Infertility and seeking medical help to have a child vary across migrant origin groups in Germany

Milewski, Nadja; Passet-Wittig, Jasmin; Bujard, Martin

Veröffentlichungsversion / Published Version
Arbeitspapier / working paper

BiB WORKING PAPER 02|2024

Infertility and seeking medical help to have a child vary across migrant origin groups in Germany

Nadja Milewski, Jasmin Passet-Wittig, Martin Bujard

BiB Bundesinstitut für Bevölkerungsforschung

BiB Working paper

Infertility and seeking medical help to have a child vary across migrant origin groups in Germany

Nadja Milewski*, Jasmin Passet-Wittig, Martin Bujard

Abstract

This study investigates the extent to which immigrants are faced with infertility and their utilization of reproductive health-care services in Germany. Previous research on migrant fertility centered mostly on the higher fertility rates of immigrants and their adaptation processes, but has largely neglected infertility. In contrast, research on infertility in the European low-fertility context focused almost exclusively on non-migrant populations. Our paper aims to serve as a bridge between these two crucial, yet distinct research areas of current demographic developments. We derived theoretical considerations from frameworks of fertility and health of migrants and minority groups. Using waves of German panel data (pairfam), we applied pooled panel regression analyses with self-perceived infertility and having used medical assisted reproduction services as dependent variables. Generally, the results indicate higher infertility and lower seeking of medical help among migrants as compared to non-migrants. However, there is substantial heterogeneity between different migrant groups: First-generation migrants show higher risks of infertility and lower usage of medical help to get pregnant. The study also indicates variation across (parents') regions of origin: women and men from Russia, Central Asia, and the Middle East (including Turkey) have an increased risk of self-perceived infertility or uncertainty about it than other migrant origin groups. Those from Russia and Central Asia have the lowest usage of medical help-seeking. These results suggest that selected immigrant groups – despite their on average rather higher number of children – face remarkable reproductive disadvantages, which deserves further attention in research on migrant fertility and assisted reproduction in general.

Keywords

Infertility, Subfecundity, Migration, Medically assisted reproduction (MAR), Assisted reproductive technology (ART), Reproductive health, Stratified reproduction, Germany

1 Introduction

This study investigates heterogeneity in infertility perceptions and help-seeking behavior by comparing immigrants with the native non-migrant population in Germany. We aim to contribute to distinct strands of current European demographic research. There is growing interest in infertility (Carson & Kallen 2021; Lazzari et al. 2021; McQuillan et al. 2022), seeking medical help to get pregnant (Greil et al. 2010; Domar et al., 2012; Passet-Wittig & Greil 2021), and the rapidly growing sector of reproductive medicine (Aleixandre-Benavent et al. 2015; Adamson et al. 2018; Crawford and Ledger 2019) in the Global North. This is because this region is characterized by fertility postponement, and higher age is one of the most important non-modifiable risk factors for infertility (Dunson et al. 2002; Evers 2002). However, previous quantitative studies have rarely included immigrant or ethnic minorities in Europe (Passet-Wittig & Greil 2021), which is remarkable, since the share of migrants and their birth numbers are significant and increasing across Europe (Sobotka 2008; Bagavos 2019).

Therefore, we argue that infertility is an important aspect to consider in research on migrant populations, because it has implications for their life course and family structure, but also for different demographic developments of social groups. In addition, knowledge on how *in*fertility varies across different migrant groups can provide important insights into the processes of adaptation also within migrant populations, by looking at, for example gender, migrant generation, or origin group (Wilson 2019). Previous quantitative studies on migrant fertility in Europe mostly investigated the fertility adaptation processes of immigrants from high(er)-fertility contexts. They generally found that fertility levels in immigrant groups are on average higher than those of natives and that they decline in the subsequent generations (Kulu et al. 2019; Milewski 2010). The perceived "hyper-fertility" of at least some immigrant groups may have contributed to migration researchers neglecting fertility barriers in immigrant groups (Inhorn & van Balen 2002; Atkin 2009; Haug & Milewski 2018). Yet, the composition of migrant groups in Europe is changing, i.e., they originate more frequently from countries with low and late fertility in Eastern Europe and Latin America (González-Ferrer et al. 2017) or they come from countries with rapidly changing fertility patterns, e.g. Turkey (Baykara-Krumme & Milewski 2017). Recently, migrant groups, such as refugees, gained attention (Saarela & Wilson 2022). These works suggest decreasing fertility in particularly vulnerable groups – yet, it is an open question what role infertility plays. Thus, our study complements migrant fertility research by looking at *in*fertility and the seeking of medical help to have a child.

Better knowledge about infertility among migrant populations also provides important information about the well-being and health status and access to reproductive healthcare of these populations. Previous empirical results on various aspects of migrant health produced mixed results and suggest

that selection processes accompanying emigration, i.e. the healthy migrant effect, and selection of remigration, i.e., salmon bias effect, play a role (Razum et al. 2000). Comparatively few demographic studies looked into perinatal health or birth outcomes in migrant populations (Juarez et al. 2018; Väisänen et al. 2022; Milewski & Peters 2014). Only recently, attempts have been made to consider the role of women's health in migrant fertility studies (Alderotti & Trappolini 2022), or include migrant status in analyses of infertility perceptions (Passet-Wittig et al. 2020) and medical help-seeking for infertility (Köppen et al. 2021). Despite these few exceptions, research on migrant infertility care in Europe is rare. It comprises qualitative studies, mostly patient samples drawn from clients using reproductive-healthcare services (Culley et al. 2009a) – yet, it is not clear whether the prevalence of infertility and of seeking medical help to have a child is similar to that of majority populations and how much variation exists across different migrant groupings in Europe.

In the US, Colen (1986) coined the term *stratified reproduction* to describe how reproduction is structured across social and cultural boundaries. What she meant is that policies and structures empower privileged – White, non-migrant women belonging to the majority group – and disempower less privileged – migrant – women throughout their life courses. The field of medically assisted reproduction (MAR) is stratified because barriers based on class and race/ethnicity persist (Inhorn 2018). Recent systematic literature reviews on reproductive endocrinology and infertility analyzed only studies in the US (Jackson-Bey et al. 2021; Christ et al. 2022; Merkison et al. 2023); they predominantly point to ethnic and racial minority groups being disadvantaged in reproductive care and access to infertility treatment. It is unclear whether such findings can be generalized to a European context, given differences in immigrant and ethnic minority populations and health-care systems (Präg & Mills 2017; Calhaz-Jorge et al. 2020; Passet-Wittig & Bujard 2021).

Against this backdrop, we pose the following research questions: First, what are the patterns and determinants of infertility in migrant groups in Germany? Second, what are their patterns and correlates of using medically assisted reproduction? For both questions, we compare migrants to the non-migrant majority population as well as to different migrant groups. For the latter, we pay special attention to the role of migrant generation and the migrants' region of origin.

Our study pools data of 12 waves of the German family panel study pairfam (Huinink et al. 2011) to investigate self-perceived infertility of individuals (if single) or couples. Importantly, we include uncertainty in answering behavior, i.e., the answer category of "I don't know" to account for the sensitivity of the infertility question and cultural differences in answering behavior. We go beyond existing research by studying self-perceived infertility and help-seeking behavior in the same sample. Therefore, we can relate the potential need to the usage of MAR. This allows us to draw conclusions

to what extent differences in medical help-seeking between migrants and non-migrants may be related to different needs and/or to, e.g. institutional barriers (Jackson-Bey et al. 2021).

2 Background

2.1 Country context

Germany makes an interesting case for this study of infertility and help-seeking due to the increasing multi-ethnicity of its population. Germany has been one of the main destinations for migrants in Western Europe for several decades. Since the end of World War II in 1945, immigrants came to Germany for various reasons and from a variety of regions of origin. Immigrant groups include, among others, work-related migrants from southern European countries and Turkey since the 1960s, and since the 1990s, increasingly from eastern and south-eastern European countries. In addition, immigrant groups include ethnic Germans mainly from Eastern Europe (e.g., from former Soviet countries) and refugees from the Balkan countries (following the wars in the former Yugoslavia), Iraq or Syria. The proportion of immigrants, including their descendants, has been rising steadily and made up 26% of the population in 2020 (Destatis 2022), and is even higher for the younger cohorts.

Another reason to make Germany a good case study is its long-standing low fertility rate and strongly increased mean age of childbearing. Although there has been a slight increase in the total fertility rate (TFR) in recent years (Bujard & Andersson 2024), it still remains well below the population replacement level of 2.1 births per woman. Moreover, with more than 20%, Germany has a high rate of childlessness, and similar to other countries in the Global North, the reasons for this are far from being fully understood. One of the reasons lies in the increasing age at which women are having children, which is a crucial risk factor for age-related infertility (Dunson et al. 2002; Evers 2002). According to the medical definition, people are identified as infertile after one year or more of regular unprotected intercourse without getting pregnant (Zegers-Hochschild et al. 2017).

Overall, the prevalence of self-perceived infertility in Germany is currently estimated around 5 to 6% for both men and women. It increases with age, reflecting the age-related increase in biological problems procreating (Passet-Wittig et al. 2020). MAR is a growing health-care sector in Germany and broadly available (DIR 2021), but treatment rates are relatively low compared to other European countries (Präg & Mills 2017; De Geyter et al. 2020). One reason for this could be that access to treatment is rather restrictive and not very inclusive. At present, public health-care insurance reimburses only married heterosexual couples and typically covers 50% of treatment costs for a

maximum of three IVF (in-vitro fertilization) cycles. As a result, the use and timing of MAR strongly depends on the economic situation of the person or the couple (Köppen et al. 2021; Passet-Wittig 2017).

2.2 Migrants, ethnic diversity, and infertility

In Germany, just as in other European countries, the heterogeneity of populations has increased as a result of continuing and changing immigration, and differential demographic behavior of immigrants and majority populations. For a while, scholars have acknowledged that migrants are very heterogeneous – which was labelled as "super diversity" (Vertovec 2007). The notion of within-migrant heterogeneity is receiving increasing attention in research on demographic behavior of migrants, such as research on fertility (Wilson 2019; Erman 2022; Milewski & Adserà 2023) and research on reproductive health (Väisänen et al. 2022). Acknowledging this heterogeneity helps to overcome a binary, simplistic distinction between immigrants and non-migrant natives. Crucial traits to account for migrant heterogeneity are migrant generation and region of origin. So far, gender differences have received only little attention.

Studies on migrant fertility in Europe look almost exclusively at women and have mainly focused on how migration impacts the subsequent life course of migrants and their descendants, i.e., birth transitions, and how fertility varies among migrants by their contexts of origin and destination (Adserà & Ferrer 2015, Kulu et al. 2019; Milewski & Adserà 2023). Empirical studies on fertility of immigrants in Europe provide support for the hypothesis of migrant selection, e.g. in the cases of marriage migrants. At the same time, the influence of socialization on high(er) fertility contexts proves significant, which lasts long after migration. Immigrants often have earlier childbearing schedules, overall have higher fertility than their non-migrant counterparts at destination, and childlessness is rather low among immigrants. Migrant fertility levels typically decline by increasing length of stay and in the subsequent migrant generation; while age at childbearing rises – which is usually interpreted as resulting from adaptation processes and adaptation of the migrant children to the low(er) fertility contexts at destination (overview Kulu et al. 2019; for Germany: Milewski 2007, 2010; Krapf & Wolf 2015; Wolf 2016). At the same time, culturally differing attitudes regarding the relevance of marriage for childbearing (Liu & Kulu 2023), differences in gender-role attitudes, in particular towards motherhood (Haug & Milewski 2018), persist over generations between minority and majority groups. These socio-economic and cultural characteristics are conducive for (relatively) earlier and higher fertility schedules (Milewski 2010).

Another mechanism – in addition to selection and socialization – linking migration and fertility are disruptive processes. Based on the assumption that international migration is a stressful process and migrants may experience processes of marginalization, the disruption hypothesis predicts lower fertility among migrants compared to non-migrants. The evidence for the disruption hypothesis is, however, scarce. On the one hand, this may be related to the fact that most of the previous empirical studies investigate work or family migrants (Mussino & Strozza 2012). Recently, a few studies looked at groups, which may experience more detrimental impacts of migration on marriage and partnerships: Refugees in Finland (in the 1940s) were found to have lower fertility (Saarela & Wilson 2022). On the other hand, most of the empirical studies look at immigrants in countries with below or close-to-replacement level fertility. If majority populations have lowest-low fertility, it is virtually not possible for migrants to fall even below these levels.

