Chapter 13
Assisted Reproductive Technologies in Germany: A Review of the Current Situation

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13.1 Introduction

As assisted reproductive technologies have become increasingly prevalent, and the issues surrounding the use of ART are discussed in the public media, a sweeping social change with ethical, cultural, and demographic consequences has been set in motion. According to some commentators, the decoupling of procreation and pregnancy seems to have suspended the "fundamental law of human reproduction" (Bahnsen and Spiewak 2008: 35). Other observers have noted that fertility treatments have created the illusion of extended fecundity through the partial transcendence of the limitations set by nature (Correll 2010: 36).

The first "test tube baby" was Louise Joy Brown, born in England on 25 July 1978. Her birth represents the cornerstone in the development of assisted reproduction[1] (Steptoe and Edwards 1978). The first "IVF baby" in Germany was born at the university hospital in Erlangen in spring of 1982 (Berlin-Institut für Bevölkerung und Entwicklung 2007: 23). In 2010, Robert Edwards, a co-founder of the first in vitro fertilisation (IVF) programme, was awarded the Nobel Prize in Physiology or Medicine. Thus, reproductive medicine, a subfield of medicine which deals with human reproduction and its dysfunctions, is still quite young. Reproductive technologies have, however, been developing rapidly, and social acceptance of fertility treatments has been growing. Worldwide, more than four million individuals have

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[1] The terms assisted reproduction and reproductive medicine are being used interchangeably in this chapter.

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been conceived through the use of ART (Beier et al. 2012). Since the systematic registration of ART began in Germany in 1997, there have been around 202,000 live births to parents who used these technologies – a figure which approximates the number of inhabitants of medium-sized German cities like Kassel or Rostock (Deutsches IVF-Register (DIR) 2014: 261).

Physicians of reproductive medicine in Germany seek to support both women and men, most of whom are in heterosexual partnerships, in fulfilling their desire to have a child. Freedom of reproduction is seen as a fundamental human right. Fertility treatment is usually preceded by the diagnosis of one or more biologically caused fertility limitations. In diagnosing these limitations, the physician distinguishes between sterility and infertility in both the male and the female partner. Infertility is defined as the inability to carry a pregnancy to term and to deliver a live birth, whereas sterility indicates the inability to conceive or to father a child. Most of the couples who undergo fertility treatment are not absolutely sterile, but have an unspecified restriction of fertility (Ludwig et al. 2013: 2). As a rule, subfertility is assumed after at least 1 year of regular sexual intercourse without contraception within which no pregnancy has been achieved (Beier et al. 2012). Since 1967 the World Health Organisation (WHO) has classified permanent involuntary childlessness as an illness with potentially severe psychological consequences (Robert Koch-Institut 2004). The extent of involuntary childlessness is difficult to estimate because of its age dependence, and because of the lack of clear boundaries between voluntary and involuntary childlessness (Kreyenfeld and Konietzka 2013: 18; Sobotka in this volume). Existing data tend to underestimate the extent of biologically based childlessness because it is assumed that an appropriate diagnosis has been confirmed.

13.2 Legal Framework and Rules for the Assumption of Costs for ART

The Embryo Protection Act (ESchG), which went into effect in Germany in 1991, established the legal framework for providers of reproductive medicine (Diedrich 2008). The main purpose of the legislation was to ensure the preservation of the embryo, and to mandate penalties for noncompliance.[2] ESchG also stipulated that ART should be used to optimise the success of a pregnancy, and not for other purposes. “The core rule related to the realisation of these goals is the so-called ‘rule of three’: physicians are only allowed to fertilise the egg cells which will be transferred within a single treatment cycle, and the number of embryos which may be transferred in each cycle is limited to three” (Riedel 2008a: 11 – own translation). ESchG lists a number of misuses of ART, including egg cell donation (i.e., the

[2] An embryo is defined as “fertilized human egg capable of developing from the time of fusion of the two nuclei, and each totipotent cell removed from an embryo that is capable of dividing or developing into an individual human being if the necessary conditions prevail” (ESchG § 8 (1)).

transfer of an unfertilised egg cell from one woman to another), surrogate motherhood, and the utilisation of egg or sperm cells after the death of the owner. The only major fertility treatments not mentioned in the legislation are the donation of sperm cells (Berlin-Institut für Bevölkerung und Entwicklung 2007: 33) and the donation of "surplus" embryos (Ahr and Hawranek 2014) unless the ART treatment had been undertaken with the purpose to donate embryos (Möller 2013: 588).

Since the ESchG first went into effect, researchers in Germany have been calling for the passage of a comprehensive law which regulates all aspects of assisted human reproduction (Diedrich and Griesinger 2006; Riedel 2008b; DIR 2014). So far, these efforts have been unsuccessful (Riedel 2008a), most likely because the proposal of new legislation would incite another round of public debate on the status of embryos and the beginning of human life (Spiewak 2009). On the one hand, the fact that assisted reproduction in Germany is only partially regulated implies that there are no clear instructions to providers on how to manage some important aspects of ART, such as the handling of "supernumerary" embryos.[3] On the other hand, a large number of directives and laws have been approved which regulate certain aspects of reproductive medicine. For instance, the standards of quality and safety for egg cells, sperm cells, oocytes, and embryos were established in the Tissue Act of 20 July 2007. The Stem Cell Act of 28 June 2002, which outlined the conditions for the import of and research on embryonic stem cells, mandated a high level of protection for human gametes. Meanwhile, German physicians of reproductive medicine have argued that, because of legal restrictions, the types of treatment they can offer their patients are not keeping up with the most recent developments in medical science and technology. For example, physicians have asserted that the prohibition on embryo selection, and thus of the elective transfer of a single embryo, often results in unwanted multiple pregnancies (Beier et al. 2012: 364).

