Who can take advantage of medically assisted reproduction in Germany?

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Abstract

Compared with other European societies, access to medically assisted reproduction (MAR) in Germany is rather restrictive. Surprisingly little is known about the actual utilization of MAR in Germany and its social selectivity, primarily due to a lack of appropriate data. This article studies the use of MAR by drawing on 11 waves of the German Family Panel (pairfam), an annual survey that collects data on partnership and family dynamics in Germany. In estimating pooled logistic regression models that take into account whether or not MAR has been used, the following treatments were included: (i) in-vitro fertilization or micro-fertilization; (ii) intrauterine insemination; and (iii) any type of surgery performed to treat infertility. The highest odds of seeking medical help for infertility were found among married, childless couples who had a higher income, a strong desire to have children, a poor self-assessed health status, and who reported having problems conceiving a child prior to the year of the interview. Among these married couples, those with an above-average income were particularly likely to use MAR. These findings indicate that social selectivity in the uptake of MAR is based on economic resources and on the importance of marriage as the cultural ideal for a ‘normal family’.

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Introduction

In Germany, as in many other advanced societies, there is a steadily increasing trend in the age at which women have their first child. The average age of women at first birth has increased from 28.8 years in 2009 to 30.1 years in 2019, a development that is in line with a long-term trend, and has led to compression of women’s reproductive phase. Men’s age at women’s first birth has also increased to unprecedented levels, reaching 33.1 years in 2019 (Dudel and Klüsener, 2019; Statistisches Bundesamt, 2020). Moreover, the highest proportion of live births across the fertile lifespan of women occur between 30 and 34 years of age.
Female infertility is assumed to be highly age-dependent (Datta et al., 2016; Passet-Wittig et al., 2018). At the same time, and unlike in other developed countries, access to medically assisted reproduction (MAR) is somewhat restricted in Germany. The term 'MAR' refers to various interventions to treat different forms of fertility impairment and infertility, including all forms of assisted reproductive technology (ART), but also surgeries and different types of insemination (Zegers-Hochschild et al., 2017).

The utilization of and access to MAR in Germany are regulated in three main ways: through guidelines, legislation and insurance coverage (Präg and Mills, 2017: 295). These three regulatory mechanisms have established partially overlapping criteria for inclusion and exclusion that are discussed below. This article will also summarize the state of research and outline the empirical analysis. Until recently (2018), guidelines that were binding on all medical professionals granted access to MAR, and particularly to ART, primarily to married, mixed-sex couples, and, in exceptional cases, to consensual unions. Thus, same-sex couples and singles were excluded from access to MAR. This policy was based on advocacy for the child’s well-being (Bundesärztekammer, 2006) based on the claim that the child’s well-being is best protected within a marriage in which the parents are bound by legal obligations. In light of changing family forms and corresponding legal changes (such as the legalization of same-sex marriage in 2017), this rationale seems to be shifting.

In Germany, the legislation that regulates MAR is rigid and, in some ways, outdated. In 1991, the Embryo Protection Act [Embryonenschutzgesetz (ESchG)] was implemented (Gesetz zum Schutz von Embryonen, 1991). This law still provides the legal framework for the application of MAR by professionals in reproductive medicine. Under the ESchG, several procedures related to ART as well as a number of diagnostic options are considered illegal, such as egg cell donation, surrogate motherhood and elective single embryo transfer. Only the donation of sperm cells is not addressed in the ESchG. Moreover, the ESchG permits the donation of embryos provided that the assisted reproduction had not been undertaken for this purpose (Möller, 2013: 588).

The aim of this controversial prohibition of egg cell donation is to prevent the child from having identity problems, based on the assumption that the separation of the genetic and gestational components implies that there is ambiguity about the identity of the child’s mother. The decision to treat egg and sperm donation differently has been justified by the different types of interventions needed to obtain male and female gametes (Revermann and Hüsing, 2010: 200). From a social science perspective, this position is rooted in gender stereotypes, with ambiguity about the identity of the father being tolerated, whereas ambiguity about the identity of the mother appears to be considered unacceptable. Thus, due to restrictive legislation, women who are unable to conceive with their own egg cells, as well as male singles and male same-sex couples, are excluded from accessing MAR in Germany. This has led to a considerable number of individuals and couples from Germany seeking treatment abroad (i.e. ‘fertility tourism’) (Bergmann, 2011).