We noticed that the empirical studies on migrant fertility (including our own ones) interpret declining fertility levels as evidence of adaptation processes in migrant populations. In doing so, the interpretation is based on the implicit assumption that the differences between the groups or their changes over time result from voluntary decision making towards fewer children. Yet, previous research has not systematically compared migrant individuals' fertility intentions and their fertility outcomes and the causes of any gap, and whether any gap is different from the respective gap among non-migrants. Hence, the question is open to what extent any fertility declines and any intentions-fertility gaps are due to conscious decision making, to fertility barriers such as infertility, or an interrelation of both.

Infertility is a barrier to reproduction that is also related to health. Recently, poor general health and mental health of migrant women and men were shown to decrease fertility intentions (Alderotti & Trappolini 2022). Yet, comparatively few studies have looked at reproductive barriers including infertility (Johnson et al. 2023), or perinatal health (Väisänen et al. 2022). This is particularly important for migrants, as health is unequally distributed. Much evidence suggests that international migrants, in particular those who move for work or educational reasons, tend to be positively selected for health – this is generally referred to as the healthy migrant effect (HME). Any initial health advantages of first-generation immigrants are assumed to decrease when immigrants stay longer in the host country. Such advantages also decrease over migrant generations. The cause for this process is seen in increasing similarities between migrants and respective host-populations with respect to socio-economic factors as well as life style and structural conditions (Loi et al. 2021). According to the weathering hypothesis (Geronimus et al. 2006), the migrants' health advantage dissipates and their health deteriorates to an extent that it becomes even worse than that of natives. Some authors relate the levelling off of the HME to the experience of cumulative disadvantages and discrimination in

general and specifically in the health-care system, which in turn increases the vulnerability of migrants (Geronimus et al. 2006). Such disadvantages can remain over generations, i.e., when immigrant groups develop into minoritized groups, marked by ethnicity, race, or religion (Bean & Tienda 1990; Kulu et al. 2019). At the same time, minority-group status and lower socio-economics are associated with occupational hazards, environmental risks and poorer housing conditions, experiences of discrimination as well as risk life-style factors and poorer health outcomes (Bean & Tienda 1990; Coleman 1994; Foner & Alba 2008), and they may contribute to a higher risk of infertility in migrant and ethnic minority groups (Jackson-Bey et al. 2021).

Overall, the empirical evidence on reproductive and perinatal health supports the hypothesis of the healthy migrant effect suggesting advantages in particular for first generation migrants. At the same time, the evidence on reproductive health highlights the importance of region of origin as a potential marker for differences. For instance, with respect to pre-term birth (PTB) – a risk factor for poor health and development outcomes of the child – the evidence is also mixed. Higher PTB risks were found in Finland, but mainly for women who immigrated from low-income countries and not for those from high-income countries (Bastola et al. 2020; Väisänen et al. 2022). Results varied across origin groups in Sweden (Li et al. 2013; Juárez et al. 2019) while PTB risks were lower among immigrants in the UK (Opondo et al. 2020).

Building on the above background, we postulate the following main working hypotheses guiding our empirical study on perceived infertility. In this paper, we will use the terms “fertility advantage” when referring to lower *in*fertility and fertility disadvantage for higher *in*fertility. We expect to find variation in perceived infertility by migrant generation, with a migrant fertility advantage mainly in the first generation as compared to non-migrants; the fertility advantage may be smaller in the second generation (H1A on generational differences). Our second hypothesis addresses variation by migrants’ origin-groups: we expect a greater migrant fertility advantage in origin groups that show greater difference in fertility patterns compared to German natives. Among migrants from countries with lower birth ages are and higher fertility levels, e.g. in the Middle East, infertility could be lower compared to Germans and compared to migrants from countries with aging fertility patterns, like from other European countries (H1B on origin/ethnic-group differences).

A third working hypothesis refers to the role of moderators. We account for two main correlates of infertility; i.e., age and general health. The migrant generations and origin groups exhibit differences in patterns of childbearing age and health. On average, as stated above, lower socio-economic positions that migrants often inhabit in the host country may correlate with a lower age of childbearing, higher average fertility and lower rates of childlessness. An earlier age of childbearing may imply that migrants are less affected by the postponement pattern, which has an increasing risk

of age-related infertility. Infertility is also related to other dimensions of health and lifestyle. In our data set, we can use the information on the self-rated health and assume that better health is associated with lower infertility. We expect that controlling for health, age and parenthood decreases infertility differences between migrant generations and non-migrants (H1C).

2.3 Migrants, ethnic diversity, and seeking help to get pregnant

Medical infertility, or the perception of it, often prompts individuals to seek help in reproductive health care. This is the second focus of our study. Systematic literature reviews on reproductive endocrinology and infertility (Jackson-Bey et al. 2021; Christ et al. 2022; Merkison et al. 2023) indicate that ethnic and racial minority groups in the US face disadvantages in both reproductive care and access to infertility treatment. In the European context, however, there is limited research (Culley et al. 2009a). The existing European studies suggest broad similarities between migrant groups in Europe and Black and Latin minorities in the US in their experiences of prejudice and discrimination in obstetric practice (Gürtin-Broadbent (2009) in London, Johnson & Borde (2009) for Germany and England, van Rooij & Korfker (2009) in The Netherlands, Vanderlinden (2011) for Germany). Inhorn et al. (2009) also highlighted immigrants from predominantly Muslim Arab countries in the US, whose experiences of discrimination and stigmatized perceptions of high fertility mirror those of Muslim immigrants in Europe, especially after 9/11.

Barriers to accessing reproductive health care and technologies encompass a wide range of factors. These include provider-related issues such as open discrimination, low cultural competence, and delayed referral to fertility clinics. Financial constraints and language barriers also pose significant challenges (Seifer et al. 2022; Geiger et al. 2003). Additionally, certain aspects may directly stem from the disadvantaged socio-economic conditions faced by migrant or ethnic minority groups, such as lower income and difficulties in affording treatment. Indirectly, factors like a higher risk of obesity, which care-providers may cite as a reason for denying care, contribute to reduced utilization of medical expertise, lower satisfaction with treatment, and potentially decreased success rates (Gürtin-Broadbent 2009; Butts 2021; Galic et al. 2021).

Research suggests, that migrants may be more inclined to seek treatment than non-migrants if they perceive themselves as facing infertility. Migrant community-related factors, such as the intergenerational transmission of culture and fertility knowledge, may influence medical help-seeking behavior on the clients' side (Culley & Hudson 2009). In Germany, immigrant women were found to have lower fertility awareness, specifically in terms of correct knowledge regarding age-related fertility decline, compared to non-migrant women (Milewski & Haug 2022). However, they also expressed a

greater willingness to explore MAR if faced with conception difficulties and showed more openness towards controversial methods like egg cell donation and surrogate mothering (Haug & Milewski 2018). In many migrant groups, biological parenthood remains of utmost importance, particularly in communities where childlessness is uncommon, and the societal repercussions of infertility are potentially significant (Christ et al. 2022). Notably, more permissive attitudes and stronger intentions to utilize MAR were observed, not only among women from countries with Muslim traditions, like Turkey, but also among women from Eastern European nations such as Poland, as well as those with Christian religiosity (Milewski & Haug 2020). Furthermore, distinctions were identified based on migrant generation: First-generation migrants displayed significantly different attitudes towards MAR usage compared to non-migrants, while responses of second-generation migrants aligned more closely with those of non-migrants, indicating ongoing socio-economic assimilation across migrant generations (Haug & Milewski 2018).

Quantitative evidence on seeking help to conceive among migrant and ethnic minority groups in European countries is both scarce and inconclusive. A non-patient study in Germany focused on immigrant groups, their attitudes towards MAR and their treatment use. This study revealed no significant difference in treatment rates between migrants and non-migrants, ranging from about 6% to 8.5% (Milewski & Haug 2022). Other studies treated migrant status as a control variable. A recent Danish register-based study offered descriptive evidence indicating that immigrants and their descendants are less likely to undergo their initial ART treatment (Brautsch et al. 2023). Conversely, a recent study in Germany found no statistically significant distinctions between migrants and non-migrants (Köppen et al. 2021).

Based on the above background we formulated the following working hypotheses guiding the second part of our analyses, i.e., seeking help to get pregnant. Similar to our analysis of infertility, we expect to find variation by migrant generation, with first generation migrants being less likely to have used MAR services compared to non-migrants; the treatment gap may be smaller in the second generation (H2A on generational differences). Our second hypothesis addresses origin-group variation: We expect a greater gap in origin groups that show greater difference in fertility patterns as compared to natives (H2B on origin/ethnic-group differences). Note: Ideally, we would also carry out this part of the analysis distinguishing by gender, migrant generation and region of origin respectively. However, seeking help to get pregnant is a rather rare event anyway, and the sample size does not allow this in a statistically sound and meaningful way. Therefore, we will rely on bivariate tests for our working hypotheses 2A and 2B, and we will carry out a multivariable analysis for combined groups only, thus comparing migrants and non-migrants and testing the role of socio-demographic compositions in explaining an overall migrant-nonmigrant gap (H2C). Based on previous research on the marginalization of migrants

in reproductive health care, we expect that migrants may have a lower reproductive health care utilization than non-migrants due to the access barriers discussed above.

3 Data and methods

3.1 Data

The analysis is based on 12 waves of the German family panel pairfam, release 12.0 (Brüderl et al., 2023; Huinink et al., 2011). Pairfam started in 2008/2009 with a nationwide random sample of 12,402 women and men from three birth cohorts (cohort 1: 1991–1993, cohort 2: 1981–1983: cohort 3: 1971–1973). Data are collected on a yearly basis by computer-aided personal interviews (CAPI). We use all available data including data from the DemoDiff study, a complementary panel survey of 1489 East Germans, and from a refreshment sample introduced in wave 11 (5021 respondents). The full data set consists of 92,251 person-years by 18,912 respondents. Because of the complex survey design, we apply weights for all analyses.

Our study includes women and men aged 21 to 49 years. Participants with inconsistent information on gender across the waves and participants below 21 years had to be excluded because the question on self-perceived infertility was not asked below that age. We also do not use information from respondents who ever mentioned that they were sterilized.[1] If a respondent mentioned sterilization of the partner, all person-years of the respondent while in a relationship with the sterilized partner were excluded. This leaves us with 65,380 person-years by 13,566 respondents. As this study uses two dependent variables, self-perceived infertility and help-seeking, and in order to utilize the maximum of information, we work with two analytic samples which are described below.

The first analytic sample is that for the analysis of self-perceived infertility. We use a self-report measure of infertility perception. For 2772 of 65,380 person-years respondents, there is no information on self-perceived infertility status. From the resulting sample of 62,608 person-years, 2.5% of all person-years (n=1593) had to be excluded because of missing values on the central independent variables concerning migration status. Two person-years had to be dropped because no weights were provided. The final data set contains 61,013 person-years from 12,943 persons (see Table A1 in

[1] Up to wave 7, sterilization was only asked as a method of contraception after respondents positively responded to the question on whether they currently used contraception. Since wave 8, information on sterilization is also asked to those currently not using contraception. As we cannot identify the timing of the sterilization, we chose to exclude all observations of anchor, or all observations while in a relationship with a sterilized partner. This is necessary because our main interest is in perception of medical problems having a child and not sterilization.

Appendix). Immigrants contribute about 19.4% of person-years in unweighted data and 26.7% in weighted data. Looking at persons rather than person-years results in a share of migrants in the sample of about 23.3% in the unweighted data and 27.7% in the weighted data, which is very close to the share of migrants in the German population (see Section 2.1). The gap between weighted and unweighted data at person and person-year level indicates that overall panel participation of migrants is lower compared to the majority population. By applying weights, we can reach a satisfactory representation of migrants in our sample.

The second analytic sample is that for the analysis of medical help-seeking. In waves 1 to 6 of the pairfam data, respondents were directed to the help-seeking question only if they were expecting a child or if they perceived themselves or their partner as infertile and said they were trying to have child. This restrictive filtering led to only between 40 and 80 non-pregnant people answering the help-seeking question per wave. Starting in wave 7, the filtering was changed, resulting in all women and men who have been trying to have a child or who were expecting a child being asked about seeking help to have a child. For the purpose of this study, we use data from waves 7 to 12. By not restricting the analysis to those presumably infertile, our study gives a "broad" picture of medical help-seeking. Studies of seeking medical help to have a child commonly include only people who are infertile and who are at risk of seeking medical help (Passet-Wittig & Greil 2021). Selecting the sample based on the perception of infertility could result in a limited picture of those seeking help, because perceiving infertility is not a necessary condition for seeking help to have child. Of all 33,930 records for this period, in 2427 person-years a response on the help-seeking question was provided. 1.9% of the person-years (n=45) with available data on the help-seeking question had to be dropped because of missing values on the main independent variable migrant status. The final data set contains 2345 person-years, to which migrants contributed 19.7% in unweighted data and 32.8% in the weighted data (see Table A2 in Appendix).