As was noted above, the donation of sperm cells, including the use of sperm cells which do not come from the female patient's male partner (heterologous or third party donation), is generally allowed in Germany. The only requirement for using donated sperm is a written declaration of consent by the future parents and the sperm donor. While the use of anonymous sperm or a mixture of sperm cells from different donors is not punishable by law, many people believe it is immoral because it violates a child's right to know her or his genetic ancestry (Revermann and Hüsing 2010: 199). To date, a sperm donor in Germany is not fully protected from legal claims that he is obliged to provide financial and other forms of support for any children who are conceived from his donation (Beier et al. 2012: 365). Two other laws are relevant in this context: the Transplantation Law of 2007 and the Children's Rights Improvement Act of 2002. "The former law prescribes that all documents in relation to human tissue have to be stored for at least 30 years … The second law stipulates that paternity cannot be contested by the male partner or the mother if they have agreed to artificial insemination by a third party donor, but only by the child after she or he reaches the age of majority" (Wischmann 2012: 121 – own

[3] These are embryos which were produced through IVF and which were left over after the treatment had been finished (Riedel 2008a).

translation). This gives children conceived by third party sperm donation the option as adults to gain access to the data of the former donor, and thus to acquire full knowledge of their ancestry.

According to guidelines which are binding on all medical professionals, access to ART services is granted to all married couples, but it is granted to cohabiting heterosexual couples only under exceptional circumstances (No. 3.1.1. of the Guideline of the Medical Chamber, Bundesärztekammer 2006). The reasoning for this restriction is that a child's welfare is best ensured within the legal bonds of matrimony. Some observers have called this restriction an example of the "power of the norm of heterosexual families with biological children" (Correll 2010: 36), while others have claimed it represents unconstitutional discrimination of same-sex couples and single women (Revermann and Hüsing 2010: 200; Möller 2013: 595).

The reasoning for the controversial prohibition of egg cell donation is to avoid ambiguity about who the mother is, and to prevent a separation of the genetic and gestational components which might result in identity problems for the child. The differences in the regulation of egg cell and sperm donation have been justified by the different "depths" involved in collecting male and female gametes (Revermann and Hüsing 2010: 200). From a social science perspective, it is relevant that ambiguity about the identity of the father of a child has long been tolerated, whereas uncertainty about the identity of a child's mother has not. Meanwhile, reproductive medical professionals have been calling for a reasonable policy on egg cell donation in Germany to support the 3–4 % of women under age 40 who are unable to conceive for genetic or other reasons (Kentenich and Griesinger 2013: 273).

The diagnostic options related to ART are also regulated under ESchG and subsequent interpretations of the law. For example, polar body diagnosis, elective single embryo transfer (eSET), and pre-implantation diagnostics (PID) are legally permitted in Germany, but only within strict limits. These procedures and the legal framework surrounding them cannot be described in detail here (see Revermann and Hüsing 2010; Beier et al. 2012). The law on PID (PräimpG) went into effect on 21 November 2011, but the corresponding by-laws with important details (PIDV) did not become effective until February 2014. A PID procedure in connection with IVF is permitted only in specially authorised centres, and only after the couple have filed an application which has been approved by an interdisciplinary ethics panel. To qualify for a PID procedure, the couple must be able to show that they carry a serious genetic disease, or that the woman is likely to die or miscarry if she becomes pregnant (PräimpG § 3a(2) and PIDV).

"The reimbursement of the costs associated with ART varies between private and statutory health insurance. Overall, there are tendencies to limit reimbursement or to deny it" (Revermann and Hüsing 2010: 209 – own translation). "Until December 2003, up to four treatment cycles were fully covered by statutory health insurance. Since January 2004, the law for the modernisation of statutory health insurance (GMG) applies. Since then only 50 % of the treatment costs for a maximum of three

treatment cycles are reimbursed.[4] For couples to qualify for coverage they must be married; women must be between 25 and 40 years of age and men must be between 25 and 50 years of age" (Passet-Wittig et al. 2014: 6). Before the treatment starts, couples have to undergo mandatory counselling on the medical and psycho-social aspects of ART with a physician who does not provide the treatment. For the relatively small share of women and men with private health insurance, the situation is somewhat different. Generally, private insurance provides full coverage for three treatment cycles based on the costs-by-cause principle, which implies that in a couple the insurance of the person who is considered "responsible" for the fertility problems has to cover the full costs (Revermann and Hüsing 2010).