The third way that access to MAR is regulated is through health insurance coverage. More invasive treatments, such as in-vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI), are expensive. Currently, an IVF cycle costs up to €4000 and an ICSI cycle costs up to €5000 (Passet-Wittig et al., 2018: 3). The reimbursement of costs varies between private and statutory health insurance providers. In general, the relatively small proportion of women and men who have private health insurance (e.g. civil servants, self-employed) get full coverage for three treatment cycles. These treatments are provided based on the costs-by-cause principle, which implies that the insurance provider of the partner in the couple who is considered ‘responsible’ has to cover the full costs (Revermann and Hüsing, 2010).

For the vast majority of women and men who have statutory health insurance, co-payments have increased considerably since the healthcare reform in 2004, as only 50% of the treatment costs for a maximum of three treatment cycles are now reimbursed. For a couple to qualify for coverage, the partners must be married, the woman must be between 25 and 40 years old, and the man must be between 25 and 50 years old. In addition, only egg and sperm cells from the couple may be used. Before the treatment starts, the partners have to undergo mandatory counselling regarding the medical and psychosocial aspects of MAR with a physician who does not provide the treatment. Currently, 10 of 16 federal states provide a more generous level of coverage of fertility treatments for their residents by reducing co-payments. Moreover, some statutory health insurance providers have recently introduced financial support for MAR treatments for unmarried mixed-sex couples (Bundesministerium für Familie, Senioren, Frauen und Jugend, 2020).

Thus, in general, the criteria for reimbursement of the costs of MAR treatments favour economically privileged (married) mixed-sex couples of a certain age range. For some couples, their individual co-payments for MAR services depend to a large extent on their health insurance provider and their place of residence. While singles and same-sex couples face particularly high barriers to access MAR in Germany, it is possible that knowledge about fertility impairments has improved among mixed-sex couples, and the tendency for them to seek help for infertility has increased over time. In addition, some criteria for exclusion, such as being in a non-marital union, may have become less salient over time.

The results of a cross-national analysis on the use of MAR treatments and on the determinants of the likelihood of seeking help for infertility have indicated that these patterns differ depending on a country’s affluence, and on the regulation, insurance coverage and costs associated with MAR treatments (Präg and Mills, 2017). It has, for example, been shown that, among mixed-sex couples in the USA, both partners contribute to the process of seeking help for infertility and that different factors may be relevant in different stages of this process (Johnson and Johnson, 2009). In addition, there is evidence that among US women, the likelihood of seeking MAR treatment
depends on the woman’s own definition of infertility, and that seeking MAR treatment is only one potential behavioural response to infertility that is embedded in a variety of medical and non-medical health-seeking resources (Greil et al., 2020). To date, few studies have focused on the sociodemographic composition of the women and men who use MAR or ART. A recent study based on Norwegian register data found that parents who conceive through ART tend to be married and older, and to have the highest levels of income and education. Thus, these results suggest that, even in a country where access to ART services is highly subsidized, there are large and persisting inequities in the use of ART (Goisis et al., 2020). However, as the study focused on live births, it did not consider those individuals with fertility impairments who wanted to have children, and who may have used ART but were not successful in conceiving. In a cross-national comparison, the impact of socio-economic status on the likelihood of seeking help for infertility was found to depend on the extent to which the treatments are subsidized by the state. Access to treatment is particularly limited in the USA because health care is based on a market model, infertility treatment is expensive, and most states do not mandate insurance coverage (Greil et al., 2011: 738). In the USA, women and couples of lower socio-economic status in all racial groups tend to face financial barriers to treatment. In addition, for various reasons, members of racial and ethnic minority groups are less likely than whites to seek treatment. Other factors that are associated with a higher likelihood of seeking medical treatment include never being diagnosed with a clinical pregnancy (primary infertility), being older, being formally married, and self-identifying as someone who has a fertility problem (Chandra and Stephen, 2010: 725; Shreffler et al., 2017: 651–652).