3.2 Dependent variables

The first dependent variable is a self-report measure of *infertility perception* of the respondent and – if in a relationship – of the couple. Perceptions about infertility may or may not overlap with medical infertility, however, as they reflect a person's experience, they are important in their own right (Benyamini 2011). Our measure of infertility perception is based on two questions inquiring whether the respondent perceived that he/she him/herself and – if available – the current partner perceived problems procreating: "Some people are not able to conceive a child or to procreate naturally. As far as you know, is it physically possible for you/for your partner to conceive a child or to procreate naturally?" Answering options were "definitely yes," "probably yes," "probably not," "definitely not,"

"don't know" and "I don't want to answer that". We constructed an indicator with three categories 1 "respondent/couple infertile", 2 "respondent/couple fertile", and 3 "don't know if respondent/couple (in)fertile". The first category applied if the respondent answered "definitely not" or "probably not" for at the least one partner. The second category applies if the respondent answered "definitely yes" or "probably yes" for him/herself and if in a relationship for the couple. The third category was chosen if the respondent answered "don't know" for at least one partner. Both questions were not asked if the respondent or his/her partner was pregnant at the time of the interview. For the infertility variable, the group of currently pregnant respondents was treated as fertile, because most children are conceived without medical assistance.

The second dependent variable is *medical help-seeking*. It is based on the question: "Have you or your partner used any of the following methods to induce a/this pregnancy since the last interview? Please indicate all methods used." The list of methods includes: "medication", "methods to determine ovulation date", "IVF or micro-fertilization (ICSI)", "surgery", "intrauterine Insemination", "other treatment", "none of these" a. Multiple answers were allowed. We identified the highest treatment received. Our help-seeking indicator differentiates whether the treatment received is typically performed at a fertility clinic (IVF, ICSI, Intrauterine Insemination, surgery, other treatment) or at the general practitioner/gynecologist (medication, methods to determine ovulation date) in Germany. Respondents who did not mention any treatment or replied with "I don't know" or "I don't want to answer that" are coded in the category "none, idk/na". The share of those who did not know or did not want to answer the help-seeking question was too small to keep as a separate group. Note that the question on help-seeking was asked to women and men who have been trying to have a child[2] or who were expecting a child.

3.3 Independent variables

Our main independent variables are two indicators of migration status: migrant generation and region of origin. For *migrant generation* we use the pairfam variable *migstatus.* The variable conveys information on the country of birth of the respondent and the respondent's mother and father. Status as a first-generation migrant is assigned to all who have immigrated themselves. Second generation migrants have parents born abroad, but were themselves born in Germany. *Region of origin* is based on the pairfam variable on the respondents' country of birth (*cob*). Second generation migrants are grouped based on their parents' country of birth (f*cob, mcob*). We distinguish between non-migrants and the following regions of origin: Middle East, Balkan countries, Russia, Kazakhstan, and other. The

[2] The question used to identify those trying is "Have you or your partner tried to have a child since the last interview?" Respondents can reply with "yes" or "no".

residual category “other” consists of respondents of other regions of origin for which group sizes are too small to further investigate them. This includes few cases were both parents originate from different regions of origin. Cases, where it is not clear whether they have a migration background or not, were dropped.

We use generated variables provided by pairfam as control variables for our analyses. For the variable age, three age groups are distinguished: <35 years, 35-39 years, 40+ years. Further, we control for whether the respondent *has biological children*, which takes into account that infertility may occur in higher parities, not only among childless individuals.[3] For marital status, or partnership respectively, we distinguish between not having a partner, being in non-marital relationship, and being married. We also account for education, assuming that higher human capital is associated with lower infertility due to higher fertility knowledge and better health-care usage. The measure of education is based on the International Standard Classification of Education (ISCED-97) and has four categories. “Primary/lower secondary education” (1) comprises those without a degree or lower secondary education (ISCED 1–3), “higher secondary education” (2) includes those with upper secondary (general and vocational) and postsecondary non-tertiary education (ISCED 4–6), “tertiary education” (ISCED 7–8) summarizes those with a university degree, and “missing values” indicates incomplete information. If currently enrolled in school, the measure assumes that the person will attain the corresponding degree. Self-perceived general health was measured on a 5-point scale from very good health to very poor health. The categories were merged so that 1 indicates poor or very poor health compared to the other categories (0). An indicator for survey wave is included to control for period effects (see Table A1).

For the help-seeking analysis we also include a measure of the households’ net income, because infertility help-seeking potentially requires considerable financial resources. We distinguish five categories: <=1500 €, 1500-2500 €, 2500-3500 €, 3500+ € and a category indicating missing values (don’t know/no answer) (see Table A2).

3.4 Plan of analysis

Our analyses consist of two parts. First, we study whether the prevalence of self-perceived infertility differs between non-migrants and migrants and within migrants. We carry out our analyses separately for women and men because sex is one crucial marker of social and health inequalities. Migrant women fare worse than men in several health domains (Gerritsen & Devillé 2009; Carnein et al. 2015; Trappolini & Giudici 2021), and the cultural perceptions of infertility may differ between women and

[3] Ten person-years had missing values on this variable, because some information to construct this variable was missing. However, it was possible to recode these cases as having children using other available information in the data set.

men. We begin by calculating prevalence rates of self-perceived infertility by migrant generation and by migrants' region of origin. Note: Ideally, we would investigate migrant generation and region of origin in the same analysis, but the sample size does not allow for such a detailed analysis. Then, we carry out a multivariable analysis of self-perceived infertility using multinomial logit regressions using the pooled data. The estimations are presented in a step-wise fashion; Models 1 contain only migrant generation or country group of origin. Models 2 add the moderator self-perceived health, and Models 3 add the socio-demographic controls.

Second, we study medical help-seeking. We begin with a bivariate description for migrant generation and country group of origin, but need to combine the samples of women and men because the sample size is very small. After all, seeking help to have a child is a rare event. In the following multivariable analyses, we do not differentiate between migrant groupings due to the sample size. We estimate pooled logit models. Cluster-robust standard errors are estimated.

All analyses are weighted using calibrated design weights as recommended by the pairfam-team in order to account for the complex survey design and panel attrition (Brüderl et al. 2023). Calibrated design weights in pairfam use information on migration background as a calibration variable. For the presentation of results from multivariable analyses, average marginal effects (AME) are calculated. AMEs are easier to interpret, as they represent an average effect on the probability of people perceiving infertility and seeking medical help, based on the observed values of each person on all variables in the model. They allow for comparisons between models (i.e. differentiated by gender), which is not possible with logit coefficients and Odds Ratios (Best & Wolf, 2014).

4 Results

4.1 Perception of infertility

Table 1 shows the shares of women and men for self-perceived infertility by migrant generation and by country group of origin. Overall, the mean probability to perceive fertility problems is 7.7% among women and 7.2% among men. With 5.2%, men are somewhat more likely to state "I don't know" than women (4.0%).

To test our working hypothesis 1A, distinguishing by migrant generation, we find significant differences: Both among women and men, the share of those perceiving infertility is highest among first generation migrants. In addition, women and men of the first migrant generation answered most

often with "don't know". Rather similar shares of self-perceived infertility are found for second generation migrants (about 7%) and non-migrants (6 to 7 %).

Testing our working hypothesis 1B, differentiating by migrants' region of origin also reveals significant and larger differences. Women from the Middle East and Balkan countries are with less than 8% by far the least likely to perceive infertility, while women from Russia are most likely to perceive infertility. Women from other European countries have – with about 10% – also higher prevalence than non-migrants. Among men we find a different pattern: Men from the Middle East have the highest share of those perceiving infertility (11 %), and their share is considerably higher than that of women from the respective regions. Among men from Russia, the share of those perceiving infertility is much smaller than that of women.

Unfortunately, it is not possible to further study the interaction of region of origin and migrant generation with regard to self-perceived infertility status because of small cell counts and empty cells.

Table 1: Self-perceived infertility by sex, migrant generation and region of origin (%)

	Women			Men		
	Fertile	**Infertile**	**Idk**	**Fertile**	**Infertile**	**Idk**
Non-migrant	89.6	6.9	3.6	88.9	6.4	4.7
1st generation migrant	83.3	11.2	5.5	80.2	12.0	7.8
2nd generation migrant	87.8	7.5	4.6	87.4	7.1	5.5
Non-migrant	89.6	6.9	3.6	88.9	6.4	4.7
NWCSSE Europe	85.4	10.2	4.4	85.3	8.7	6.0
Balkan	90.4	4.2	5.4	88.8	7.6	3.6
Russia	78.2	15.2	6.5	80.2	9.7	10.2
Kazakhstan	84.8	9.4	5.8	80.7	10.7	8.6
Middle East	86.3	7.1	6.6	82.8	11.1	6.2
other	88.1	8.2	3.7	81.9	10.3	7.7
Overall share	88.3	7.7	4.0	87.6	7.2	5.2
n	*28,674*	*2,131*	*1,107*	*26,120*	*1,646*	*1,335*

Data: Calculations based on pairfam waves 1-12 (weighted data). N_{total}=12,943 persons with 61,013 person-years.
Note: Idk = I don't know; NWCSSE = North, West, Central, South, South-East Europe.

For the multivariable analyses, we proceed in two steps in order to test our working hypothesis 1C, firstly using migrant generation as the main independent variable, secondly, region of origin. Figure 1 shows the results of the multivariable analysis for migrant generation for women and men using AME (full tables are available in Tables A3a and A3b in the Appendix). The first row in each category shows results from the baseline model (Models M1-W/M1-M). Moderators and control variables were added

in two steps (Models M2-W/M2-M to M3-W/M3-M). The analyses show that first generation migrant women and men are more likely to perceive infertility than non-migrants. First-generation migrants are also more likely to state that they are unsure compared to non-migrant women and men. By contrast, second generation migrants do not differ from non-migrants in their probability to perceive infertility. With respect to their health status, the three groupings in our study hardly varied. First-generation migrants more often had children than the other two groups, and their education was on average lower (see Table A1). Yet, adding the independent variables reduces AMEs for self-perceived infertility only slightly, and it cannot explain the higher infertility and don't-know answers among women and men of the first migrant generation. On the contrary, for the "I don't know" category the AMEs increase with the inclusion of controls (Models M2-W2/M2-M). Hence, our results do not support our working hypothesis 1A; contrary to our assumption, first-generation migrants have a fertility disadvantage as compared to non-migrants. Yet, such disadvantages were not found in the second generation. Moreover, the controls did not contribute much to explaining these patterns (H1C).

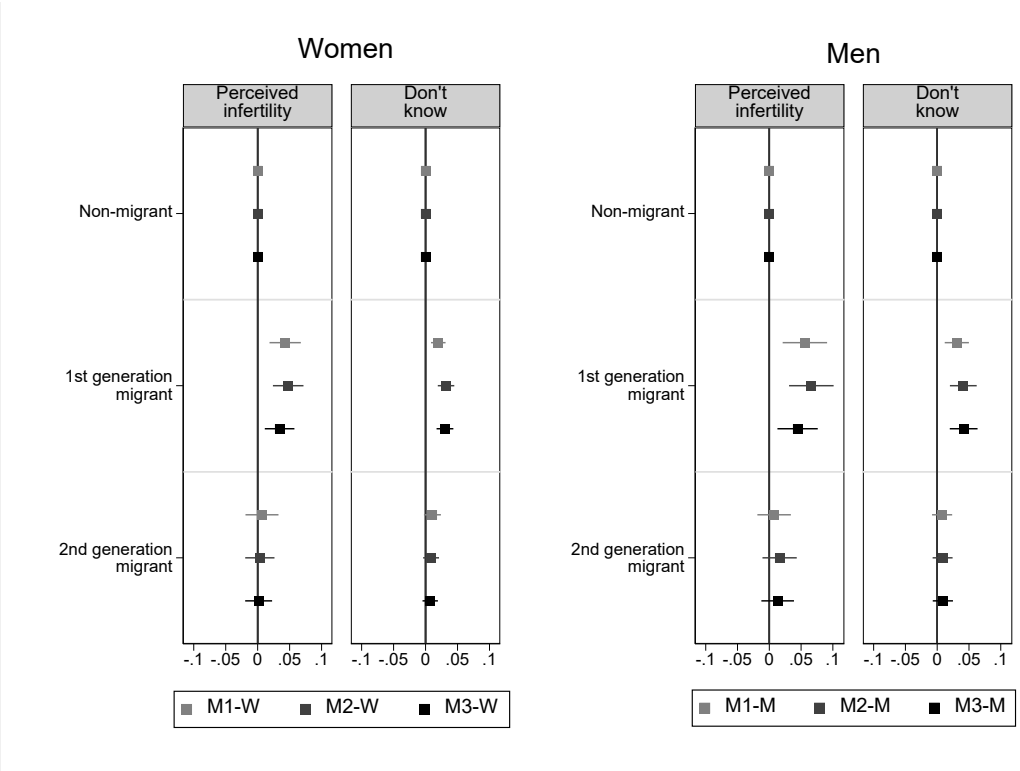
Figure 2 displays the results of the multivariable analyses of perceived infertility using migrants' region of origin as the main explanatory variable (full results: Table A4a and A4b in Appendix). In the baseline model (Models M1-W), it appears that migrant women from the Balkan countries are less likely to perceive infertility compared to the non-migrant reference group. The effect becomes statistically significant when controls are added. Women from the Balkan countries appear as the only origin group for which a fertility advantage remains as indicated in lower infertility. By contrast, migrant women from Russia and potentially Kazakhstan have increased risks of self-perceived infertility. The effect sizes are relatively larger, but the confidence intervals are large, too. Adding health and socio-demographics in the Models M2-W and M3-W does not reduce the effect sizes. The results for women from other European countries (NWCSSE Europe) and those in the "other" grouping hardly vary from that of non-migrants. While we find variation among migrant women with respect to infertility, the pattern of the "I don't know" answer is less heterogeneous. Migrant women from all groups of regions of origin have increased risks of answering "I don't know" with regard to their self-perceived procreative ability. The pattern does not change with the inclusion of covariates in Models M2-W and M3-W.