"Since the implementation of the GMG, some statutory health insurance providers have individually increased coverage of fertility treatments for their customers" (Passet-Wittig et al. 2014: 7). A few selected federal states, like Saxony, Saxony-Anhalt, Lower Saxony, Mecklenburg-Western Pomerania, and Thuringia, support state residents who seek fertility treatments by limiting their co-payment to 25 % (Passet-Wittig et al. 2014). This means that a couple's statutory health insurance provider and their place of residence have become significant factors in the size of their ART co-payments. The reduction in reimbursement by the GMG has had severe consequences for the great majority of couples with fertility problems.[5] The number of fertility treatments fell sharply after the passage of the law, and is only slowly returning to previous levels (DIR 2014, see section 13.3.5). In the political realm, the public financing of ART treatments is a matter of dispute. Proponents argue that permanent involuntary childlessness is an illness, and point to the tenuous demographic situation in Germany. Critics question the assertion that fertility problems are an illness, and argue that the fulfilment of the desire to have children should not be considered a form of social security. Rauprich (2008: 46) offered a further perspective on public financing of fertility interventions, asserting that having a child is a fundamental need, and that the question of how to pay for these treatments is one of equality of opportunity.

Across Europe, the financing mechanisms for ART vary greatly. While the costs associated with fertility treatments are fully covered by insurance in some countries (e.g., Spain), couples must bear the full costs themselves in others (e.g., Switzerland). The legal framework and the regulation of the criteria for access also vary considerably across Europe (Rauprich 2008; Revermann and Hüsing 2010; Küpker 2013). In Germany, some couples choose to pay for the fertility treatments themselves or to seek treatment abroad, presumably because of the legal restrictions in Germany and the challenges they face in gaining timely access to treatment. According to one

[4] A constitutional complaint about the reduction in reimbursement was rejected by the Federal Constitutional Court (Bundesverfassungsgericht 2009).

[5] "The costs associated with fertility treatments are considerable. In Germany, the cost of a standard IVF cycle including medication is about 3000 euros. An intracytoplasmatic sperm injection (ICSI), which is necessary in cases of male subfertility, costs about 3600 Euro. The rate of success varies according to the age of the woman and other factors … Based on this, a rough estimate of the cost of a live birth is about 15,000 euro" (Rauprich 2008: 32).

estimate, around 1000 German couples each year engage in "fertility tourism" in countries with less restrictive fertility treatment regulations (such as Belgium, the Czech Republic, and Spain) or with lower costs for ART (such as Hungary and Slovenia) (Revermann and Hüsing 2010: 221).[6]

13.3 Assisted Reproductive Technologies (ART)

In this section, I provide brief descriptions of the medical procedures and technologies which are currently being used to help couples with fertility problems fulfil their desire to have a child. While these descriptions do not include medical details, they should make it easier to understand the temporal developments in their use, and the extent to which these procedures have been successful in Germany (see section 13.3.5).

13.3.1 Intrauterine Insemination (IUI)

After the timing of a woman's ovulation is determined through regular ultrasound monitoring, a "washed" sperm sample is placed directly inside the woman's uterus using a sterile soft catheter. This procedure considerably shortens the distance the sperm must normally travel; i.e., from the vagina through the cervix and the uterus and into the fallopian tube. IUI can be performed with or without hormonal stimulation to trigger ovulation. As this treatment usually does not cause any pain, it can be performed without the use of anaesthesia (Wischmann 2012: 75). As the fertilisation takes place within the woman's body, it is a relatively simple form of ART. IUI has a long tradition (Dorn 2013), and has been practiced for a much longer period of time than the more extensive procedures that involve an extracorporeal fertilisation.

13.3.2 In Vitro Fertilisation (IVF)

IVF is the joining of an egg and sperm outside of the woman's body. The actual fertilisation and the initial process of cell division take place in vitro in a nutrient liquid. This eliminates the need for the embryo to pass through the fallopian tube. IVF is the most basic form of all of the extracorporeal ART procedures, which can be understood as being special cases of IVF. "IVF can be described as follows: After

[6] Other sources cite much higher numbers (Spiewak 2011). An ethnographic study by Bergmann (2011) provides insights into the complex motivations for fertility tourism to Spain, Denmark, and the Czech Republic.

a hormonal stimulation to trigger a woman's ovulation, multiple eggs are retrieved using a transvaginal technique. In the laboratory, the identified and prepared eggs are incubated together with the washed sperm. After successful fertilisation, the resulting embryos are cultivated and transferred to the patient's uterus" (Revermann and Hüsing 2010: 37 – own translation). It is important to note that the retrieval of mature follicles is done under conscious sedation or general anaesthesia, which has certain risks. In most cases, 6–10 eggs are removed from the woman at once, and the man's semen is collected, prepared, and washed on the same day. To initiate the fertilisation, the egg and the sperm are incubated together, and the embryos are cultivated for about 2 days in an incubator. This process is monitored microscopically, and the quality of the embryos is judged according to morphological criteria.[7] No later than 5 or 6 days after fertilisation a maximum of three promising embryos are transferred into the woman's uterus, in line with the rules set out in ESchG. Any "leftover" fertilised eggs which are at the stage prior to the fusion of the two nuclei (2-PN stage) are often cryopreserved in liquid nitrogen (Revermann and Hüsing 2010: 37). Interestingly, over time there has been an extension in the duration of the period prior to the transfer of the embryo. The purpose of this "German compromise", which is based on a liberal interpretation of the ESchG, is to limit the number of transferred embryos to a maximum of two, while still achieving pregnancy rates comparable to those in other countries (DIR 2011).[8] The decision about whether to use an IVF procedure often depends on the quality of the man's sperm and medical indications of the woman.