Currently, little is known about the actual utilization of MAR in Germany or about its social selectivity. The main reason why knowledge of these issues is still rather limited is that hardly any data are available that could be used to study these patterns (Kuhnt et al., 2018). In Germany, the demand for MAR is largely assessed by relying on data from the German IVF registry. This database is somewhat limited because it includes those individuals who are seeking medical assistance related to ART, but not all individuals who have experienced fertility problems. While the registry has collected data on extracorporeal fertilization (IVF, ICSI, cryotransfer) since 1998, it has only included data on treatments with donor sperm since 2018. The registry also lacks information on the sociodemographic characteristics of the treated individuals except for age. According to the most recent data in the IVF registry (2019), the mean age of women seeking fertility treatment is 35.5 years, while the mean age of men is 38.9 years (Deutsches IVF-Register, 2020: 224). The estimated prevalence of infertility in Europe is between 7% and 9% (Bundesa¨rztekammer, 2018: A5). In an analysis of data for two German birth cohorts in 2012 and 2013, Passet-Wittig et al. (2016: 83) reported that 7.5% of women and 6.5% of men were experiencing infertility. According to international findings, only approximately 50% of women and men with fertility problems seek any type of medical assistance (Boivin et al., 2007; Datta et al., 2016). These results underline the importance of disentangling the factors that assist and prevent individuals from seeking help for infertility and, particularly, from using MAR.

In light of the ongoing tendency to postpone family formation and the rather restricted access to MAR, this article contributes to the theme of this special issue by elucidating some of the social inequalities in access to MAR in an affluent society. Specifically, it asks the following questions: Who can take advantage of MAR under the current circumstances? Is there a pattern of cumulative disadvantage or of scattered disadvantage in access to MAR among different social groups?

In line with previous research, it was expected that the results would show that a combination of factors promotes the use of MAR in Germany. These factors include being married, being older, having a solid financial background, being highly educated and, in turn, being better informed about the available options.

Materials and methods

This study is based on data from the German Family Panel ‘pairfam’ (Panel Analysis of Intimate Relationships and Family Dynamics), a multidisciplinary, longitudinal study of partnership and family dynamics in Germany (Bruderl et al., 2020; Huinink et al., 2011). The German Family Panel is an annual survey that includes respondents from the birth cohorts 1971–1973, 1981–1983 and 1991–1993. The first survey wave was collected in 2008–2009, and the most recent wave available was collected in 2018–2019. In 2009–2010, an oversample of Eastern German respondents was added to the data (Kreyenfeld et al., 2012). One of the exceptional features of this survey is that it collects detailed fertility histories. It is also one of the few scientific surveys in Germany that provides data which are suitable for studying the use of assisted reproduction, as it collects information on the utilization of MAR, as well as on the respondents’ fertility histories, fertility intentions and self-assessed infertility. Moreover, these data are available for the respondent and his/her partner. Data from Wave 1 (2008–2009) to Wave 11 (2018–2019) have been pooled for this analysis. Accordingly, the respondents have provided up to 11 years of data points.

This investigation was restricted to respondents and their partners aged ≥ 25 years who had tried to become pregnant since the last interview or who were currently pregnant. The respondents had to be in a relationship but they could live separately from their partner. We mainly used information from the anchor, who also contributed information about his/her partner. As the number of same-sex couples surveyed was extremely low, mixed-sex couples alone were included in this study. In total, 1446 subjects were observed over 4541 person-years in the analytical sample. They reported 255 MAR events. The majority of these respondents underwent one MAR procedure (64% of all users of MAR), while almost one-quarter (21%) reported having two procedures and 15% reported undergoing three or more procedures. The maxi-
mum number of MAR procedures reported by a respondent was seven.

A change in the survey mode needs to be highlighted. Up to Wave 6, information on the use of MAR was collected only for couples with positive fertility intentions in which one of the partners reported having difficulties conceiving, or for all couples who were expecting a child at the time of the survey. Since Wave 7, all respondents who had tried to have a child or were expecting a child have been asked whether they used MAR, regardless of their infertility status.

