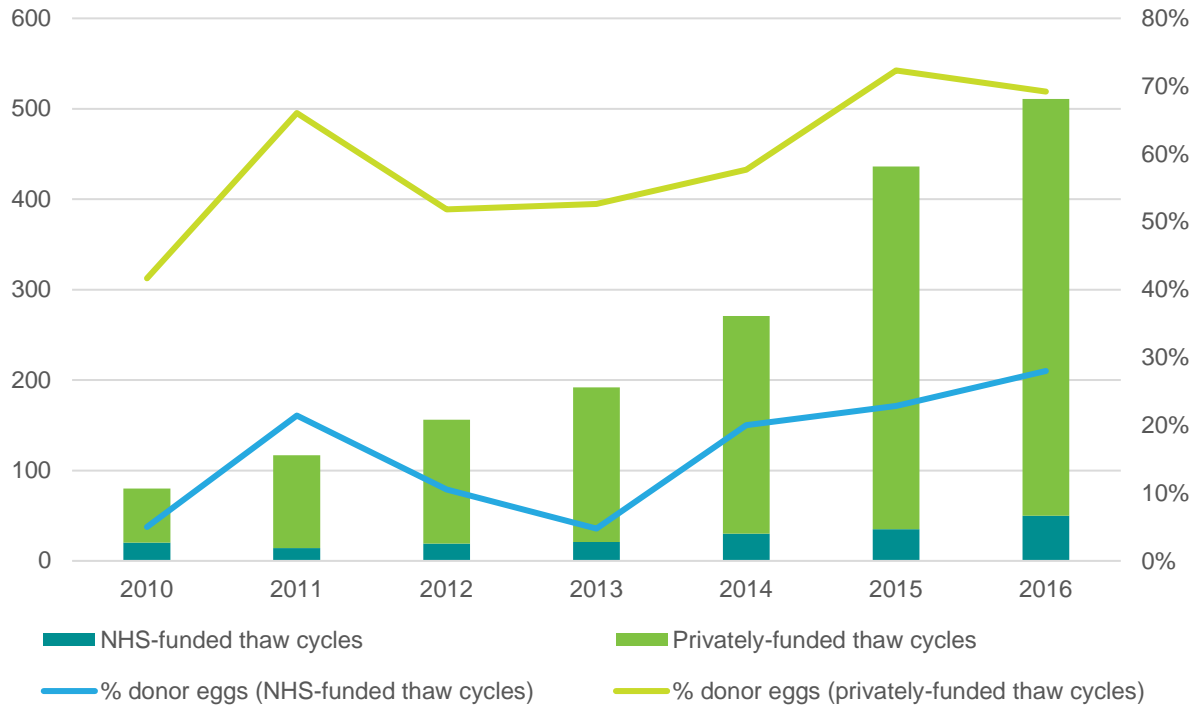
Figure 5 shows the increase in egg freezing cycles since 2010. A total of 234 cycles were carried out in 2010, of which 74% were privately funded and 26% were publicly funded. Just six years later, the total number of egg freezing cycles increased by 460% to 1,310, of which 81% were privately funded and 19% were publicly funded. The growth observed in egg freezing has largely been driven by growth in private egg freezing cycles.

Most women freezing eggs using NHS funding are aged below 35, with 89% below age 38. This is likely to be due to the age criteria applied to NHS funding of egg freezing for individuals who are undergoing medical treatment that may prematurely affect their fertility.

Only women freezing or thawing eggs for medical reasons will be eligible for NHS funding. Although we know that patients may not all receive NHS funding when seeking egg freezing treatment for medical reasons, we can use NHS funding as an indicator of women freezing eggs for medical reasons.

Using NHS funding as a proxy, we can see that, in 2016, there were only 50 'medical' thaw cycles. This compares with 461 'elective' thaw cycles which were privately funded. Since 2011, as treatment cycles have increased, the proportion of egg thaw cycles for 'medical' (NHS funded) reasons has stayed relatively stable around 8-12%.

**Figure 6: Number of thaw cycles and % of thaw cycles using donor eggs, for NHS and privately-funded treatments**



The small numbers of ‘medical’ freeze and thaw cycles means that conclusions throughout this report about these cycles should be treated with caution.

## Overall success rates

In recent years, birth rates from frozen eggs have improved, due in the main to the widespread adoption of new vitrification freezing methods.<sup>12, 13</sup> The figures for birth rates in the UK for the period 2010-16 can be seen in figure 7.