13.3.3 Intracytoplasmic Sperm Injection (ICSI)

The intracytoplasmic sperm injection procedure was first developed in the early 1990s. The only difference between ICSI and conventional IVF is the fertilisation itself. This technique involves the insemination of a mature egg cell by the microinjection of a single sperm cell into it. The steps before and after insemination are exactly the same as those in a conventional IVF procedure without ICSI. Therefore, the success of the treatment does not depend on the number and mobility of sperm. ICSI was originally developed to treat cases of male infertility or abnormalities in

[7] Judging the embryo's stage of development according to morphological criteria is an indirect method, and is thus subject to prognostic vagueness. The selection and further culturing of the embryos has to be done at the stage of the impregnated fertilized egg, under the Embryo Protection Act (ESchG) (Revermann and Hüsing 2010: 41). Therefore, this morphological evaluation is not comparable to the eSET.

[8] "In each individual case, the criteria for determining how many fertilized eggs should be cultivated longer so that after 5 days in vitro a maximum of three promising embryos can be transferred will depend on the characteristics and medical history of the couple (age, number, and outcome of previous treatments). However, more than three fertilized eggs may be kept prior to the fusion of the nuclei (2-PN stage). Thus, this practice is beneficial only for couples who have a certain number of fertilised eggs at their disposal" (DIR 2011: 12 – own translation).

sperm, and since then has proved to be a major advance in the treatment of subfertility of male origin. In the application of this technique, healthy women need to undergo fertility treatment. Today, ICSI is routinely used to fertilise cryopreserved eggs or treat idiopathic infertility, or in cases in which conventional IVF has not been successful. Worldwide and in Germany specifically, ICSI is now used more often than conventional IVF. A basic disadvantage of ICSI relative to IVF is that natural selection of sperm in the fertilisation of the egg is replaced by artificial selection. This could be associated with an elevated risk of genetic disorders, although the different studies which have investigated this question have generated contradictory results (Revermann and Hüsing 2010: 39).

13.3.4 Cryopreservation

Human gametes and embryos can be preserved through a process of freezing at around −196°C. This process, called cryopreservation, is a widely used assisted reproduction technique. The cryopreservation of embryos and impregnated egg cells has become increasingly common in countries around the world, provided their legal norms permit the procedure. "In Germany, the cryopreservation of impregnated egg cells is practiced extensively, in particular because of the prohibition on creating and preserving 'leftover' embryos" (Revermann and Hüsing 2010: 43 – own translation).[9] The advantage to cryopreserving supernumerary fertilised egg cells at the stage prior to the fusion of the two nuclei (2-PN stage) is that there is no need for the repeated hormonal stimulation of women's ovulation and a retrieval of mature eggs, or for the use of the expensive ICSI method. While today the cryopreservation of sperm is routinely done, the cryopreservation of unfertilised egg cells is still technically challenging because of their sensitiveness (Griesinger et al. 2008). But the new technique of vitrification, in which egg cells are frozen within a few seconds, appears to represent a breakthrough (Spiewak 2013). Cryopreservation can also be applied to female and male gametes, and is thus also a method for preserving fecundity in patients preparing to undergo radiation or chemo therapy. For social reasons, interest in the freezing of egg cells or embryos seems to be growing (Lawrence 2010): "More attention might be given to so-called *social freezing* (highlighted originally – H.T.), because many women feel pressured by their 'biological clock' and are concerned about the diminishing quality of their egg cells and the declining likelihood of motherhood" (Beier et al. 2012: 372 – own

[9] In the majority of European countries, the cryopreservation of leftover human embryos is the preferred procedure (Griesinger et al. 2008: 27). If the "rule of three" in the Embryo Protection Act (ESchG) is strictly followed, "supernumerary" embryos can be generated only exceptionally, while this is regularly the case if eSET or PID is being used (Riedel 2008b). In many countries with more liberal laws than those of Germany, the fate of a great number of frozen embryos currently poses complex problems (Grady 2008).

translation).[10] The cryopreservation of egg cells is legal in Germany, but the high costs of the procedure and the short optimal age span for extracting a supply of egg cells are obstacles to even wider use (Spiewak 2013).

13.3.5 Temporal Development of ART and Measures of Success

Among the aims of the German IVF registry is to ensure the quality of ART by collecting data and setting national standards. The registry has been collecting data since 1982, the year when the first IVF baby was born in the Federal Republic of Germany.[11] While participation by IVF centres in the collection of data for the registry was mandatory under the guidelines of the Medical Chamber from 1998 to 2012, since 2012 clinics are no longer required to collect data (DIR 2013). Nevertheless, the registry will continue to provide IVF centres with a wealth of data. The German IVF registry collects electronically all of the data needed for a quality assessment of each initiated treatment cycle. "The prospective documentation as well as the cycle-by-cycle data collection are of particular value" (DIR 2014: 237). Unlike in some other countries (e.g., Human Fertilisation and Embryology Authority in Great Britain), the IVF registry in Germany is an association which relies on the voluntary participation of professional organisations, and thus lacks a statutory basis (Griesinger et al. 2008). The registry collects data on extracorporeal fertilisation only, and not on intrauterine forms of insemination in which the fertilisation takes place within the woman's body. So far, there is no insemination registry in Germany.[12] In 2013, 130 out of 131 IVF centres which participate in the German IVF registry had exported their data into the registry (DIR 2014: 9).