The use of MAR over the course of the observation period was measured with the following annual question: ‘Have you or your partner used any of the following methods to induce a pregnancy since the last interview? Please indicate all methods used’. Out of a variety of potential methods, the following (more invasive) treatments were considered as MAR in the analyses: IVF or micro-fertilization (ICSI), intrauterine insemination (IUI) and any type of surgery performed to treat infertility. If the respondents reported undergoing more than one MAR procedure in an observation spell, the method considered to be the last treatment within the whole MAR process was used, starting with surgery, then moving on to IUI, and ending with IVF/ICSI.

Pooled logistic regression models that measured whether or not respondents used MAR in a given year were estimated. This method was chosen because we were more interested in obtaining population-averaged coefficients than subject-specific coefficients. As a sensitivity check, Generalized Estimating Equations models were also run, and these yielded very similar results (not shown). For reasons of simplicity, the results of the more common logistic regressions have been presented. Cluster robust standard errors were applied to account for the correlation in the error terms related to the clustering of repeated observations per respondent. A sensitivity analysis was conducted to account for the change in survey mode between Wave 6 and Wave 7. By estimating the models across all waves up to Wave 6, and from Wave 7 to Wave 11, the results remained stable (not shown).

The main explanatory variables that govern the respondents’ access to MAR were assumed to be the couples’ level of education, based on the highest vocational degree of the respondent and of the partner (both no degree, both vocational degree, both university degree, her degree is lower than his, his degree is lower than hers); income (monthly net household income); and union status (married, cohabiting, or together but living apart). This study also controlled for characteristics that are known to have an impact on access to MAR: age (categorical), gender, region (federal states that provide additional financial support for fertility treatments by reducing co-payments versus federal states that do not), migration background, number of biological children, subjective health during the last 4 weeks, self-assessed importance of having a(nother) child, and self-perceived ability to procreate. To measure the individual desire to have children, the respondents were asked at each wave to distribute 15 points among five life goals according to the importance they currently place on them. Of those five items, the item ‘having a(nother) child’ was selected. The scale was recoded to a value range between zero and 10. The self-perceived ability to procreate includes information provided by the anchor about his/her fertility status, and his/her assessment of the fertility status of his/her partner. It also includes direct information from the partner, if available, using the partner dataset. To avoid problems of reverse causation and to ensure that the temporal order of events is accurate, all time-varying covariates were lagged by 1 year: i.e. couples’ level of education, income, union status, age, federal state, number of children, health status, self-assessed importance of children and self-perceived fertility status. Therefore, individuals who contributed observations in a single year were excluded from the sample. The analyses controlled for information on the panel wave.

In estimating nested models, groups of variables were included in a stepwise manner to detect any changes in the coefficients. Model 1 controlled for education and wave. In Model 2, income and marital status were added. In Model 3, variables on the sociodemographic and health characteristics of the respondents were introduced. The infertility status of the couple was added in Model 4 to control for any moderating impact on the association between the explanatory variables. In addition, an interaction between the key determinants of net household income and marital status was included. As infertility is such an important factor for predicting the use of MAR, a separate model for couples who reported having fertility problems was estimated (see Appendix).

Results

Of the respondents in the sample who said that they had tried to become pregnant since the last interview or who were currently pregnant, 87% did not report having any fertility problems and 13% reported that they had experienced fertility problems. Of the couples who reported being fertile, 3.4% said that they had used MAR. A closer inspection of the data revealed that the use of MAR among this group increased toward the end of the reproductive phase (not shown). Among the couples in which at least one partner perceived that they were having difficulties conceiving a child, the proportion who were using MAR increased to 33.2%. Across all of the couples, the utilization rate of MAR was 7.6%. The proportion of fertile couples who reported using MAR increased slightly between Waves 7 and 10. However, the general pattern remained stable despite the change in the survey mode (Table 1).