Migrant men from Russia, Kazakhstan and the Middle East have increased probabilities of self-perceived infertility. For Russia, the predicted probabilities are positive, but again, the confidence intervals are large. For men from the Middle East, the predicted probabilities become statistically insignificant when the full set of control variables are added, while men from Kazakhstan are the only group for which the association remains significant, and probabilities even increase when controls are added. In addition, most migrant groups have increased probabilities of answering the question on their self-perceived procreative ability with "I don't know". Russian men are the only group for which

the association is significant. Note that the inclusion of controls in Models M2-M and M3-M does not notably change effect sizes or patterns among men.

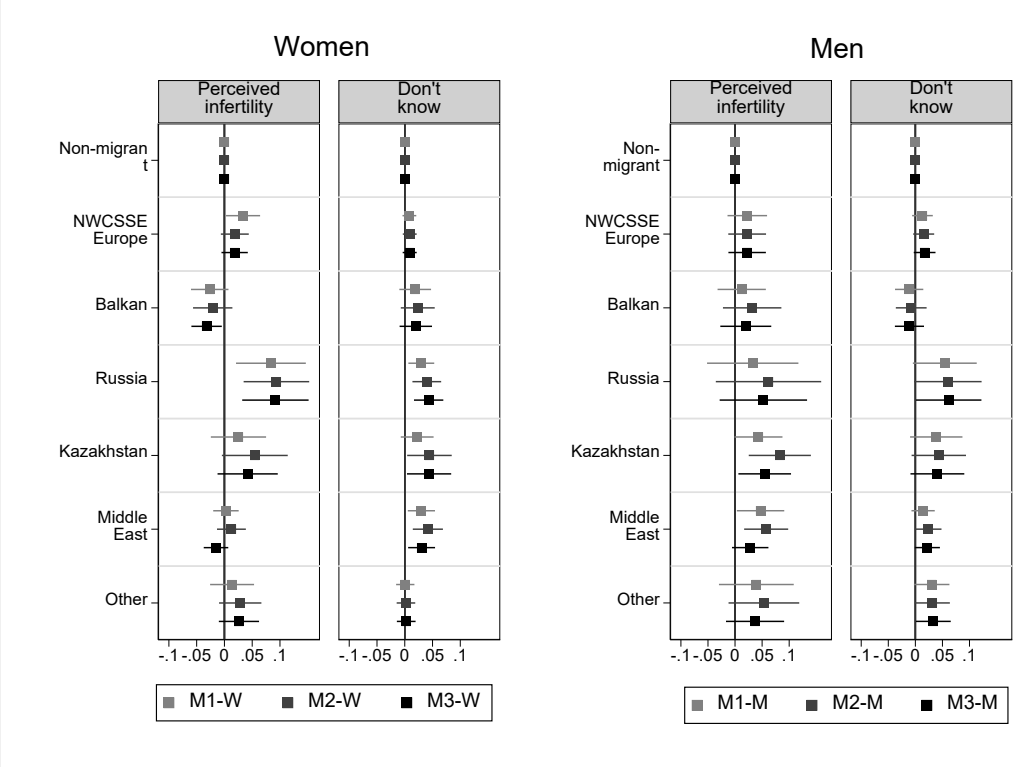
By and large, the controls showed the effects known from the literature: Persons, who were older, who were childless, who perceived their health as bad were more likely to perceive infertility (Tables A3a/b and A4a/b).

Figure 1. Self-perceived infertility, by gender and migrant generation (AME)



Data: Calculations based on pairfam waves 1-12 (weighted data), person-years: n_{women}= 31,912; n_{men}= 29,101.
Notes: AME = average marginal effects. Multinomial model; full models are available in Tables A3a/b (Appendix). M2-W/M control for age, children, and subjective health. M3-W/M additionally control for marital status/partnership, health, and wave.

Figure 2. Self-perceived infertility, by gender and migrants' region of origin (AME)



Data: Calculations based on pairfam waves 1-12 (weighted data), person-years: n_{women}= 31,912; n_{men}= 29,101.
Notes: AME = average marginal effects; NWCSSE = North, West, Central, South, South-East Europe. Multinomial model; full models are available in Table A4a/b (Appendix). M2-W/M controls for age, children, and subjective health. M3-W/M additionally control for marital status/partnership, health, and wave.

4.2 Seeking medical help to have a child

In our second analysis, we look at seeking help to have a child among those who said that they were trying to have a child. Due to the small sample size and the small number of events, we combine the answers of women and men.

Table 2 displays the share of persons who indicated any medical help to conceive. Testing our working hypothesis 2A, i.e., comparing migrant generations, we found the lowest share of help seekers in the second migrant generation and the highest share among non-migrants, while first-generation migrants were in-between. By region of origin – testing our hypothesis 2B –, variation was less pronounced among migrants except for the very heterogeneous group of "other" regions. Lowest shares were found for respondents from the Middle East, Russia and Kazakhstan. These patterns do not correspond fully to what would be expected by our results on perceived infertility, whereby non-migrants would have lower need than first-generation migrants, and people from the Middle East, Russia and

Kazakhstan would have a higher need as opposed to other groupings. Thus, our results do not support our working hypothesis 2A and 2B, and rather point to a more heterogeneous pattern.

Table 2: Any medical help-seeking, by migrant generation and region of origin (%)

	Any medical help-seeking	
	No	**Yes**
Non-migrant	67.0	33.0
1st generation migrant	72.3	27.7
2nd generation migrant	79.5	20.5
Non-migrant	67.0	33.0
Europe + Balkans	77.0	23.0
Russia/Kazakhstan	82.4	17.6
Middle East	82.8	17.2
Other	58.4	41.6
Overall share	*69.8*	*30.3*
n	*1642*	*703*

Data: Calculations based on pairfam waves 7-12 (weighted data). N_{total}=1500 persons with 2345 person-years.
Note: NWCSSE = North, West, Central, South, South-East Europe.

Due to the relatively small sample, we focus mainly on comparing migrants and non-migrants in the following analyses, which tests the role of controls (working hypothesis 2C). For the same reason, a simple indicator of seeking medical help vs. not seeking medical help is applied in most descriptive and multivariable analyses.

Table 3 relates the need to the help-seeking. We compare help-seeking rates between migrants and non-migrants by self-perceived infertility status. Generally, among those who perceive infertility, the probability that they have sought medical help is about twice as high compared to those who do not perceive infertility. However, the help-seeking rate in the latter is still notable, suggesting that self-perceived infertility does not capture all the reasons for seeking medical help. Help-seeking rates are higher among non-migrants, whether they are perceiving infertility or not. However, the difference is much more pronounced if no problems procreating are perceived.

In a next step, we compare the share of help-seekers for each type of treatment received between migrants and non-migrants. Overall, 33% of non-migrants used help to have a child, compared to only about 25% among migrants. When looking at the type of treatment, migrants mentioned the GP/gynecologist as highest treatment less often than non-migrants (14.9% vs. 23.4%), but migrants and non-migrants similarly often mention that they received treatment typically provided in fertility

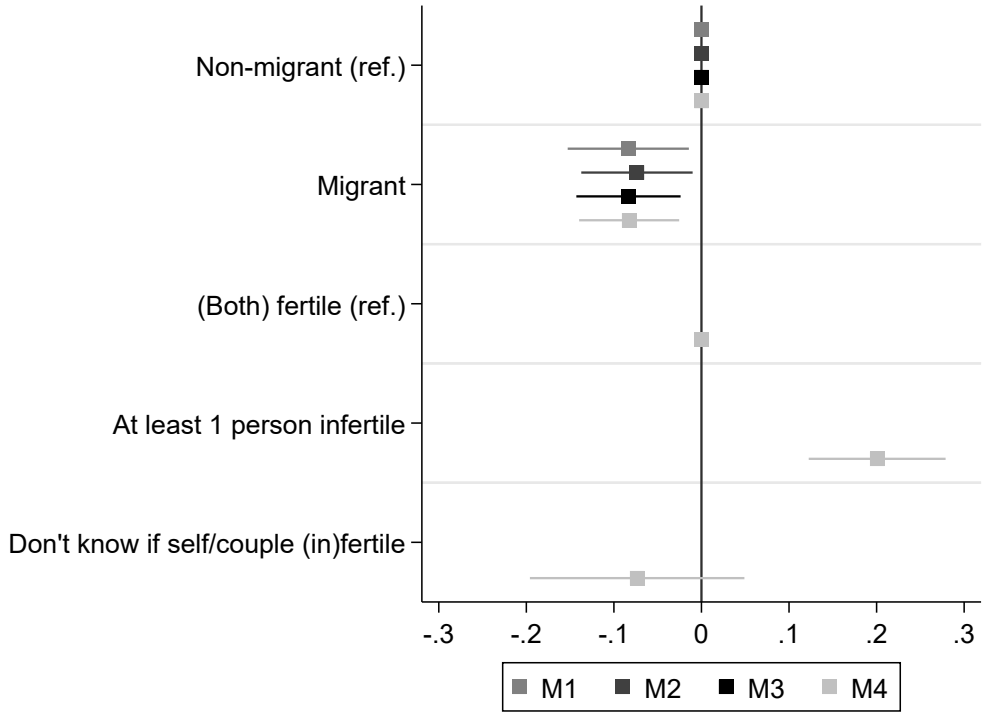
clinics. Importantly, if we look only at those who sought medical help to get pregnant, migrants are more likely to have received treatment at a fertility clinic (migrants: 39.2%; non-migrants: 29.3%).

Table 3: Help-seeking rates, by migrant status and self-perceived infertility (%)

	Perceived infertility			Ratio of help seekers perceiving infertility / help seekers not perceiving infertility
	Yes	No	Don't know	
Non-migrant	64.4	29.4	25.2	2.2
Migrant	43.0	23.0	16.7	1.9
Total %	57.8	27.4	20.9	2.1
Person-years	137	552	58	

Data: Calculations based on pairfam waves 7-12 (weighted data). N_{total}=1500 persons with 2345 person-years.

Figure 3. Help-seeking by migrant status and perceived infertility (AME)



Data: Calculations based on pairfam waves 7-12 (weighted data). N_{total}=1500 persons with 2345 person-years.
Notes: AME = average marginal effects. Logistic model; full models are available in Table A5 (Appendix). Model 2 controls for sex, age, children, and subjective health. Model 3 additionally controls for marital status/partnership, education, and household income. Self-perceived infertility is added in Model 4.

Figure 3 displays the results of the multivariable analysis, which are consistent with the descriptive findings (see Tables 3 and 4). There is a stable migrant disadvantage in seeking medical help to have a

child: Their probability to seek any help is about 8 %points lower than that of non-migrants. The negative association of migrant status and help-seeking remains relatively stable in size and significance when control variables are added. Of the covariates, parity and perception of infertility are the strongest predictors – each reducing the probability of help-seeking by about 20 %points. As parity is an important predictor and migrants are more likely to have children, also in our sample, we also tested whether parity moderates the association of migrant status with medical help-seeking, but found no such effect.

Overall, the effects of the explanatory variables are in the directions as known from the literature. Respondents in our sample are more likely to have used medical help to get pregnant when they were older, were childless, were married, when having higher education, when having a household income of 3500€ or more, and perceived their health status as bad.