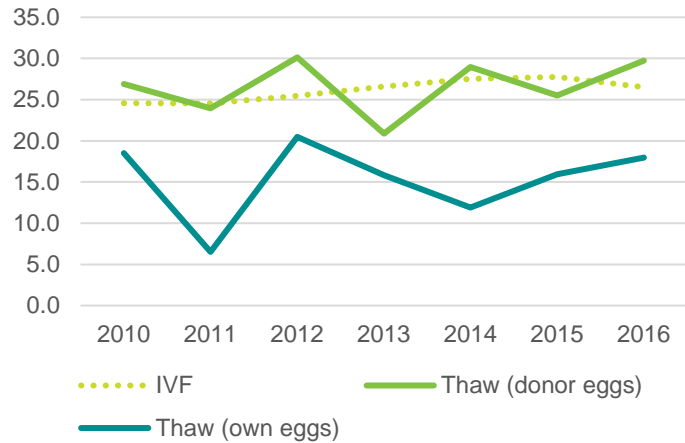
<sup>12</sup> Khalili, M. A., et al (2017). Vitrification of human immature oocytes before and after in vitro maturation: a review. *Journal of assisted reproduction and genetics*, 1413-26.

<sup>13</sup> American Society for Reproductive Medicine, & Society for Assisted Reproductive Technology. (2013). Mature oocyte cryopreservation: a guideline. *Fertility and Sterility*, 37-43.

Figure 7 shows the birth rate PTC from all cycles using frozen donor eggs in 2016 was around 30%. This is in line with the overall birth rate from IVF which was 26% in 2016 (and in line with the birth rate for fresh donor eggs which was 33% in 2016).

In 2016, the birth rate for women using their own eggs in a thaw cycle was around 18%. This is significantly below IVF overall (26%). It is important to note that the number of thaw cycles with patients using their own eggs is very low, with only 178 in 2016 and therefore, there is likely to be greater variability in birth rates for frozen own eggs compared to frozen donor eggs. Despite this greater variability, we know the trends follow those in fresh IVF, where donor egg birth rates are higher than own egg birth rates.

**Figure 7: Birth rates PTC by year of thaw**



## The influence of age on success rates

There are two ways to look at how age affects birth rates. The first is by the age of the woman when the eggs were frozen, referred to as 'patient age at freeze'. The second way is by the age patients were when they used the frozen eggs, also known as 'patient age at thaw'. Due to the way our Register database is structured, we are less certain about the conclusions drawn when looking at patient age at freeze<sup>14</sup>.

### Age at freeze

Women are born with a finite number of eggs and these decrease in number and quality with age. When egg freezing takes place, it freezes the quality of the eggs at that point in time of a woman's life. This means that the age at which a woman freezes her eggs is particularly important. Our data shows that there is a pattern in success rates for women who use their frozen eggs in treatment. The success rate decreases with the increasing age of the woman when the eggs were frozen. The highest success rates are for women aged below 35.<sup>15</sup>

<sup>14</sup> For more detail, see the supplementary data tables to this report available on our website.

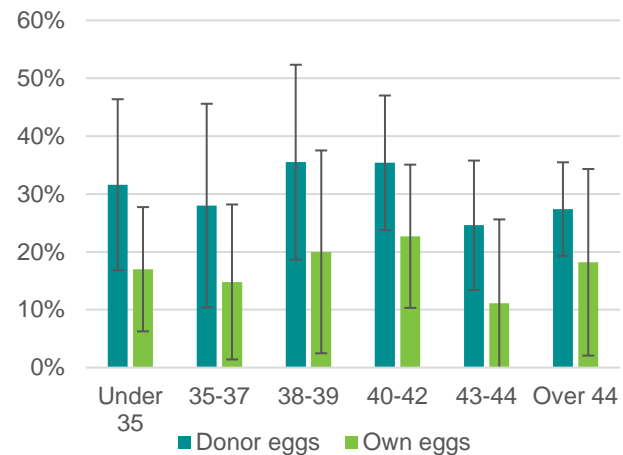
<sup>15</sup> For more detail, see the supplementary data tables to this report available on our website.