Type of support or treatment

Among those couples who used any methods to induce a pregnancy, the types of support or treatments that were specified by the respondents were identified (Fig. 1). More than 60% of all couples used non-invasive methods to improve their chances of successful conception or initiation of pregnancy. These methods included calculating the woman’s ovulation date or use of medication (information on the type of medication is not available). Among the more invasive techniques used, IVF or ICSI were mentioned most
frequently (26%). Only a minority of the couples underwent IUI (9%) or surgery (2%). In accordance with the official consensus (Zegers-Hochschild et al., 2017), IVF, ICSI, IUI and surgery were considered as MAR in the subsequent analyses. These treatment types require couples to seek medical help, and they are the most costly but also the most successful interventions for treating different forms of fertility impairment and infertility. Medication alone is often utilized in the early stages of infertility treatment or as a method flanking other, more invasive measures. Overall, the methods classified as MAR accounted for approximately one-third of all treatments.

Sociodemographic composition

A first descriptive overview of the sociodemographic characteristics of the couples who were already pregnant or wanted to have children suggests that there is social selectivity in the use of MAR in Germany (Fig. 2). Of the respondents who used MAR, the majority were female (64%), while almost three-quarters had an above-average income (73%). Among the non-users of MAR, 57% had an above-average income. Compared with non-users of MAR, MAR users were more likely to be married (77% versus 67%) and childless (79% versus 53%), they rated their subjective health less favourably (23% versus 10%), and they were much more likely to report fertility problems (52% versus 10%). More than 50% of MAR users, compared with 38% of non-users, emphasized the importance of having children. Education was not found to be a strong indicator of differences in the uptake of MAR (both partners had a university degree in 32% of the couples who used MAR versus 27% of the couples who were non-users of MAR).

Another distinctive characteristic was the average age of the respondents. The mean age of the non-users of MAR was 34.58 years [95% confidence interval (CI) 34.56–34.59], while the mean age of MAR users was 36.99 years (95% CI 36.93–37.05). The age distribution follows a reverse u-shaped function and is clearly left-skewed for the MAR users (Fig. 3).

### Table 1: Self-assessed ability/inability to procreate and the proportion of couples using medically assisted reproduction in percent (n\_person-years = 4541).

|                | Fertile | At least one partner infertile | Total |
|----------------|---------|-------------------------------|-------|
| No MAR         | 96.6    | 66.8                          | 92.4  |
| MAR            | 3.4     | 33.2                          | 7.6   |

Source: German Family Panel – Waves 1–11, own estimations, data were weighted using a design weight (Brüderl et al., 2011).

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**Fig. 1** Type of support/treatment (if any) in percent (n\_person-years = 757). Source: German Family Panel – Waves 1–11, own estimations, data were weighted using a design weight (Brüderl et al., 2011).
Results of the pooled logistic regression analyses

The results of the logistic regression analyses are presented in Table 2, with an emphasis on the main explanatory variables that focus on the impact of education, income and marital status on the use of MAR. Regression results are provided as relative odds, with asterisks indicating the level of significance.

Fig. 2  Sociodemographic background of non-users and users of medically assisted reproduction (MAR) \((n_{\text{person-years}} = 4541)\). Source: German Family Panel — Waves 1—11, own estimations, data were weighted using a design weight (Bruederl et al., 2011).

Fig. 3  Age distribution of non-users and users of medically assisted reproduction (MAR) \((n_{\text{person-years}} = 4541)\). Source: German Family Panel — Waves 1—11, own estimations, data were weighted using a design weight (Bruederl et al., 2011).
Education, income and marital status

In line with the bivariate analysis, education was found to have a weak effect on the odds of using MAR. Although it might be assumed that more highly educated couples had better knowledge of the available options, this study did not find any clear evidence that this influenced their likelihood of seeking medical help. While the respondents without a vocational degree had somewhat lower odds of using MAR, this effect became insignificant after accounting for their sociodemographic characteristics in Model 3. It appears that the educational differences were largely due to the different age compositions of lower and higher educated respondents. Of greater relevance was the economic position of the household. The odds of using MAR increased sharply with the available monthly income. Given that, in Germany, insurance typically covers the costs of three treatment cycles, the couples who were better off were less likely than the economically less privileged couples to have limited options for using MAR due to financial constraints. Another decisive factor in the chances of using MAR was the marital status of the couple, because, under the legal guidelines and the insurance coverage rules, access to MAR was primarily granted to married couples. These restrictions were reflected in the low odds of using MAR among non-married couples. Compared with married couples, cohabiting couples were 40% less likely to use MAR, and partners who were living in separate households were even less likely to use MAR. The effect of marital status remained stable even after controlling for other sociodemographic variables or the fertility status of the couple (Models 3 and 4).