4.3 Robustness and data quality

Although our analyses are based on rather small samples, we are confident of the data quality. The prevalence of perceived infertility of 7.7% among women and 7.2% among men is in the range of what other studies for Europe find for self-reported 12-months infertility, but within this range it is at the lower bound (Cox et al. 2022). They also compare well with another pairfam study using the same indicator which estimated slightly lower mean prevalence of 5.6% for women and 4.9% for men (Passet-Wittig et al. 2020). The higher average prevalence in the current study could be due to the aging of the sample as the other study used only waves 1 to 7. In our sample, 30% of all women and men have sought medical help to have a child. This also compares well to a study on non-migrants and migrants in Germany (Milewski & Haug 2022), based on a different data source.

For the main analyses on perceived infertility, all pregnant women or men with pregnant partners were treated as fertile since most children are still conceived without medical assistance. As a sensitivity analysis (results available upon request), we excluded all pregnant individuals or couples from the perceived fertile category and re-ran the analyses. No substantive differences were found comparing effect estimates on this analysis with the findings in Tables A3 and A4, indicating that the assumption that treating pregnant individuals or couples as fertile is reasonable.

As sometimes happens in panel surveys, the routing of respondents to the perceived infertility question was subject to change. During waves 2 and 3, preload information on infertility status was used in the filter. Respondents who considered themselves or their partners as definitively infertile were not reposed the same question, implicitly assuming their sterility. Starting from wave 4 onwards, the question was posed without referencing the preload information. To examine whether the

conditional filtering in waves 2 and 3 influenced the results, we conducted analyses excluding these waves, but found no substantial differences.

We also wanted to take into account more life style and health variables, i.e., BMI, smoking, alcohol in addition to subjective health. Here, we faced some restrictions. BMI is updated every year but only for the main sample and not for the Demodiff sample, thus it contains a lot of missing values. Smoking was only included for the full sample in waves 5, 7 and 9 and in wave 11 only for refreshment sample. Alcohol consumption was included only in waves 5, 7, 9 and 11. Including them would have resulted in a large share of missing values in these variables. Or using only selected waves would have been problematic, considering – with self-perceived infertility among migrants – we are studying a rather rare event.

5. Conclusion

This study examines disparities in self-perceived infertility and seeking medical assistance to get pregnant among migrant women and men compared to the non-migrant population in Germany, offering insights into a group often overlooked in infertility research, particularly in Europe. Studying migrants and their reproductive health needs is especially important in countries like Germany and many other European nations, where the migrant population exceeds 20%. Utilizing representative general population data over 12 waves, we compared the perceived infertility of women and men and/or their partners, as well as their pursuit of medical assistance in conceiving, with that of non-migrants. Our analysis included first and second migrant generations from various regions of origin.

Against our expectations of a fertility advantage in the first generation and among migrants from countries with an earlier stage of the second demographic transition, results did not *consistently* support these assumptions. Instead, we observed significant *variation* among migrant groups. Notably, a migrant fertility disadvantage emerged in the first generation, challenging the notion of a healthy-migrant effect in fertility. First-generation women and men faced higher risks of self-perceived infertility and were more likely to express uncertainty about their fertility status. Contextualizing these effects, the prevalence of perceived infertility in our sample was approximately 8% (men) to 9% (women), indicating its relative rarity in the general population. Consequently, differences among social groups were modest, with around a 4%-point increase among migrant women (controlling for other factors). Given the low baseline risk, however, this 4%-point increase signifies that one-third

more first-generation migrant women experience infertility compared to non-migrants – a notable scale effect. However, infertility is just one facet of reproductive challenges.

Another pertinent question is whether migrants and non-migrants differ in their medical help-seeking behaviour. Our findings (descriptive) indicate that first-generation migrants not only face higher infertility rates but also exhibit lower utilization of infertility care. Additionally, we anticipated that disparities between migrants and non-migrants may be less pronounced in the second generation than the first. Yet, we found no differences in the risk of self-perceived infertility for the second migrant generation compared to non-migrants, but observed even lower treatment rates compared to the first generation.

We observed variation in migrants' regions of origin. We anticipated *lower* infertility for migrants from countries where fertility patterns are characterized by young birth ages and low childlessness compared to Germany, which is characterized by late fertility and high childlessness. Instead, we discovered *higher* rates of infertility and uncertainty – and thus a fertility disadvantage – among groups from Russia, Kazakhstan, and the Middle East, including Turkey. Strikingly, our descriptive analysis suggests that these groups have the lowest utilization of infertility treatment in our – admittedly – small sample. These findings imply that processes of fertility disruption may predominantly impact the first generation and specific migrant origin groups. On the one hand, Germany's general healthcare provision may facilitate the integration of migrant health over generations, on average. On the other hand, ethnic-based marginalization processes may become apparent in certain cases. Future research should investigate in more detail the underlying causes of these disparities. Finally, in the realm of migrant fertility research, it is essential not to automatically interpret higher fertility levels among migrants compared to non-migrants as evidence against fertility disruption, or declining fertility levels among subsequent generations as proof of adaptation. Instead, future studies should systematically compare fertility ideals and intentions to actual fertility outcomes, and consider reproductive barriers as an explanation for deviations. Such studies can complement existing research and shed light on the extent to which seemingly adaptive processes stem from conscious decision-making versus involuntary reproductive barriers. This would eventually allow to directly assess the hypothesis of fertility disruption in migrant populations.

Further, in line with a recent literature review on seeking medical help for to get pregnant, we examined various stages of help-seeking (Passet-Wittig & Greil 2021). Our analysis revealed a significant disparity among migrants in Germany. They are notably less inclined to consult a general practitioner or gynecologist (only). Interestingly, there is virtually no difference in the reception of treatments typically administered at fertility clinics, such as inseminations or IVF. When focusing solely on those seeking any form of medical assistance, migrants exhibit an even higher tendency to undergo

treatment in fertility clinics. This implies that migrants who have decided to seek medical help in conceiving are more inclined towards pursuing more advanced and invasive treatments. This finding aligns with a study indicating that first-generation migrants in Germany display greater openness to medically assisted reproduction (MAR) and stronger intentions to use MAR compared to non-migrants (Haug & Milewski 2018). This underscores, on the one hand, that help-seekers represent a distinct group, demonstrating the importance of utilizing general population samples for a comprehensive understanding of the process of seeking medical assistance at various stages of treatment. On the other hand, the reasons behind this heightened openness towards MAR among migrants warrants attention. Previous research suggests that stronger norms regarding biological children and the significance of motherhood in migrant groups from countries with more familistic social structures play a crucial role (Haug & Milewski 2018). Consequently, infertility is a concern for childless individuals or couples and for families seeking to expand beyond one child. As this study shows, this appears to be important to consider in studies of migrants, but should be considered also for non-migrants.

This study, like any empirical research, has limitations stemming from the data and offers suggestions for future data collections. We utilized a social science survey in Germany, introducing questions on the sensitive topic of infertility and help-seeking for the first time. While the pairfam survey covers the general population and includes a representative sample of immigrants, it does not over-represent any specific migrant group. Due to the relatively rare occurrence of infertility and help-seeking, the immigrant case numbers were small, limiting the ability to differentiate within groups as desired. We conducted multivariable analyses for infertility based on either migrant generation or region of origin, but not both simultaneously. While the pairfam data provided a solid foundation for studying population heterogeneity in perceived infertility, it was less comprehensive for examining medical help-seeking to get pregnant. Separate multivariable models for women and men, let alone for migrant generation or region of origin, were not feasible. Consequently, the findings indicate a migrant disadvantage, but the variation we found between migrant groups based on merely descriptive analyses rests on much less solid ground. Nevertheless, both variables – migrant generation and (parents') region of origin – are crucial markers for probing within-migrant diversity and comprehending marginalization processes that seem to impact specific migrant groups. Our results underscore that a simplistic distinction between migrants and non-migrants falls short of capturing this diversity. A more nuanced approach is warranted. Notably, our findings suggest that first-generation migrants, in particular, may face reproductive challenges, aligning with existing literature on migrant assimilation, fertility, and health. The disruptive nature of migration on the life course, often accompanied by spatial separation of family members, language barriers, and acculturation processes, is linked to stress and cumulated disadvantages (Sluzki 1979; Geronimus 2006). Therefore, the duration of stay in a destination country should be considered in future studies.

To better comprehend the causes of infertility and treatment experiences, it is crucial to complement demographic and socio-economic data with additional health and lifestyle variables (Homan et al. 2007). Factors such as smoking, alcohol and substance use, and adverse BMI have been shown to correlate with ethnicity, religious affiliation, and religiosity, for both women and men, and they also explain health differences across European countries. Certain groups, like religious Muslims, may exhibit reduced risks associated with alcohol use, yet face elevated risks of overweight and childhood diabetes compared to non-migrants in Europe. This suggests the need for a more nuanced examination of group disparities – not only between migrant minorities in Europe and non-migrants, but also within different migrant or ethnic groups. Such an approach would also yield insights into the societal context and the healthcare system. It is worth noting that these lifestyle factors are modifiable risk factors, and hence amenable to prevention and intervention.

To sum up, our study provides an in-depth picture on both interrelated events – perceived infertility and help-seeking – for the migrant population, differentiating by sex, migrant generation, and region of origin. It demonstrates a migrant fertility disadvantage, ie., higher infertility and lower help-seeking in particular in the first generation and for certain groups of origin. These findings are relevant for research on migrant assimilation, showing a yet rarely analyzed dimension of social inequality and differential demographic behavior in contemporary multi-ethnic Europe.

Appendix

Table A1: Description of the sample for self-perceived infertility analyses, by gender and migrant status (in %)

	Women			Men		
	Non-migrant	Migrant	Total	Non-migrant	Migrant	Total
Migrant generation						
Non-migrant	100.0	na	70.6	100.0	na	75.8
1st generation migrant	na	55.2	16.2	na	52.7	12.8
2nd generation migrant	na	44.8	13.2	na	47.3	11.5
NWCSSE Europe	na	42.6	12.6	na	37.9	9.2
Balkan	na	6.9	2.0	na	6.0	1.5
Russia	na	12.3	3.6	na	9.0	2.2
Kazakhstan	na	6.8	2.0	na	7.5	1.8
Middle East	na	18.7	5.5	na	25.8	6.3
Other	na	12.7	3.7	na	13.8	3.3
Age in years						
<35	53.6	51.2	52.9	51.2	54.7	52.0
35-39	25.7	26.7	26.0	26.1	26.4	26.2
40+	20.7	22.1	21.1	22.7	18.9	21.8
Children						
No	52.0	43.1	49.4	65.2	57.4	63.3
Yes	48.0	56.9	50.6	34.8	42.6	36.7
Marital status/ partnership						
No partner	22.7	23.5	23.0	33.1	28.4	31.9
Unmarried	36.8	25.0	33.3	34.9	24.6	32.4
Married	40.4	51.5	43.7	32.1	47.0	35.7
Education						
Primary/lower secondary	6.5	16.3	9.4	6.4	17.3	9.0
Higher secondary	56.4	47.3	53.7	56.1	47.3	53.9
Tertiary	37.1	35.8	36.7	37.4	35.1	36.9
Missing value	0.1	0.6	0.3	0.1	0.4	0.2
Subjective health						
Good	85.1	84.4	84.9	88.8	88.3	88.7
Bad	14.9	15.6	15.1	11.2	11.7	11.4
Total n	*5003*	*1681*	*6684*	*4923*	*1336*	*6259*
Total person-years	*25,149*	*6763*	*31,912*	*24,056*	*5045*	*29,101*

Data: Calculations based on pairfam waves 1-12 (weighted data). N_{total}=12,943 persons with 61,013 person-years.
Note: NWCSSE = North, West, Central, South, South-East Europe; na = not applicable.

Table A2: Description of the sample for help-seeking analyses, by migrant status (in %)

	Non-migrant	Migrant	Total
Help-seeking			
No	67.0	75.4	69.8
Yes	33.0	24.6	30.3
Sex			
Men	50.7	44.0	48.5
Women	49.3	56.1	51.5
Age in years			
<35	52.5	57.3	54.1
35-39	29.9	30.5	30.1
40+	17.6	12.3	15.9
Children			
No	59.2	54.7	57.7
Yes	40.8	45.4	42.3
Marital status/ partnership			
No partner	4.3	3.4	4.0
Unmarried	34.8	23.9	31.3
Married	60.9	72.7	64.8
Education			
Primary/ lower secondary	56.9	60.4	58.0
Higher secondary/ tertiary	43.2	39.6	42.0
Household income in €			
<=1500	8.1	9.9	8.7
1500-250	14.5	19.2	16.1
2500-350	24.7	28.5	25.9
3500+	48.0	36.0	44.0
Missing value	4.8	6.4	5.3
Subjective health			
Good	87.3	85.4	86.7
Bad	12.7	14.6	13.4
Perceived infertility			
(Both) fertile	87.4	85.9	86.9
At least 1 person infertile	10.4	9.6	10.2
I don't know	2.1	4.5	2.9
Overall share	*67.2*	*32.8*	*100.0*
N	*1884*	*461*	*2345*

Data: Calculations based on pairfam waves 7-12 (weighted data). N_{total}=1500 persons with 2345 person-years.