Over the past 10 years, the practice of endocrinology and reproductive medicine in Germany has been moving out of the universities and into the private sector. The main reasons for this shift appear to be the lower remuneration of ART practitioners by the universities and increasing economic pressure. As a result, more than 80 % of ART treatments are taking place in the private sector (Beier et al. 2012: 351).

[10] This is the topic of the Dutch documentary "Eggs for later", which was produced in 2010 (http://www.imdb.com/video/wab/vi1370856473/). A 2013 poll conducted by the Cologne market research institute YouGov in Germany found that 27 % of the 536 women surveyed said they could imagine having their egg cells frozen to ensure that they can fulfil their desire to have a child (YouGov 2013). The debate on social freezing gained momentum when in 2014 the large US-based companies Facebook and Apple announced that they would pay for the social freezing of their employees' egg cells (Groll 2014).

[11] In 1984 the first IVF baby was born in the German Democratic Republic (Revermann and Hüsing 2010: 48).

[12] Estimates indicate that since 1970 more than 100,000 children have been born in western Germany following insemination by third party donors. Currently, about 1000 children per year in Germany are conceived through this method (Katzorke 2008: 98).

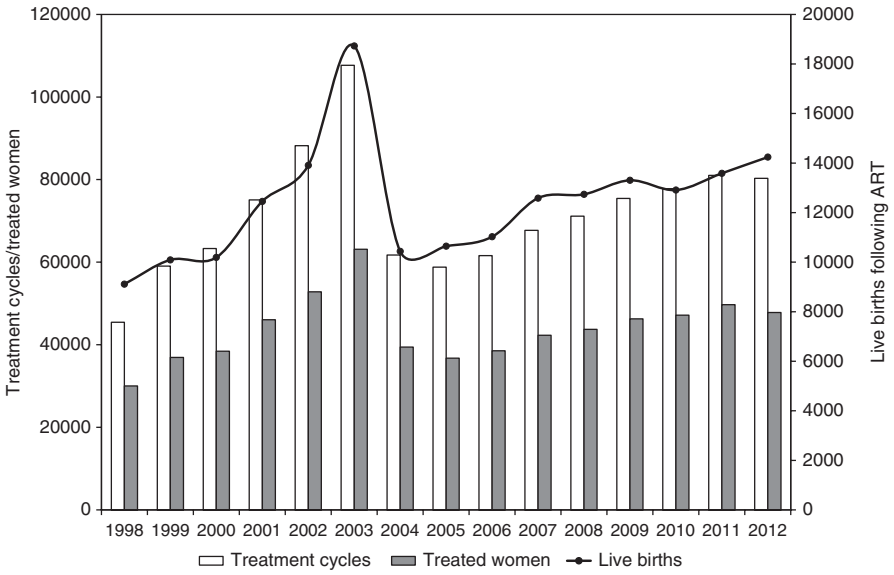

Fig. 13.1 The development of ART in Germany, 1998–2012 (Source: DIR 1999–2014 (own calculations))

"International lab networks are on the rise, and the takeover of IVF centres by private investors is nothing new" (DIR 2012: 13).

Figure 13.1 provides an overview of the development of ART over time since the beginning of reliable data collection. Up to 2003, the number of treatment cycles and the number of treated women[13] rose continuously. Over the same period, the number of live births resulting from fertility treatments also increased. Growth was particularly strong between 2002 and 2003, as couples and physicians were aware of the upcoming reduction in reimbursement levels. Physicians thus appear to have been performing treatments in that period which otherwise might have been performed the next year. The decline between 2003 and 2004 was especially large. Since then, the absolute numbers have reflected the consequences of the changes in reimbursement mandated in the GMG. In 2013, there were about as many treatment cycles as there were between 2001 and 2002. The mean age at fertility treatment among both women and men has increased rapidly: in 2013, it was 35.2 years for women and 38.6 years for men (DIR 2014: 28). In addition, some observers have argued that the rise in the use of treatments which are not covered by statutory health insurance is a sign that many couples are turning to privately financed treatments.[14] Since 2004, there has again been a steady increase in the number of treat-

[13] Even in cases in which the male partner is the cause of subfertility, the registry counts only fertility treatments among women.

[14] More detailed analyses of the reduction in reimbursement related to ART have shown that it is necessary to distinguish between short-term and long-term effects on use (Connolly et al. 2009).

ment cycles and in the number of live births following ART. The number of treatment cycles was roughly proportional to the number of treated women; on average, the number of treatment cycles per woman was between 1.5 and 1.7. Particularly telling is the share of live births resulting from ART among all live births: the share was largest in 2003, when it reached 2.6 %; whereas by 2012, the share was 2.1 % (own calculation).[15]

The IVF registry data clearly show that the success of ART is age dependent: "The likelihood of a pregnancy following ART is about 27 % per cycle after age 35 and it declines to 15 % per cycle at age 40" (Beier et al. 2012: 353 – own translation). This pattern is accompanied by increasing rates of miscarriage among women ages 35 and older (DIR 2014: 22–23). Overall, miscarriage rates have fallen over time. Another positive trend is that because of improvements in the quality of stimulation and in oocyte treatment, along with changes in transfer technology, the mean number of transferred embryos decreased by about 25 % between 1998 and 2012.