## Age at thaw

Figure 8 sets out birth rates by the woman's age at thaw. We can see that birth rates remain relatively stable across age brackets, with the greatest variation occurring between patients aged 40-42 and 43-44. It is not clear what causes this drop amongst older women. Some broader research suggests that the maternal age at thaw does have an effect on success rates, possibly due to an increased risk of pregnancy complications or miscarriage.<sup>16, 17</sup>

Overall, it appears there is minimal difference between the youngest and oldest age categories for birth rates; significantly less so than when looking at the patients' age at freeze or when patients use donor eggs (which are likely to be from younger patients). This reflects the patterns observed in fresh egg IVF treatment cycles.

**Figure 8: Birth rates PTC by age at thaw (2016)**

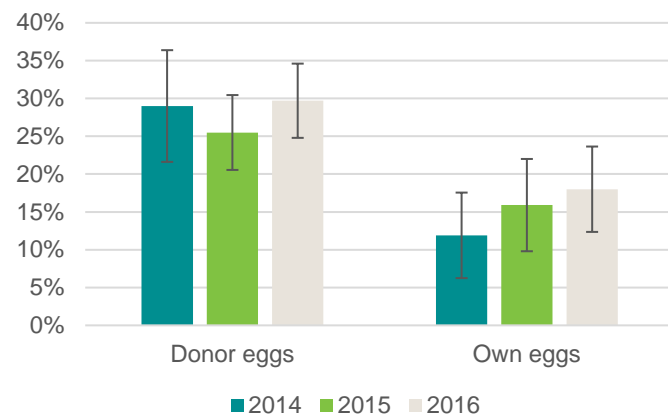


## The impact of donor eggs on success rates

In 2016, donor eggs overall had a significantly higher success rate per thaw treatment cycle (30%) than own eggs (18%).

As noted earlier, the significantly higher success rates for donor eggs compared to own eggs is to be expected and is largely due to the access criteria applied to women who donate their eggs. This access criteria requires women to have healthy indications for fertility, such as BMI, age and lifestyle factors.

**Figure 9: Birth rates PTC by egg source**



## Medical and elective success rates

In 2016, 30% of elective egg thaw treatment cycles using frozen donor eggs resulted in a birth, and 20% of elective egg thaw treatment cycles using frozen own eggs resulted in a

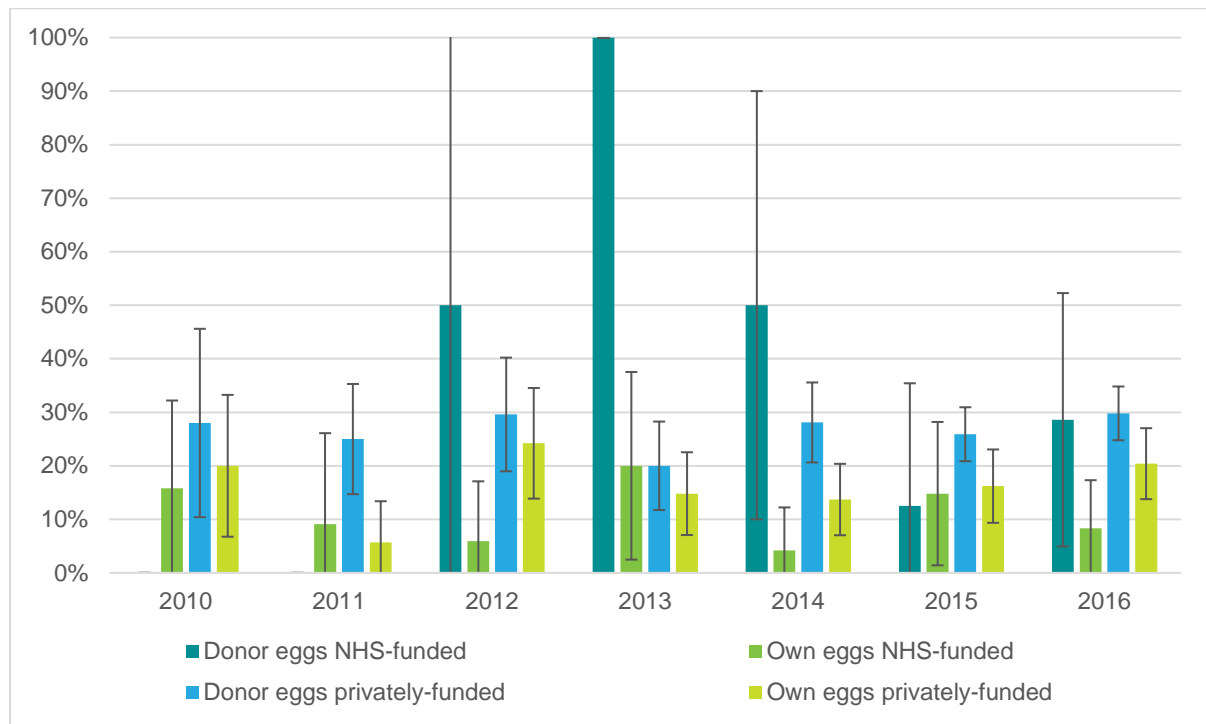
<sup>16</sup> American Society for Reproductive Medicine, & Society for Assisted Reproductive Technology. (2013).