Sociodemographic background

Utilization of MAR was also governed by the sociodemographic characteristics of the respondents. Unsurprisingly, the odds of using MAR increased with age, as well as among the childless respondents. As illustrated by the descriptive findings, a u-shaped age pattern was found, whereby the odds were highest between 35 and 39 years of age, and decreased after 40 years of age. Women were

Table 2  Pooled logistic regression model (odds ratios with robust standard errors), 1 = medically assisted reproduction (MAR), 0 = no MAR (1446 subjects over 4541 person-years, 255 events).

|                                    | Model 1   | Model 2   | Model 3   | Model 4   |
|------------------------------------|-----------|-----------|-----------|-----------|
| Couple’s level of education (ref. both vocational degree) |           |           |           |           |
| Both no degree                      | 0.27**    | 0.38*     | 0.45      | 0.48      |
| Both university degree              | 1.04      | 0.83      | 0.94      | 0.96      |
| Her degree lower than his           | 0.77      | 0.72      | 0.76      | 0.63*     |
| His degree lower than hers          | 0.87      | 0.87      | 0.92      | 0.83      |
| Household net income (€) (ref. < 2100) |           |           |           |           |
| 2100–2999                          | 1.90**    | 1.65*     | 1.93**    |           |
| 3000–3899                          | 2.29***   | 1.59      | 1.92**    |           |
| >3900                              | 2.60***   | 1.74*     | 2.07**    |           |
| Marital status (ref. married)       |           |           |           |           |
| Together but living apart           | 0.28**    | 0.17***   | 0.30**    |           |
| Cohabiting                          | 0.56**    | 0.44***   | 0.60**    |           |
| Age (years) (ref. 25–29)            |           |           |           |           |
| 30–34                              | 1.24      |           | 1.11      |           |
| 35–39                              | 3.12***   |           | 2.12***   |           |
| ≥40                                | 3.30***   |           | 1.99      |           |
| Female (ref. male)                  |           |           |           |           |
| 1.51**                             | 1.50*     |           |           |           |
| Federal states with additional support (ref. no support) | 1.06 | 0.91 |
| Migration background (ref. no migration background) | 0.84 | 0.85 |
| Number of children (ref. childless) |           |           |           |           |
| 1                                 | 0.20***   |           | 0.26***   |           |
| ≥2                                 | 0.21***   |           | 0.28***   |           |
| Importance of having children (scale 0–10) | 1.27*** | 1.33*** |
| Poor subjective health (ref. at least satisfactory) | 1.87*** | 1.50* |
| Infertile (ref. fertile)            |           |           |           |           |
| Constant                           | 0.05***   | 0.04***   | 0.02***   | 0.01***   |
| Pseudo R2                          | 0.03      | 0.05      | 0.15      | 0.26      |
| Wald v2                            | 46.28     | 68.19     | 170.74    | 342.68    |

Significance: $P \leq 0.1$ (*), $P \leq 0.05$ (**), $P \leq 0.01$ (***)

Source: German Family Panel – Waves 1–11, controlled for missing values.
more likely than men to report that they were using MAR. This gender gap is attributed to the stronger age dependence of women’s fertility, and to differential reporting within couples that may be related to men experiencing more shame about having to rely on MAR (Wischmann and Thorn, 2013). Whether or not the respondents were living in a federal state that covered additional payments for MAR, and whether or not they had a migration background were not found to be significantly associated with the use of MAR. Among the respondents who said that they highly value having children, the odds of using MAR were significantly higher compared with the respondents who reported that they do not value having children as strongly, which indicates that there was self-selection in line with the respondents’ preferences. Thus, it may be assumed that the couples were more likely to seek medical care and to undertake costly invasive medical procedures if the perceived benefits outweighed the costs.