Table A3a: Results of the multinomial logit analysis on the probability of self-perceived infertility by migrant generation for <u>women</u> (AME)

	M1-W						M2-W						M3-W					
	Fertile		Infertile		Idk		Fertile		Infertile		Idk		Fertile		Infertile		Idk	
	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%
Migrant generation (ref. non-migrant)																		
1st generation migrant	-0.063	-0.091,-0.035	0.043	0.019,0.067	0.020	0.008,0.031	-0.08	-0.107,-0.052	0.048	0.024,0.072	0.032	0.019,0.045	-0.065	-0.092,-0.037	0.034	0.011,0.057	0.030	0.017,0.043
2nd generation migrant	-0.017	-0.046,0.011	0.007	-0.019,0.033	0.011	-0.003,0.024	-0.012	-0.037,0.013	0.003	-0.019,0.026	0.009	-0.004,0.021	-0.009	-0.032,0.014	0.002	-0.020,0.023	0.007	-0.005,0.019
Age (ref. <35 years)																		
35-39							-0.074	-0.092,-0.056	0.067	0.052,0.083	0.007	-0.003,0.016	-0.075	-0.093,-0.057	0.068	0.052,0.084	0.007	-0.003,0.017
40+							-0.143	-0.174,-0.113	0.123	0.095,0.152	0.020	0.006,0.034	-0.138	-0.169,-0.107	0.116	0.087,0.145	0.022	0.007,0.038
Children (ref. no)																		
Yes							0.087	0.066,0.108	-0.04	-0.060,-0.021	-0.047	-0.057,-0.037	0.112	0.088,0.136	-0.066	-0.089,-0.043	-0.046	-0.057,-0.036
Subjective health (ref. good health)																		
Bad health							-0.033	-0.050,-0.017	0.028	0.014,0.042	0.006	-0.004,0.015	-0.032	-0.048,-0.016	0.028	0.014,0.042	0.004	-0.005,0.013
Marital status/ partnership (ref. married)																		
No partner													0.044	0.023,0.064	-0.052	-0.071,-0.034	0.009	-0.001,0.018
Unmarried													0.015	-0.006,0.035	-0.027	-0.046,-0.009	0.012	0.004,0.021
Education (ref. prim. & lower second.)																		
Higher secondary													-0.123	-0.163,-0.083	0.082	0.045,0.118	0.042	0.021,0.063
Tertiary													-0.034	-0.050,-0.018	0.024	0.010,0.039	0.010	0.002,0.017
Missing value													-0.180	-0.379,0.019	0.202	0.003,0.400	-0.022	-0.043,-0.002
Observations	*31,912*						*31,912*						*31,912*					

Data: Calculations based on pairfam waves 1-12 (weighted data). N_{total}= 6684 women with 31,912 person-years.
Notes: AME = average marginal effect. CI 95% = 95% confidence intervals; Idk = I don't know. Model M3-W includes wave as a control (not shown, available upon request).

Table A3b: Results of the multinomial logit analysis on the probability of self-perceived infertility by migrant generation for men (AME)

	M1-M						M2-M						M3-M					
	Fertile		Infertile		Idk		Fertile		Infertile		Idk		Fertile		Infertile		Idk	
	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%
Migrant generation (ref. non-migrant)																		
1st generation migrant	-0.087	-0.125,-0.049	0.056	0.021,0.091	0.031	0.012,0.050	-0.107	-0.144,-0.070	0.066	0.031,0.101	0.041	0.020,0.062	-0.086	-0.122,-0.051	0.045	0.013,0.076	0.042	0.020,0.063
2nd generation migrant	-0.015	-0.046,0.016	0.008	-0.019,0.034	0.008	-0.008,0.024	-0.025	-0.056,0.006	0.016	-0.011,0.043	0.009	-0.007,0.024	-0.022	-0.053,0.008	0.013	-0.012,0.039	0.009	-0.007,0.025
Age (ref. <35 years)																		
35-39							-0.070	-0.087,-0.053	0.065	0.051,0.079	0.005	-0.006,0.016	-0.064	-0.082,-0.047	0.059	0.045,0.073	0.006	-0.005,0.016
40+							-0.130	-0.166,-0.095	0.124	0.089,0.160	0.006	-0.011,0.023	-0.125	-0.160,-0.090	0.115	0.082,0.147	0.010	-0.008,0.029
Children (ref. no)																		
Yes							0.087	0.067,0.107	-0.038	-0.057,-0.019	-0.049	-0.059,-0.038	0.105	0.080,0.130	-0.067	-0.090,-0.043	-0.039	-0.049,-0.028
Subjective health (ref. good health)																		
Bad health							-0.030	-0.050,-0.009	0.028	0.011,0.045	0.002	-0.009,0.013	-0.024	-0.044,-0.005	0.026	0.011,0.042	-0.002	-0.013,0.008
Marital status/ partnership (ref. married)																		
No partner													0.037	0.011,0.064	-0.067	-0.091,-0.043	0.030	0.017,0.043
Unmarried													0.025	-0.003,0.053	-0.042	-0.068,-0.016	0.017	0.007,0.027
Education (ref. prim. & lower second.)																		
Higher secondary													-0.098	-0.138,-0.058	0.065	0.033,0.098	0.033	0.009,0.056
Tertiary													-0.049	-0.066,-0.031	0.037	0.022,0.052	0.012	0.002,0.021
Missing value													-0.166	-0.350,0.018	0.153	-0.008,0.314	0.013	-0.076,0.102
Observations	*29,101*						*29,101*						*29,101*					

Data: Calculations based on pairfam waves 1-12 (weighted data). N_{total}= 6259 men with 29,101 person-years.
Notes: AME = average marginal effect. CI 95% = 95% confidence intervals; Idk = I don't know. Model M3-M includes wave as a control (not shown, available upon request). AME = Average marginal effect. CI 95% = 95% confidence intervals.

Table A4a: Results of the multinomial logit analysis on the probability of self-perceived infertility by region of origin for <u>women</u> (AME)

	M1-W						M2-W						M3-W					
	Fertile		Infertile		Idk		Fertile		Infertile		Idk		Fertile		Infertile		Idk	
	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%
Migrant generation (ref. non-migrant)																		
NWCSSE Europe	-0.042	-0.075,-0.009	0.034	0.003,0.064	0.008	-0.004,0.021	-0.028	-0.056,0.000	0.019	-0.006,0.044	0.009	-0.004,0.021	-0.027	-0.054,-0.001	0.018	-0.005,0.042	0.009	-0.004,0.022
Balkan	0.008	-0.043,0.058	-0.026	-0.060,0.007	0.019	-0.010,0.047	-0.002	-0.057,0.052	-0.021	-0.057,0.014	0.023	-0.007,0.054	0.012	-0.035,0.059	-0.032	-0.059,-0.005	0.020	-0.009,0.049
Russia	-0.113	-0.179,-0.048	0.084	0.021,0.147	0.030	0.006,0.053	-0.133	-0.196,-0.070	0.094	0.035,0.153	0.040	0.014,0.066	-0.135	-0.200,-0.070	0.092	0.032,0.152	0.043	0.017,0.069
Kazakhstan	-0.048	-0.111,0.016	0.025	-0.024,0.075	0.022	-0.007,0.052	-0.099	-0.176,-0.022	0.055	-0.005,0.114	0.044	0.004,0.085	-0.086	-0.157,-0.015	0.042	-0.012,0.096	0.044	0.004,0.084
Middle East	-0.033	-0.066,0.001	0.003	-0.020,0.026	0.030	0.005,0.054	-0.054	-0.091,-0.017	0.013	-0.013,0.039	0.042	0.014,0.069	-0.015	-0.048,0.018	-0.015	-0.037,0.007	0.030	0.006,0.055
Other	-0.015	-0.056,0.027	0.014	-0.026,0.053	0.001	-0.016,0.017	-0.031	-0.070,0.009	0.028	-0.010,0.067	0.002	-0.015,0.019	-0.029	-0.067,0.009	0.026	-0.010,0.062	0.003	-0.014,0.019
Age (ref. <35 years)																		
35-39							-0.076	-0.094,-0.059	0.069	0.053,0.084	0.008	-0.001,0.017	-0.076	-0.094,-0.058	0.068	0.052,0.083	0.008	-0.002,0.018
40+							-0.143	-0.173,-0.113	0.122	0.094,0.150	0.022	0.007,0.036	-0.136	-0.166,-0.106	0.112	0.085,0.140	0.024	0.008,0.040
Children (ref. no)																		
Yes							0.085	0.064,0.106	-0.038	-0.057,-0.019	-0.047	-0.057,-0.037	0.112	0.088,0.135	-0.065	-0.088,-0.043	-0.046	-0.057,-0.036
Subjective health (ref. good health)																		
Bad health							-0.034	-0.051,-0.017	0.029	0.014,0.043	0.005	-0.004,0.015	-0.032	-0.049,-0.016	0.028	0.014,0.042	0.004	-0.005,0.013
Marital status/ partnership (ref. married)																		
No partner													0.047	0.027,0.067	-0.055	-0.073,-0.037	0.008	-0.001,0.017
Unmarried													0.019	-0.002,0.039	-0.031	-0.050,-0.012	0.012	0.003,0.021
Education (ref. prim. & lower second.)																		
Higher secondary													-0.139	-0.179,-0.099	0.100	0.063,0.138	0.039	0.018,0.059
Tertiary													-0.035	-0.050,-0.019	0.026	0.012,0.040	0.009	0.001,0.016
Missing value													-0.226	-0.418,-0.034	0.249	0.057,0.442	-0.023	-0.043,-0.004
Observations	*31,912*						*31,912*						*31,912*					

Data: Calculations based on pairfam waves 1-12 (weighted data). N_{total}= 6684 women with 31,912 person-years.
Notes: AME = average marginal effect; CI 95= 95% confidence interval; Idk = I don't know; NWCSSE = North, West, Central, South, South-East Europe. Model M3-W includes wave as a control (not shown, available upon request).

Table A4b: Results of the multinomial logit analysis on the probability of self-perceived infertility by region of origin for men (AME)

	M1-M						M2-M						M3-M					
	Fertile		Infertile		Idk		Fertile		Infertile		Idk		Fertile		Infertile		Idk	
	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%	AME	CI 95%
Migrant generation (ref. non-migrant)																		
NWCSSE Europe	-0.036	-0.076,0.005	0.023	-0.014,0.059	0.013	-0.006,0.032	-0.038	-0.076,0.001	0.022	-0.012,0.057	0.015	-0.004,0.035	-0.039	-0.078,-0.000	0.022	-0.012,0.057	0.017	-0.003,0.037
Balkan	-0.001	-0.052,0.050	0.012	-0.032,0.057	-0.011	-0.038,0.015	-0.024	-0.082,0.034	0.032	-0.022,0.086	-0.008	-0.036,0.021	-0.009	-0.060,0.042	0.020	-0.027,0.067	-0.011	-0.038,0.016
Russia	-0.087	-0.194,0.020	0.033	-0.052,0.117	0.054	-0.005,0.113	-0.122	-0.232,-0.011	0.062	-0.036,0.159	0.060	-0.002,0.122	-0.114	-0.219,-0.009	0.052	-0.028,0.133	0.062	0.001,0.122
Kazakhstan	-0.082	-0.143,-0.021	0.043	-0.001,0.088	0.039	-0.010,0.087	-0.126	-0.197,-0.055	0.083	0.025,0.140	0.043	-0.007,0.094	-0.095	-0.164,-0.027	0.055	0.006,0.103	0.041	-0.009,0.090
Middle East	-0.061	-0.108,-0.015	0.047	0.003,0.091	0.014	-0.007,0.036	-0.081	-0.125,-0.038	0.057	0.017,0.098	0.024	-0.000,0.048	-0.050	-0.089,-0.012	0.028	-0.006,0.062	0.022	-0.001,0.045
Other	-0.070	-0.141,0.002	0.039	-0.030,0.108	0.030	-0.003,0.063	-0.085	-0.152,-0.018	0.053	-0.012,0.119	0.031	-0.001,0.064	-0.070	-0.128,-0.012	0.037	-0.017,0.091	0.033	0.001,0.065
Age (ref. <35 years)																		
35-39							-0.073	-0.090,-0.056	0.067	0.053,0.081	0.006	-0.005,0.017	-0.066	-0.083,-0.048	0.060	0.046,0.074	0.006	-0.005,0.017
40+							-0.133	-0.169,-0.097	0.126	0.090,0.162	0.007	-0.010,0.024	-0.127	-0.162,-0.092	0.116	0.083,0.149	0.011	-0.007,0.029
Children (ref. no)																		
Yes							0.087	0.067,0.107	-0.038	-0.057,-0.020	-0.048	-0.059,-0.038	0.105	0.080,0.130	-0.067	-0.090,-0.043	-0.038	-0.049,-0.028
Subjective health (ref. good health)																		
Bad health							-0.030	-0.051,-0.010	0.028	0.011,0.045	0.002	-0.009,0.013	-0.024	-0.044,-0.005	0.026	0.011,0.042	-0.002	-0.013,0.008
Marital status/ partnership (ref. married)																		
No partner													0.039	0.013,0.066	-0.068	-0.092,-0.044	0.029	0.016,0.042
Unmarried													0.027	-0.001,0.055	-0.043	-0.069,-0.017	0.016	0.006,0.026
Education (ref. prim. & lower second.)																		
Higher secondary													-0.104	-0.144,-0.063	0.068	0.035,0.101	0.035	0.012,0.059
Tertiary													-0.049	-0.066,-0.031	0.037	0.022,0.052	0.012	0.002,0.021
Missing value													-0.178	-0.362,0.005	0.161	0.000,0.322	0.017	-0.077,0.111
Observations	*29,101*						*29,101*						*29,101*					

Data: Calculations based on pairfam waves 1-12 (weighted data). N_{total}= 6259 men with 29,101 person-years.