<sup>17</sup> Setti, P. E., et al (2013). Comparative analysis of fetal and neonatal outcomes of pregnancies from fresh and cryopreserved/thawed oocytes into same group of patients. *Fertility and Sterility*, 396-401.

birth. Frozen donor egg birth rates have remained fairly stable over the past three years, while frozen own egg success rates for this group have slightly increased.

In 2016, 29% of medical egg thaw treatment cycles using frozen donor eggs resulted in a birth, and 8% of medical own egg thaw treatment cycles using frozen donor eggs resulted in a birth. However, due to the very small number of patients using either frozen donor or frozen own eggs in NHS-funded egg thaw cycles, we are less certain about how representative this data is across all patients in this group.

**Figure 10: Birth rates PTC by funding and egg source**





# Making decisions about egg freezing

## Egg freezing techniques as a method of preserving fertility

Fertility naturally declines as a woman gets older, although the rate and age at which this decline happens varies widely between women. 'Standard' fresh IVF does not offer a solution to age-related fertility decline because it cannot reverse egg degeneration.<sup>18</sup> This is why the age a woman is when she freezes her eggs is so important.

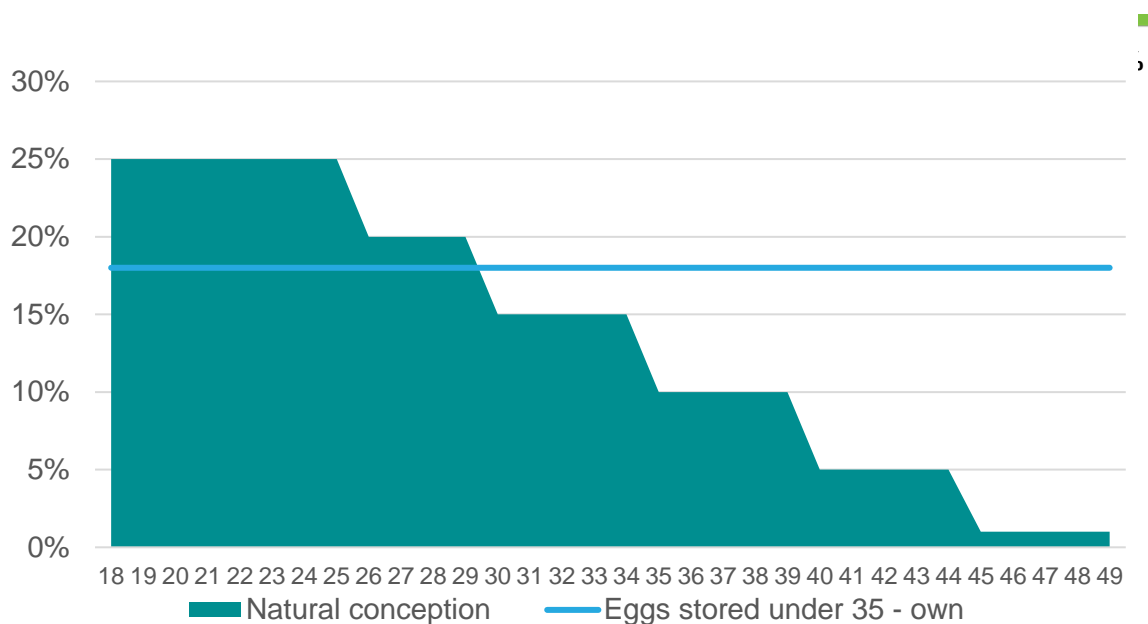


Figure 11 shows the chances of successful pregnancy when a patient uses their own eggs frozen when they were below the age of 35 (and the 95% confidence interval shaded below) compared to the natural monthly conception rate. This shows that from the age of 35, the chance of success using the patient's frozen eggs is higher than the natural conception rate. This suggests that egg freezing and thawing preserve a woman's fertility when eggs are frozen under the age of 35.