Medical background
A poor subjective health status reported in the year prior to treatment increased the respondents’ odds of using MAR by 50% compared with the respondents who reported a health status that was at least satisfactory. The most important factor associated with the utilization of MAR was, unsurprisingly, the awareness of fertility impairments (Model 4). The respondents who reported perceiving themselves or their partner as having fertility problems had approximately 10 times higher odds of using MAR compared with those who did not. As the perception of one’s procreative ability seems to be a highly influential predictor of the use of MAR, separate models were estimated solely for those couples who reported having fertility problems (Table A.1, Appendix). The results mirror those of the full model. Only age became insignificant, as the awareness of fertility impairments became more common with increasing age.

Results from model with interaction terms
To better understand the relative importance of economic resources and marital status for the use of MAR, the full logistic regression model was re-estimated while including an interaction between net household income and marital status. The results are displayed as predicted probabilities (Fig. 4). Based on the median monthly net household income, those with less than €3000 and those with €3000 or more are distinguished. The findings show that it was not marital status per se that had a positive impact on the use of MAR. Married and unmarried couples did not differ significantly if they had an above-average income. Only unmarried couples with a below-average income had significantly lower odds of using MAR. Among married couples, those with an above-average income had the highest odds of using MAR, although this was not significantly different from that of married couples with a lower income.

Discussion
These findings reveal strong social selectivity in the utilization of MAR in Germany. The odds of using MAR were found to be highest for married, childless couples with a higher income and a poor self-assessed health status. Among these married couples, those with an above-average income were
particularly likely to use MAR. Being older and placing high value on having children were also associated with increased likelihood of seeking medical help for infertility. In line with expectations, the findings reflect a pattern of cumulative disadvantage: younger couples with a less solid financial background, particularly those who were not married, appeared to have faced barriers to the use of MAR because of restrictive guidelines, corresponding legislation and limited insurance coverage.

In light of the ongoing tendency to postpone family formation, the age of the parents — especially the mother — becomes an exceptionally relevant factor, as the likelihood of requiring medical assistance to procreate increases with age. Compared with younger couples, middle-aged couples are more restricted by the time they have left to realize their desire to have a child. Indeed, the findings indicate that the odds of seeking medical help for infertility were elevated among couples from their mid-30s onward.

Contrary to the expectation of an educational effect for couples with higher degrees that was driven by their selective knowledge of available methods, funding, access to MAR and more conscientious health-related behaviour, no evidence of differential use by education was found. It was only among the couples who perceived that they were unable to procreate that those with no vocational degree seemed to be disadvantaged compared with those with more education. This finding suggests that this group might need more access to information provided by health professionals and others. Probably due to increased media attention, members of the younger cohorts generally seemed to be well informed about the options available to them. As has been found in other studies (Goisis et al., 2020), there may still be a correlation between education and births in relation to MAR. Highly educated couples might simply have the resources to continue treatment for as long as needed to conceive a child.

A strong association was found between the respondents’ subjective health status in the year prior to observation and their current uptake of MAR, which indicates that having a poor health status increased the odds of using MAR. This finding needs to be interpreted with caution because the possibility of reverse causation cannot be ruled out completely. As expected, the couples who perceived themselves as having difficulties procreating were found to be much more likely to seek medical help compared with couples who did not. Self-assessed infertility was shown to have the strongest impact on the likelihood of using MAR, in line with findings from the USA (Shreffler et al., 2017). This seemingly obvious result should be seen in the context of recent research which has shown that the self-assessed inability to procreate is not stable over the life course, but varies with age, partner’s perception, contraceptive use and other factors (Passet-Wittig et al., 2020). Moreover, even after accounting for the perception of the inability to procreate, there were additional effects of social determinants such as age, income and marital status. Future research should investigate whether underlying causes, such as health limitations, affect both the likelihood of reporting a poor health status and the perceived ability to procreate. Another question that warrants more research with appropriate longitudinal data is which individuals actually succeed in having a live birth due to MAR, while broadening the investigation to the psychological, social and economic resources facilitating ‘reproductive success’.