Notes: AME = average marginal effect; CI 95= 95% confidence interval; Idk = I don't know. NWCSSE = North, West, Central, South, South-East Europe. Model M3-M includes wave as a control (not shown, available upon request).

Table A5: Results of the multivariable logistic analysis on the probability of medical help-seeking to have a child, all respondents (AME)

	M1		M2		M3		M4	
	AME	**CI 95**	**AME**	**CI 95**	**AME**	**CI 95**	**AME**	**CI 95**
Migrant	-0.084	-0.153,-0.014	-0.074	-0.137,-0.010	-0.083	-0.143,-0.024	-0.083	-0.140,-0.025
Women (ref. men)			0.093	0.040,0.146	0.099	0.048,0.149	0.092	0.042,0.142
Age (ref. <35 years)								
35-39			0.085	0.028,0.143	0.062	0.006,0.119	0.049	-0.014,0.112
40+			0.178	0.088,0.268	0.157	0.070,0.243	0.114	0.033,0.195
Has kids (ref. no kids)			-0.208	-0.259,-0.157	-0.225	-0.275,-0.175	-0.212	-0.262,-0.162
Bad health (ref. good health)			0.081	0.007,0.155	0.097	0.023,0.170	0.083	0.009,0.157
Marital status/ partnership (ref. married)								
No partner					-0.168	-0.279,-0.057	-0.164	-0.273,-0.054
Unmarried					-0.129	-0.181,-0.078	-0.122	-0.174,-0.070
Lower education (ref. higher education)					-0.043	-0.099,0.013	-0.051	-0.104,0.003
Household income (ref. <1500€)								
1500-2500					0.091	-0.008,0.189	0.093	-0.009,0.194
2500-3500					0.054	-0.043,0.152	0.047	-0.051,0.146
3500+					0.114	0.015,0.213	0.105	0.005,0.205
Missing value					0.028	-0.100,0.157	0.034	-0.096,0.163
Self-perceived infertility								
At least 1 person infertile							0.201	0.123,0.279
Don't know if self/couple (in)fertile							-0.073	-0.196,0.049
Observations	*2345*		*2345*		*2345*		*2345*	

Data: Calculations based on pairfam waves 7-12 (weighted data). N_{total} =1500 persons with 2345 person-years. Sample includes women and men (no separate models because of small sample size).

Notes: AME = average marginal effect; CI 95% = 95% confidence intervals. Model 4 includes wave as a control (not shown, available upon request).

References

Adamson, G. D., de Mouzon, J., Chambers, G. M., Zegers-Hochschild, F., Mansour, R., Ishihara, O., Banker, M., & Dyer, S. (2018). International Committee for Monitoring Assisted Reproductive Technology: world report on assisted reproductive technology, 2011. *Fertility and Sterility*, *110*(6), 1067–1080. https://doi.org/10.1016/j.fertnstert.2018.06.039.

Adserà, A., & Ferrer, A. (2015). Immigrants and demography: marriage, divorce, and fertility. In B. R. Chiswick & P. W. Miller (Eds.), *Handbook of the Economics of International Migration* (Vol. 1, pp. 315–374). Elservier. https://doi.org/10.1016/B978-0-444-53764-5.00007-4.

Alderotti, G., & Trappolini, E. (2022). Health status and fertility intentions among migrants. *International Migration*, *60*(4), 164–177. https://doi.org/10.1111/imig.12921.

Aleixandre-Benavent, R., Simon, C., & Fauser, B. C. J. M. (2015). Trends in clinical reproductive medicine research: 10 years of growth. *Fertility and Sterility*, *104*(1), 131–137. https://doi.org/10.1016/j.fertnstert.2015.03.025.

Atkin, K. (2009). Making sense of ethnic diversity, difference and disadvantage within the context of multicultural societies. In L. Culley, N. Hudson, & F. van Rooij (Eds.), *Marginalized Reproduction: Ethnicity, Infertility and Reproductive Technologies* (pp. 49–63). Routledge.

Bagavos, C. (2019). On the multifaceted impact of migration on the fertility of receiving countries: Methodological insights and contemporary evidence for Europe, the United States, and Australia. *Demographic Research*, *41*, 1–36. https://doi.org/10.4054/DemRes.2019.41.1.

Bastola, K., Koponen, P., Gissler, M., & Kinnunen, T. I. (2020). Differences in caesarean delivery and neonatal outcomes among women of migrant origin in Finland: A population-based study. *Paediatric and Perinatal Epidemiology*, *34*(1), 12–20. https://doi.org/10.1111/ppe.12611.

Baykara-Krumme, H., & Milewski, N. (2017). Fertility patterns among Turkish women in Turkey and abroad: the effects of international mobility, migrant generation, and family background. *European Journal of Population*, *33*(3), 409–436. https://doi.org/10.1007/s10680-017-9413-9.

Bean, F. D., & Tienda, M. (1990). *The Hispanic population of the United States*. Russell Sage Foundation.

Benyamini, Y. (2011). Health and illness perceptions. In H. S. Friedman (Ed.), *The Oxford handbook of health psychology* (pp. 281–314). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195342819.013.0013.

Best, H., & Wolf, C. (2014). Logistic regression. In H. Best & C. Wolf (Eds.), *The SAGE handbook of regression analysis and causal inference* (pp. 153–172). Sage.

Brautsch, L. A. S., Voss, I., Schmidt, L., & Vassard, D. (2023). Social disparities in the use of ART treatment: a national register-based cross-sectional study among women in Denmark. *Human Reproduction*, *38*(3), 503–510. https://doi.org/10.1093/humrep/deac247.

Brüderl, J., Drobnic, S., Hank, K., et al. (2023). The German Family Panel (pairfam). *GESIS Data Archive*, *ZA5678 Data file Version 12.0.0*. https://doi.org/10.4232/pairfam.5678.12.0.0.

Bujard, M., & Andersson, G. (2024). Fertility declines near the end of the COVID-19 pandemic: Evidence of the 2022 birth declines in Germany and Sweden. European Journal of Population 40. https://doi.org/10.1007/s10680-023-09689-w.

Butts, S. F. (2021). Health disparities of African Americans in reproductive medicine. *Fertility and Sterility*, *116*(2), 287–291. https://doi.org/10.1016/j.fertnstert.2021.06.041.

Calhaz-Jorge, C., De Geyter, C. H., Kupka, M. S., Wyns, C., Mocanu, E., Motrenko, T., Scaravelli, G., Smeenk, J., Vidakovic, S., & Goossens, V. (2020). Survey on ART and IUI: legislation, regulation, funding and registries in European countries: The European IVF-monitoring Consortium (EIM) for the European Society of Human Reproduction and Embryology (ESHRE). *Human Reproduction Open*, *2020*(1), hoz044. https://doi.org/10.1093/hropen/hoz044.

Carnein, M., Milewski, N., Doblhammer, G., & Nusselder, W. J. (2015). Health inequalities of immigrants: patterns and determinants of health expectancies of Turkish migrants living in Germany. In G. Doblhammer (Ed.), *Health among the elderly in Germany: New evidence on disease, disability and care need* (pp. 157–190). Barbara Budrich.

Carson, S. A., & Kallen, A. N. (2021). Diagnosis and management of infertility: a review. *JAMA*, *326*(1), 65–79. https://doi.org/10.1001/jama.2021.4788.

Christ, J. P., Vu, M., Mehr, H., Jackson-Bey, T., & Herndon, C. N. (2022). See one, do one, teach one: reimagining reproductive endocrinology and infertility training programs to expand access to care. *F&S Reports*, *3*(Suppl. 2), 114–121. https://doi.org/10.1016/j.xfre.2021.10.001.

Coleman, J. (1994). *Foundations of social theory*. Harvard University Press. https://www.hup.harvard.edu/catalog.php?isbn=9780674312265.

Colen, S. (1986). With respect and feelings: voices of West Indian child care and domestic workers in New York City. In J. B. Cole (Ed.), *All American women: Lines that divide, ties that bind* (pp. 46–70). Free Press.

Cox, C. M., Thoma, M. E., Tchangalova, N., Mburu, G., Bornstein, M. J., Johnson, C. L., & Kiarie, J. (2022). Infertility prevalence and the methods of estimation from 1990 to 2021: a systematic review and meta-analysis. *Human Reproduction Open*, *2022*(4), hoac051. https://doi.org/10.1093/hropen/hoac051.

Crawford, G., & Ledger, W. (2019). In vitro fertilisation/intracytoplasmic sperm injection beyond 2020. *BJOG: An International Journal of Obstetrics & Gynaecology*, *126*(2), 237–243. https://doi.org/10.1111/1471-0528.15526.

Culley, L. A., Hudson, N., Rapport, F. L., Katbamna, S., & Johnson, M. R. D. (2006). British South Asian communities and infertility services. *Human Fertility*, *9*(1), 37–45. https://doi.org/10.1080/14647270500282644.

Culley, L., & Hudson, N. (2009). Constructing relatedness: ethnicity, gender and third party assisted conception in the UK. *Current Sociology*, *57*(2), 249–267. https://doi.org/10.1177/0011392108099165.

De Geyter, C., Calhaz-Jorge, C., Kupka, M. S., Wyns, C., Mocanu, E., Motrenko, T., Scaravelli, G., Smeenk, J., Vidakovic, S., Goossens, V., & The European IVF-monitoring Consortium (EIM) for the European Society of Human Reproduction and Embryology (ESHRE). (2020). ART in Europe, 2015: results generated from European registries by ESHRE. *Human Reproduction Open*, *2020*(1), hoz038. https://doi.org/10.1093/hropen/hoz038.

DIR. (2021). Jahrbuch 2020. German IVF register. *Journal of Reproductive Medicine and Endocrinology*, *3*, 1–60.

Domar, A., Gordon, K., Garcia-Velasco, J., La Marca, A., Barriere, P., & Beligotti, F. (2012). Understanding the perceptions of and emotional barriers to infertility treatment: a survey in four European countries. *Human Reproduction*, *27*(4), 1073–1079. https://doi.org/10.1093/humrep/des016.

Dunson, D. B., Colombo, B., & Baird, D. D. (2002). Changes with age in the level and duration of fertility in the menstrual cycle. *Human Reproduction*, *17*(5), 1399–1403. https://doi.org/10.1093/humrep/17.5.1399.

Erman, J. (2022). Cohort, policy, and process: the implications for migrant fertility in West Germany. *Demography*, *59*(1), 221–246. https://doi.org/10.1215/00703370-9629146.

Evers, J. L. (2002). Female subfertility. *The Lancet*, *360*(9327), 151–159. https://doi.org/10.1016/S0140-6736(02)09417-5.

Foner, N., & Alba, R. (2008). Immigrant religion in the U.S. and Western Europe: bridge or barrier to inclusion? *International Migration Review*, *42*(2), 360–392. https://doi.org/10.1111/j.1747-7379.2008.00128.x.