The results of our analysis are supported by international evidence which suggests egg freezing is a successful and cost-effective method of preserving fertility. A recent study demonstrated that for women at the age of 40, freezing eggs below age 35 is more cost effective than IVF.<sup>19</sup>

<sup>18</sup> Daly, I., & Bewley, S. (2013). Reproductive ageing and conflicting clocks: King Midas' touch. *Reproductive biomedicine online*, 722-32.

<sup>19</sup> van Loendersloot, L. L., et al (2011). Expanding reproductive lifespan: a cost-effectiveness study on oocyte freezing. *Human reproduction*, 3054-3060.

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## The number of clinics performing egg freezing

Over the last few years, egg freezing and thawing have become more common in fertility clinics in the UK. The number of clinics performing one or more egg freezing cycles has increased from 37 in 2010 to 62 in 2016. However, most clinics are performing 10 or fewer cycles a year (64% in 2016), with only 15% performing more than 20 in 2016. Just three clinics performed more than 100 egg freezing cycles, with the highest performed being 186 cycles.

This shows that a large concentration of egg freezing cycles are being undertaken in a limited number of clinics, despite many offering the treatment. This means that despite media interest in egg freezing, most clinics do very few cycles of egg freezing each year, and only a select few do a lot of egg freezing cycles. If overall treatment numbers continue to increase, it will be interesting to see if egg freezing becomes more widely distributed across clinics in the UK.

The number of clinics conducting egg thaw treatment cycles has also increased over the last few years. Most of these clinics are performing 10 treatment cycles or fewer so, as we found with egg freezing, there is a high concentration of thaw cycles within a small number of clinics, particularly for thaw cycles using donor eggs.

### Location

As with standard IVF treatment, the majority of cycles take place in England, particularly in London. However, this is the case disproportionately so for egg freezing, in which the bulk are primarily located in London (78% of egg freezing cycles take place in London).

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## The costs of egg freezing and thawing

### NHS funded

The National Institute for Health and Care Excellence (NICE) recommends that women who are diagnosed with cancer that is likely to affect their fertility should be offered fertility preservation on the NHS.<sup>20</sup> Fertility preservation could include embryo or egg storage, depending on which is most appropriate.

When women who have preserved their fertility due to medical reasons then wish to use their frozen eggs, they would be eligible for NHS funding for treatment.<sup>21</sup>

### Privately funded

A review of prices advertised on UK clinic websites in May 2018 showed that the average cost of a complete egg freezing cycle, including storage and use of eggs in future treatment, ranges from £7,000-£8,000. This is made up of the cost of egg freezing, storage and using frozen eggs in treatment. Prices range from £2,720-£3,920 for an egg freezing cycle, with

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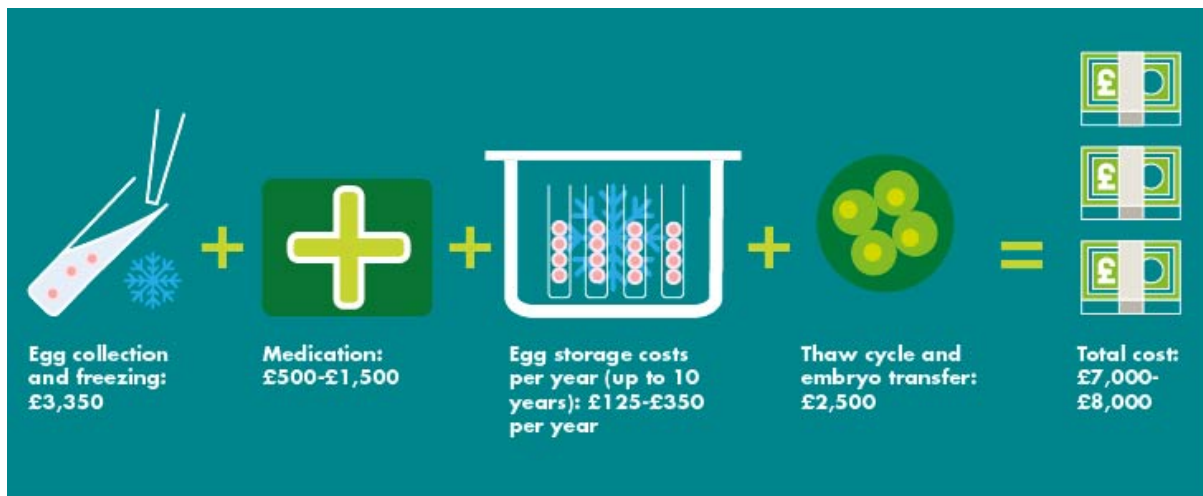
<sup>20</sup> <https://www.nice.org.uk/guidance/cg156/ifp/chapter/freezing-sperm-eggs-or-embryos-before-cancer-treatment>