Taken together, these findings suggest that social selectivity in the uptake of MAR among the mixed-sex couples in Germany included in this study was largely based on economic resources and on the importance of marriage as the cultural ideal of a ‘normal family’. Thus, it appears that there are economic barriers that could be alleviated by social policies. Currently, more and more federal states in Germany are reducing the co-payments for MAR treatments. This policy could be implemented across the whole country. Even more effective in terms of reducing social inequities would be adjustment of the co-payments depending on the couples’ economic resources. Until recently, medical guidelines and insurance regulations that solely favoured married couples having access to MAR were rooted in the cultural idea of linking children’s welfare to both biological and married parents (Herrmann-Green, 2008), and thus supported the social reproduction of a rather traditional family model. However, changing living arrangements and family forms, as well as related legal changes, are increasingly putting those restrictions under pressure. Thus, it is likely that access to MAR will not be as strongly linked to particular family forms in the future.

Due to the survey design of pairfam, a limitation of this study was the focus on respondents of three birth cohorts, which does not enable conclusions to be drawn for the whole cross-section of the population of reproductive age. Another more severe constraint is that, due to low case numbers, same-sex couples and singles had to be excluded from these analyses, and these social groups are likely to face higher and different barriers to gaining access to MAR. More suitable data should be collected to investigate the use of MAR among these groups.

In 2017, marriage for same-sex couples was fully legalized in Germany, which puts additional pressure on policymakers to liberalize access to MAR (Wapler, 2018). To date, acceptance of the freedom of procreation has been restricted by the definition of criteria for access to MAR. In the future, this principle will be increasingly challenged by ideas of reproductive justice (Barnes and Fledderjohann, 2020). A prime example of reproductive injustice is the differential legal treatment of social fatherhood and social motherhood in the context of MAR in Germany, as sperm donation by a third-party donor is allowed but egg cell donation is not. As well as meritng more research attention, this issue is likely to increase social tensions, and should therefore be seen as a social policy concern.

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Appendix. See Table A.1.

Table A.1  Pooled logistic regression model (odds ratios with robust standard errors), only infertile couples, 1 = medically assisted reproduction (MAR), 0 = no MAR (261 subjects over 583 person-years, 163 events).

|                          | Model 1       | Model 2       | Model 3       |
|--------------------------|---------------|---------------|---------------|
| Couple’s level of education (ref. both vocational degree) |               |               |               |
| Both no degree           | 0.20**        | 0.25**        | 0.31**        |
| Both university degree   | 1.27          | 0.93          | 0.89          |
| Her degree lower than his| 0.86          | 0.78          | 0.71          |
| His degree lower than hers| 1.19          | 1.13          | 1.15          |
| Household net income (€) (ref. <2100) |               |               |               |
| 2100–2999                | 1.95*         | 1.98*         |               |
| 3000–3899                | 2.74***       | 2.61**        |               |
| >3900                    | 3.02***       | 3.31***       |               |
| Marital status (ref. married) |               |               |               |
| Together but living apart| 0.51          | 0.32          |               |
| Cohabiting               | 0.7           | 0.50*         |               |
| Age (years) (ref. 25–29) |               |               |               |
| 30–34                    | 0.67          |               |               |
| 35–39                    | 0.97          |               |               |
| ≥40                      | 1.05          |               |               |
| Female (ref. male)       |               |               |               |
| Federal states with additional support (ref. no support) |           |               |               |
| Migration background (ref. no migration background) |           |               | 0.79          |
| Number of children (ref. childless) |           |               |               |
| 1                        |               |               | 0.26***       |
| ≥2                      |               |               | 0.57          |
| Poor subjective health (ref. at least satisfactory) |           |               | 1.76**        |
| Importance of having children (scale 0–10) |           |               | 1.60***       |
| Constant                 | 0.41***       | 0.24***       | 0.07***       |
| Pseudo R2                | 0.02          | 0.05          | 0.15          |
| Wald v2                  | 14.94         | 26.26         | 92.89         |

Significance: \( P \leq 0.1 \) (*), \( P \leq 0.05 \) (**), \( P \leq 0.01 \) (**

Source: German Family Panel – Waves 1–11, controlled for missing values.

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