This development is associated with a further reduction in the share of multiple deliveries. Between 1998 and 2012, the proportion of triplets among all IVF newborns decreased by almost 80 %. In 2012, an average of less than two embryos were transferred per treatment cycle, which may be expected to improve the chances of a successful pregnancy (DIR 2014: 18).[16] The fact that transferring more than one embryo at a time increases the likelihood of multiple pregnancies is often seen as the most problematic aspect of ART. Compared with single pregnancies, multiple pregnancies are associated with higher morbidity and mortality risks for embryos and infants and increased health-related risks for women. Moreover, multiple births can have serious mental, social, and economic consequences for families.[17] In many countries, the use of diagnostic options like eSET is encouraged in an effort to limit the number of multiple pregnancies. For instance, in Sweden eSET is widely used to transfer only one embryo in each cycle (Revermann and Hüsing 2010). Of the live births resulting from ART in Germany in 2012, 66.5 % were singletons, 31.9 % were twins, and 1.6 % triplets (DIR 2014: 31).[18] Births following the use of ART therefore accounted for about 20 % of all multiple deliveries (own calculation).

The most common indicator of the success of ART is the pregnancy rate, defined as the percentage of clinical pregnancies per treatment. The data needed to track clinical pregnancies can be collected relatively quickly and completely, whereas the

[15] The last European comparison of data on ART for 2010, conducted by the European Society of Human Reproduction and Embryology (ESHRE), found that in Germany the share of infants conceived through ART relative to all births was about 2.1 %. The countries with larger shares were Denmark (5.9 %), Slovenia (5.1 %), and Iceland (4.4 %) (Kupka et al. 2014: 2104).

[16] It is noteworthy that the trend towards transferring fewer embryos did not stop when the GMG took effect: "The decision about the number of embryos that should be transferred was influenced by personal, health-related, and economic considerations" (Revermann and Hüsing 2010: 98).

[17] If there are strong medical reasons, multiple pregnancies have to be reduced. To prevent extreme preterm births and to limit related risks, fetal reduction is carried out via induced abortion of single embryos. In 2012 in Germany, this was done in 254 cases affecting 380 embryos (DIR 2014: 14).

[18] Of all live births in Germany (2012), only 3.5 % were from multiple deliveries (Statistisches Bundesamt 2014).

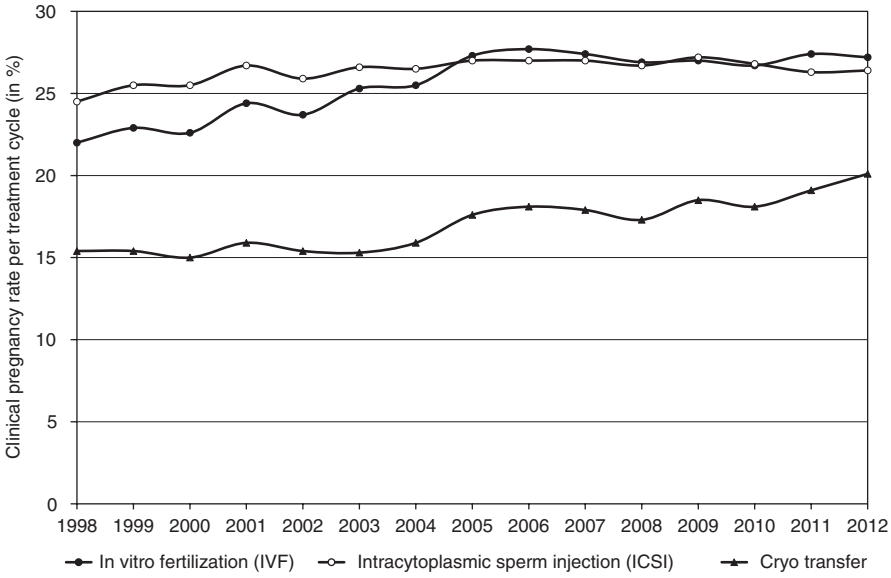

Fig. 13.2 The development of clinical pregnancy rates following ART in Germany, 1998–2012 (Source: DIR 1999–2014 (own calculations))

data on births following ART are often incomplete because it is difficult to link the data on the women who received treatment to information on subsequent births (Revermann and Hüsing 2010).

Figure 13.2 shows a clear increase in pregnancy rates following ART between 1998 and 2012. The rates rose for so-called fresh cycles (IVF, ICSI), but also for cryo transfers (frozen-thawed transfer, mostly in the 2-PN stage). It is important to note that pregnancy rates were higher following IVF and ICSI treatments than they were following cryo transfers. ICSI seems to have performed somewhat better than IVF from 1998 to 2004; thereafter, however, the pregnancy rates resulting from each of the two treatments can hardly be distinguished. Nonetheless, since 1998 ICSI has been used far more frequently in Germany than conventional IVF. Thus, the profiles of the patients who were treated with the respective methods might have shifted (Revermann and Hüsing 2010).

For couples and their attending physicians, a far more important indicator of the success of ART is the so-called "baby take-home rate", or the percentage of live births per treatment cycle. This rate is considerably lower than the clinical pregnancy rate (Fig. 13.3).