<sup>21</sup> <https://www.nice.org.uk/guidance/cg156/chapter/Recommendations#access-criteria-for-ivf>

the average (median) cost for freezing eggs being around £3,350. There are variations in what is included within this cost, with most clinics including one or two years of storage. However, these costs do not include the medication required for treatment which can vary from £500 to thousands. The cost of storing eggs also ranges from £125-£350 a year.

When it comes to using frozen eggs in treatment, costs range from £1,650-£4000, with the average (median) being around £2,500. Freezing eggs is therefore a significant investment and, as with all fertility treatment, clinics should inform patients of all the relevant costs upfront, so they have an accurate idea of how much the full process is likely to be.

**Figure 12: Average costs of elements for a typical egg freezing cycle**



## Risks of egg freezing and thawing

Fertility treatments are generally very safe – most women are no more likely to experience problems with their health or pregnancy than women who have conceived naturally. However, there are some risks to be aware of, which range from mild discomfort to more serious conditions.

### Success

There is always a risk with IVF that embryos do not develop and implant. When using fresh eggs, there is often the option to undergo another treatment cycle. However, as patients freeze a finite number of eggs, it is important patients recognise that there is no guarantee freezing eggs will lead to a live birth.

Some studies have found that patients have unrealistically high expectations of success.<sup>22</sup> Even though birth rates with frozen eggs are increasing, in 2016, only around one in four egg thaw cycles resulted in a birth (or three out of every four egg thaw treatment cycles did not result in a birth), which is an important risk for prospective patients to consider.

<sup>22</sup> Greenwood, E. A., et al (2018). To freeze or not to freeze: decision regret and satisfaction following elective oocyte cryopreservation. *Fertility and Sterility*. 1097-1104

## Emotional costs

The portrayal of egg freezing as a ‘back-up plan’ or ‘fertility insurance’ that allows women to undertake medical treatment, or take the time to find suitable long-term partners, complete their education, achieve financial stability or advance their career goals, may strongly influence the ways in which some women’s reproductive choices and experiences are shaped. Women should be provided with clear information about the risks of fertility treatment, costs and likely success rates, based on all the relevant factors to avoid disappointment or future regret.

## Not using frozen eggs

Although the clinically optimum time to freeze eggs is early on in a woman’s reproductive life, success rates are not the only consideration, and other factors may lead women to consider freezing their eggs later in life. In some cases, one reason is because the younger a woman is when she freezes her eggs, the less likely she is to ever need to use them, because she could probably conceive naturally.<sup>23</sup> Another reason women may consider freezing eggs later than the clinically optimum time is the 10-year legal storage limit for frozen eggs. This storage limit could mean that the end of the storage period arrives before the woman is ready to use her eggs, and the woman may need to choose between allowing her eggs to perish or using her eggs in an IVF treatment thaw cycle before she feels ready.

## Baby and maternal health

Available evidence shows no differences between the use of vitrified or fresh eggs in the rates of obstetrical problems<sup>24, 25</sup> and no increased risk of chromosomal anomalies or significant physical or developmental deficits in the babies created.<sup>26, 27</sup> However, there is some evidence of higher miscarriage rates in pregnancies with frozen thawed eggs in infertile patients.<sup>28</sup>

Nevertheless, these studies so far are limited in scope, as only approximately 2,000 babies have been born worldwide from cryopreserved eggs, and long-term studies on safety for children born from this process are not yet available.

Additionally, regardless of the age when eggs were frozen, health concerns do remain for women who become pregnant later in life compared to younger pregnant women.

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<sup>23</sup> Mesen, T. B., et al (2015). Optimal timing for elective egg freezing. *Fertility and Sterility*, 1551–1556.

<sup>24</sup> Cobo, A., et al (2016). Oocyte vitrification as an efficient option for elective fertility preservation. *Fertility and sterility*, 755-764.

<sup>25</sup> Noyes, N., Porcu, E., & Borini, A. (2009). Over 900 oocyte cryopreservation babies born with no apparent increase in congenital anomalies. *Reproductive Biomedicine Online*, 769-776.

<sup>26</sup> Cobo, A., et al (2014). Obstetric and perinatal outcomes of babies born from vitrified oocytes. *Fertility and Sterility*, 1006-1015.

<sup>27</sup> Setti, P. E., et al (2013). Comparative analysis of fetal and neonatal outcomes of pregnancies from fresh and cryopreserved/thawed oocytes into same group of patients. *Fertility and Sterility*, 396-401.

<sup>28</sup> Ibid.

# Background information

## Some key definitions and measures

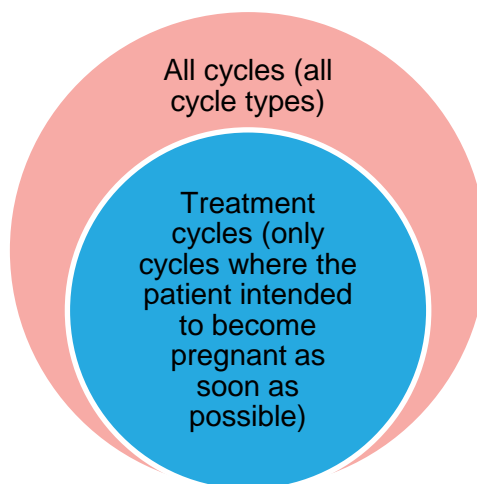
### 'Cycles' and 'treatment cycles'

Patients undergo fertility treatment for a range of reasons:

- with the intention of becoming pregnant as soon as possible (most patients)
- fertility preservation (a growing number of patients)
- altruistic reasons, such as donation.

The term 'treatment cycle' includes only those cycles where the patient recorded on their registration form that they intended to become pregnant as part of their treatment (IVF, DI and egg share cycles are always treatment cycles).

The term 'cycle' covers all the interventions that are conducted at a fertility clinic, regardless of whether the patient intended to become pregnant as soon as possible. This includes 'non-treatment cycles' such as egg freezing, donation, and embryo storage.



## Our Register data

### Our role in collecting data

Clinics in the UK are required by law to provide information to us about all licensed fertility treatments they carry out. We hold this information on the Register, which contains information about fertility patients, the treatment they received and its outcomes.

Aggregated results are published according to the year in which the cycle was started.

As our database consists of a live Register, and we rely on accurate reporting from clinics, there can always be missing outcomes and information may be subject to change. As clinics may submit data at any time, the figures published here may differ slightly to those published before or in the future.

Clinic-specific data is published on our clinic search tool, Choose a Fertility Clinic on our [website](#).

### How we quality assure our data

HFEA Direction 005 sets out the legal basis and requirements which govern our interaction with licensed clinics and third-party providers. We work closely with clinics and third-party

systems to ensure the importance of guidance around submission of Register data is understood through professional stakeholder groups, workshops and sharing good practice and benchmarking information in our 'State of the sector' report.

We use additional quality assurance processes which include:

- manually validating data submissions.
- carrying out regular quality assurance checks on data through the inspection process
- publishing non compliances with data quality issues in inspection reports on our website
- where relevant, reviewing quality (validation) reports and auditing clinics where irregular data has been submitted.

### **Egg freezing and egg thawing data**

Analysing egg freezing data is complex because there are three sets of data to consider.

Egg freezing data is the data from women who have frozen eggs for future use. We have a full set of this data and can easily analyse it. Not all women who have frozen eggs will have used them at present.

Egg thaw data is from women who have used a frozen egg (either their own, or someone else's in treatment).

In theory, each used frozen egg should be able to be linked to a thawed egg so that we can know further details about the origin of the egg used in the thaw cycle. However, this is not always possible due to limitations in our database structure which was set up before egg freezing was commonly available. Our database upgrade will address these limitations.

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