The trend of the baby take-home rate more or less reflects the temporal development of the pregnancy rates, but at a lower level. In 2012, a baby take-home rate of about 18 % after IVF or ICSI had been achieved. The rate was far lower following cryo transfers, as this method is associated with lower pregnancy rates and higher miscarriage rates. Overall, the baby take-home rate rose slightly between 1998 and 2012. This is remarkable because the mean age of the women and the men seeking

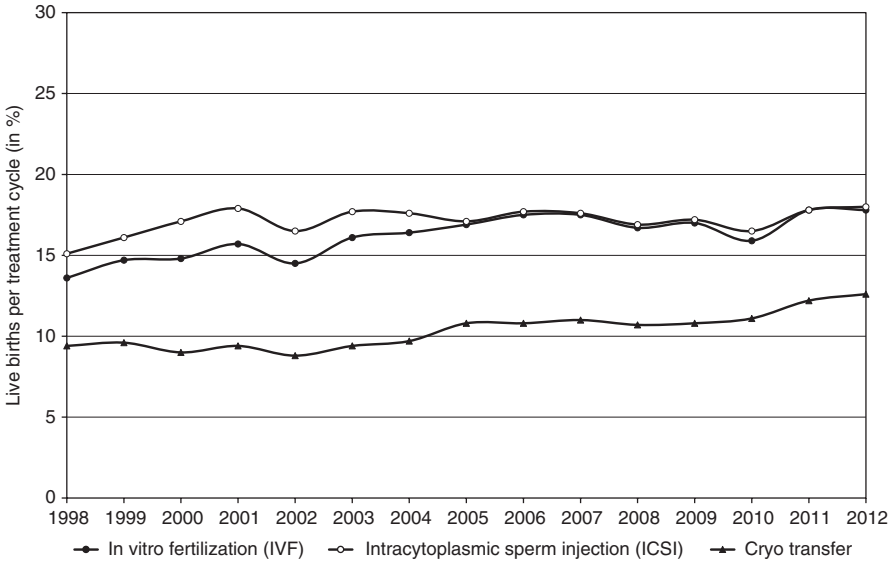

Fig. 13.3 The development of the baby take-home rate following ART in Germany, 1998–2012 (Source: DIR 1999–2014 (own calculations))

fertility treatment had been increasing rapidly and continuously during this time (DIR 2014: 28). Currently, the mean pregnancy rate after ART in Germany is only slightly below the European average, while the baby take-home rate corresponds to the European average.[19] Internationally, the further decline in the share of multiple pregnancies and deliveries and the reduction in the proportion of preterm births are considered signs of success, particularly among physicians of reproductive medicine (Wischmann 2012: 86). Due to improved medical and technical options, the use of ICSI and cryopreservation is increasing and the number of embryos transferred per cycle is declining, not only in Germany and across Europe, but also in other countries around the world (Revermann and Hüsing 2010).

The estimates of the rates of childlessness for bio-medical reasons vary widely for Germany. Revermann and Hüsing (2010: 18) have vaguely stated that between 0.5 and 1.5 million, or between three and 10 % of German couples, are involuntarily childless. Meanwhile, other scholars have estimated that between 1.2 and 1.5 million German couples are unable to conceive (Diedrich 2008). According to Sütterlin (2009: 1), every seventh German couple, or around 14 % of couples, experience involuntary childlessness. This value is closer to the figure mentioned by Michelmann (2008: 2), of between 10 and 15 % of all couples.[20] It should be noted, however, that

[19] Compared to Germany, the baby take-home rate is higher in the UK, Slovenia, Sweden, Norway, Iceland, and some formerly socialist countries (Revermann and Hüsing 2010: 96; Kupka et al. 2014: 2104).

[20] Beier et al. (2012) calculated based on a microsimulation model that the increase in the average age of women at first birth between 1985 and 2007 in West Germany contributed to an increase in involuntary childlessness from 3.5 % to 6.5 %.

all of these estimates of the extent of involuntary childlessness are based on data on the demand for ART, and are thus affected by the blurred lines between temporary and permanent childlessness. Given the lack of reliable data on involuntary childlessness, self-assessments by individuals of their own fecundity can be very informative. In the German Family Panel (pairfam), which covers certain birth cohorts (Huinink et al. 2011),[21] both the male and the female respondents had been asked whether it was possible for them and their partner to procreate by natural means. In the first wave (2008/09), between eight and nine per cent of women and men aged 35–39 replied that natural conception was probably or definitely not possible for them. Meanwhile, between 7 and 8 % of the respective partners of these respondents concurred with these assessments. Among the study participants who were 10 years younger, 3 % reported having fertility problems. Overall, it appears that the share of the German population who are concerned about their prospects for biological procreation is sizeable.

The question of whether – and, if so, to what extent – ART can contribute to a stabilisation or an increase in cohort fertility is difficult to answer. Based on complete fertility histories for Danish women, Sobotka et al. (2008: 95) estimated that for women of the birth cohort 1978 the net effect of ART is between 3 and 4 %. Among the factors which contribute to this relatively strong effect are easy access to ART treatments, public awareness of treatment options, increasing subfertility linked to the continued postponement of childbearing, and the relatively frequent use of ART among younger women and among mothers trying to have another child. At the same time, the authors expressed scepticism about suggestions that ART should be integrated into pronatalist policies, in part because they believe that promoting the illusion that fecundity is possible at higher reproductive ages could prove problematic.[22] Based on their analyses for West Germany, Beier et al. (2012) concluded that if the provision of ART continues at around current levels, the extent to which these treatments can compensate for the postponement of fertility will be negligible from a demographic perspective. Nevertheless, as the data on the temporal development of the baby take-home rate (Fig. 13.3) have shown, reproductive medicine can make an important contribution at the individual level by helping couples fulfil their desire to have a child. This is particularly relevant because involuntary childlessness is still a social taboo which can have grave psychological and mental implications for individuals (Hyatt 2012).

[21] This paper uses data from the German Family Panel pairfam, coordinated by Josef Brüderl, Karsten Hank, Johannes Huinink, Bernhard Nauck, Franz Neyer, and Sabine Walper. Pairfam is funded as long-term project by the German Research Foundation (DFG).

[22] This argument has also been put forward by Rainer et al. (2011), who emphasised that if ART was widely available, women might be tempted to postpone the births of their children until even later in the life course. This "behavioural effect" of postponement is likely to reduce the fertility rate in countries with high fertility in particular.

13.4 Discussion

"The declared ethos of reproductive medicine acknowledges the significance of the individual desire to have a child, and it affirms the right of couples to make their own procreation decisions" (Beier et al. 2012: 359 – own translation). Currently, the ability of German couples to make their own fertility treatment decisions is subject to legal restrictions, including prohibitions on the use of certain techniques, like egg cell donation, surrogacy, and reproductive cloning. However, in light of global changes in technologies and values, the debate about these legal obstacles may be expected to continue among experts and the public. Thus, in time, many of these restrictions will likely be challenged and overturned. A multifaceted societal debate is highly desirable, as it touches on fundamental aspects of the protection of human dignity, including questions about the beginning of human life and the essence of a life worth living. On the other hand, the freedom of individuals to make their own procreation decisions may be restricted in practice if access to ART services is limited. This is especially likely to be the case for economically disadvantaged population groups. ART has been relatively expensive in Germany particularly since the passage of the GMG in 2004, which substantially increased the co-payments for fertility treatments. Moreover, the legally and professionally defined criteria for access to reproductive medicine tend to exclude some social groups, including unmarried couples, same-sex couples, and singles. This tendency towards exclusion is attributable in part to the fact that the legal status of a sperm donor relative to any children conceived through his donation has not been fully clarified, particularly if the children are born out of wedlock. But the main reason certain social groups are excluded is the continued dominance of traditional cultural ideals of the family, which dictate that children should grow up in a home with two married biological parents (Herrmann-Green 2008). Groups who are not permitted to access ART services in Germany often have to seek out services in hospitals abroad.[23] The allocation of access to ART services in Germany privileges particular living arrangements, and is based on the cultural ideal of a "normal family" rooted in the interrelation of marriage and procreation. The more this family ideal comes under pressure due to on-going social changes, the more people will demand a liberalisation of access to reproductive medicine. Thus, the debate over access to assisted reproduction has the potential to challenge well-established attitudes about the family, and in so doing to unsettle deeply entrenched concepts about reproduction, motherhood, fatherhood, and kinship. The extent to which this actually occurs depends on the specific social conditions. In the case of Germany, it is interesting from a social science perspective to observe that social fatherhood and motherhood are still perceived differently by

[23] Worldwide, the rising demand for and the increasing shortage of egg cells has led to an international market in egg cells and fertility tourism. "The development of reproductive tourism is related to an extension of the supply as well as to the structural and economic inequities between countries and regions" (Berg 2008: 244 – own translation). Egg cell donation and surrogacy are aspects of the global commercialisation of the female body (Rudrappa 2012).

the legal system, with sperm donation by a third party donor being allowed while egg cell donation is prohibited.

Reproductive medicine is barely 40 years old, and is thus a young discipline which is still developing extremely rapidly. Not surprisingly, certain problems related to reproductive medicine remain unresolved. These problems often result from particular legal situations and corresponding value conflicts (Riedel 2008b). The unintended consequences of certain ART treatments did not become obvious until the first generation of children conceived by ART grew older. Now, however, it is generally recognised that allowing children to know their genetic origin is essential, not only for medical reasons, but also for reasons of personal identity. This presupposes that children will be told about their conception, that reproductive donations will not occur anonymously, and that the relevant data on donors will be stored and preserved in a central location. Revermann and Hüsing (2010: 228) have pointed out that the safety, the risks, and especially the consequences of ART over time have not been subjected to the same investigative rigour as the medical techniques. From an ethical standpoint, new courses of action always entail new responsibilities (Kreß 2013).

To evaluate the potential of ART, a broad societal debate about the opportunities and implications of these technologies is certainly needed. At present, the success rates of fertility treatments tend to be overstated, while the emotional strain of undergoing these treatments is often underestimated (Revermann and Hüsing 2010). The desire to have a child at any age cannot be fulfilled. Education and counselling should help to lower the barriers to seeking fertility treatment, and to alleviate widespread social biases regarding subfertility, particularly among men (Thorn 2008). In the future, topics like the "social freezing" of egg cells and new diagnostic options for preserving embryos may be expected to dominate the debate on the socially acceptable and desirable implications of ART. On the one hand, reproductive medicine can be seen as expression of a deeply rooted human desire to achieve emancipation from nature. But on the other, these technologies break taboos and call into question traditional ideas of what it means to be human (Rauprich and Siegel 2003).

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