Galic, I., Negris, O., Warren, C., Brown, D., Bozen, A., & Jain, T. (2021). Disparities in access to fertility care: who's in and who's out. *F&S Reports*, *2*(1), 109–117. https://doi.org/10.1016/j.xfre.2020.11.001.

Geiger, H. J. (2003). Racial and ethnic disparities in diagnosis and treatment: a review of the evidence and a consideration of causes. In B. D. Smedley, A. Y. Stith, & A. R. Nelson (Eds.), *Unequal treatment: Confronting racial and ethnic disparities in health care* (pp. 417–454). National Academies Press. https://www.ncbi.nlm.nih.gov/books/NBK220337/.

Geronimus, A. T., Hicken, M., Keene, D., & Bound, J. (2006). "Weathering" and age patterns of allostatic load scores among blacks and whites in the United States. *American Journal of Public Health*, *96*(5), 826–833. https://doi.org/10.2105/AJPH.2004.060749.

Gerritsen, A. A., & Devillé, W. L. (2009). Gender differences in health and health care utilisation in various ethnic groups in the Netherlands: a cross-sectional study. *BMC Public Health*, *9*, 109. https://doi.org/10.1186/1471-2458-9-109.

González-Ferrer, A., Castro Martín, T., Kraus, E., & Eremenko, T. (2017). Childbearing patterns among immigrant women and their daughters in Spain: over-adaptation or structural constraints. *Demographic Research*, *37*, 599–634. https://doi.org/10.4054/DemRes.2017.37.19.

Greil, A. L., Slauson-Blevins, K., & McQuillan, J. (2010). The experience of infertility: a review of recent literature. *Sociology of Health & Illness*, *32*(1), 140–162. https://doi.org/10.1111/j.1467-9566.2009.01213.x.

Gürtin-Broadbent, Z. (2009). "Anything to become a mother": migrant Turkish women's experiences of involuntary childlessness and assisted reproductive technologies in London. In L. Culley, N. Hudson, & F. van Rooij (Eds.), *Marginalized Reproduction: Ethnicity, Infertility and Reproductive Technologies* (pp. 117–133). Routledge.

Haug, S., & Milewski, N. (2018). Women's attitudes toward assisted reproductive technologies–A pilot study among migrant minorities and non-migrants in Germany. *Comparative Population Studies*, *43*, 343–370. https://doi.org/10.12765/CPoS-2019-06en.

Homan, G. F., Davies, M., & Norman, R. (2007). The impact of lifestyle factors on reproductive performance in the general population and those undergoing infertility treatment: a review. *Human Reproduction Update*, *13*(3), 209–223. https://doi.org/10.1093/humupd/dml056.

Huinink, J., Brüderl, J., Nauck, B., Walper, S., Castiglioni, L., & Feldhaus, M. (2011). Panel analysis of intimate relationships and family dynamics (pairfam): conceptual framework and design. *Journal of Family Research*, *23*(1), 77–101.

Inhorn, M. C. (2018). *America's Arab Refugees: vulnerability and health on the margins*. Stanford University Press.

Inhorn, M. C., Ceballo, R., & Nachtigall, R. (2009). Marginalized, invisible, and unwanted: American minority struggles with infertility and assisted conception. In L. Culley, N. Hudson, & F. van Rooij (Eds.), *Marginalized Reproduction: Ethnicity, Infertility and Reproductive Technologies* (pp. 181–197). Routledge.

Inhorn, M., & Van Balen, F. (Eds.). (2002). *Infertility around the globe: new thinking on childlessness, gender, and reproductive technologies*. University of California Press.

Jackson-Bey, T., Morris, J., Jasper, E., Velez Edwards, D. R., Thornton, K., Richard-Davis, G., & Plowden, T. C. (2021). Systematic review of racial and ethnic disparities in reproductive endocrinology and

infertility: where do we stand today? *F&S Reviews*, *2*(3), 169–188. https://doi.org/10.1016/j.xfnr.2021.05.001.

Johnson, K. M., Shreffler, K. M., Greil, A. L., & McQuillan, J. (2023). Bearing the reproductive load? Unequal reproductive careers among U.S. Women. *Population Research and Policy Review*, *42*(1), 14. https://doi.org/10.1007/s11113-023-09770-6.

Johnson, M., & Borde, T. (2009). Representation of Ethnic Minorities in Research: Necessity, Opportunity and Adverse Effects. In L. Culley, N. Hudson, & F. van Rooij (Eds.), *Marginalized Reproduction: Ethnicity, Infertility and Reproductive Technologies* (pp. 64–79). Routledge.

Juárez, S., Mussino, E., & Hjern, A. (2019). Being a refugee or having a refugee status? Birthweight and gestational age outcomes among offspring of immigrant mothers in Sweden. *Scandinavian Journal of Public Health*, *47*(7), 730–734. https://doi.org/10.1177/1403494818777432.

Köppen, K., Trappe, H., & Schmitt, C. (2021). Who can take advantage of medically assisted reproduction in Germany? *Reproductive Biomedicine & Society Online*, *13*, 51–61. https://doi.org/10.1016/j.rbms.2021.05.002.

Krapf, S., & Wolf, K. (2015). Persisting differences or adaptation to German fertility patterns? First and second birth behavior of the 1.5 and second generation Turkish migrants in Germany. *Kölner Zeitschrift Für Soziologie Und Sozialpsychologie*, *67*(Suppl.1), 137–164. https://doi.org/10.1007/s11577-015-0331-8.

Kulu, H., Milewski, N., Hannemann, T., & Mikolai, J. (2019). A decade of life-course research on fertility of immigrants and their descendants in Europe. *Demographic Research*, *40*, 1345–1374. https://doi.org/10.4054/DemRes.2019.40.46.

Lazzari, E., Gray, E., & Baffour, B. (2022). *A dyadic approach to the study of perceived infertility and contraceptive use. Demographic Research,* 47, 1-36. https://doi.org/10.4054/DemRes.2022.47.1.

Li, X., Sundquist, J., & Sundquist, K. (2013). Immigrants and preterm births: a nationwide epidemiological study in Sweden. *Maternal and Child Health Journal*, *17*(6), 1052–1058. https://doi.org/10.1007/s10995-012-1087-7.

Liu, C., & Kulu, H. (2023). Competing family pathways for immigrants and their descendants in Germany. *International Migration Review* (online first). https://doi.org/10.1177/01979183231161600.

Loi, S., Pitkänen, J., Moustgaard, H., Myrskylä, M., & Martikainen, P. (2021). Health of immigrant children: the role of immigrant generation, exogamous family setting, and family material and social resources. *Demography*, *58*(5), 1655–1685. https://doi.org/10.1215/00703370-9411326.

McQuillan, J., Passet-Wittig, J., Greil, A. L., & Bujard, M. (2022). Is perceived inability to procreate associated with life satisfaction? Evidence from a German panel study. *Reproductive Biomedicine & Society Online*, *14*, 87–100. https://doi.org/10.1016/j.rbms.2021.09.004.

Merkison, J. M., Chada, A. R., Marsidi, A. M., & Spencer, J. B. (2023). Racial and ethnic disparities in assisted reproductive technology: a systematic review. *Fertility and Sterility*, *119*(3), 341–347. https://doi.org/10.1016/j.fertnstert.2023.01.023.

Milewski, N. (2007). First child of immigrant workers and their descendants in West Germany: Interrelation of events, disruption, or adaptation? *Demographic Research*, *17*, 859–896. https://doi.org/doi:10.4054/DemRes.2007.17.29.

Milewski, N. (2010). *Fertility of immigrants. A two-generational approach in Germany*. Springer. http://dx.doi.org/10.1007/978-3-642-03705-4.

Milewski, N., & Adserà, A. (2023). Introduction: fertility and social inequalities in migrant populations: a look at the roles of selection, context of reception, and employment. *Journal of International Migration and Integration*, *24*(Suppl. 1), 1–21. https://doi.org/10.1007/s12134-022-01003-7.

Milewski, N., & Haug, S. (2020). Religious diversity and women's attitudes toward using assisted reproductive technologies— insights from a pilot study in Germany. *Journal of Religion and Demography*, *7*(1), 150–168.

Milewski, N., & Haug, S. (2022). At risk of reproductive disadvantage? Exploring fertility awareness among migrant women in Germany. *Reproductive Biomedicine & Society Online*, *14*, 226–238. https://doi.org/10.1016/j.rbms.2021.11.007.

Milewski, N., & Peters, F. (2014). Too low or too high? On birthweight differentials of immigrants in Germany. *Comparative Population Studies*, *39*(1), 3–22. https://doi.org/10.12765/CPoS-2014-02.

Mussino, E., & Strozza, S. (2012). The fertility of immigrants after arrival: the Italian case. *Demographic Research*, *26*, 99–130. https://doi.org/10.4054/DemRes.2012.26.4.

Opondo, C., Jayaweera, H., Hollowell, J., Li, Y., Kurinczuk, J. J., & Quigley, M. A. (2020). Variations in neonatal mortality, infant mortality, preterm birth and birth weight in England and Wales according to ethnicity and maternal country or region of birth: an analysis of linked national data from 2006 to 2012. *Journal of Epidemiology and Community Health*, *74*(4), 336–345. https://doi.org/10.1136/jech-2019-213093.

Passet-Wittig, J. (2017). *Unerfüllte Kinderwünsche und Reproduktionsmedizin. Eine sozialwissenschaftliche Analyse von Paaren in Kinderwunschbehandlung*. Barbara Budrich.

Passet-Wittig, J., & Bujard, M. (2021). Medically assisted reproduction in developed countries: overview and societal challenges. In N. Schneider & M. Kreyenfeld (Eds.), *Research Handbook on the Sociology of the Family* (pp. 417–438). Edward Elgar Publishing. https://doi.org/10.4337/9781788975544.00039.

Passet-Wittig, J., Bujard, M., McQuillan, J., & Greil, A. L. (2020). Is perception of inability to procreate a temporal phenomenon?: A longitudinal exploration of changes and determinants among women and men of reproductive age in Germany. *Advances in Life Course Research*, *45*, 100339. https://doi.org/10.1016/j.alcr.2020.100339.

Passet-Wittig, J., & Greil, A. L. (2021). Factors associated with medical help-seeking for infertility in developed countries: a narrative review of recent literature. *Social Science & Medicine*, *227*, 113782. https://doi.org/10.1016/j.socscimed.2021.113782.

Präg, P., & Mills, M. C. (2017). Cultural determinants influence assisted reproduction usage in Europe more than economic and demographic factors. *Human Reproduction*, *32*(11), 2305–2314. https://doi.org/10.1093/humrep/dex298.

Razum, O., & Twardella, D. (2002). Time travel with Oliver Twist – Towards an explanation for a paradoxically low mortality among recent immigrants. *Tropical Medicine & International Health*, *7*(1), 4–10. https://doi.org/10.1046/j.1365-3156.2002.00833.x.

Razum, O., Zeeb, H., & Rohrmann, S. (2000). The "healthy migrant effect" - not merely a fallacy of inaccurate denominator figures. *International Journal of Epidemiology*, *29*(1), 191–192. https://doi.org/10.1093/ije/29.1.191.

Saarela, J., & Wilson, B. (2022). Forced migration and the childbearing of women and men: A disruption of the tempo and quantum of fertility? *Demography*, *59*(2), 707–729. https://doi.org/10.1215/00703370-9828869.

Sabarre, K.-A., Khan, Z., Whitten, A. N., Remes, O., & Phillips, K. P. (2013). A qualitative study of Ottawa university students' awareness, knowledge and perceptions of infertility, infertility risk factors and assisted reproductive technologies (ART). *Reproductive Health*, *10*, 41. https://doi.org/10.1186/1742-4755-10-41.

Seifer, D. B., Sharara, F. I., & Jain, T. (2022). The Disparities in ART (DART) Hypothesis of Racial and Ethnic Disparities in Access and Outcomes of IVF Treatment in the USA. *Reproductive Sciences*, *29*(7), 2084–2088. https://doi.org/10.1007/s43032-022-00888-0.

Sluzki, C. E. (1979). Migration and family conflict. *Family Process*, *18*(4), 379–390. https://doi.org/10.1111/j.1545-5300.1979.00379.x.

Sobotka, T. (2008). Overview Chapter 7: The rising importance of migrants for childbearing in Europe. *Demographic Research*, *19*, 225–248. https://www.jstor.org/stable/26349250.

Statistisches Bundesamt. (2022). *Bevölkerung und Erwerbstätigkeit. Bevölkerung mit Migrationshintergrund. Ergebnisse des Mikrozensus 2020* (Fachserie 1 Reihe 2.2).

Trappolini, E., & Giudici, C. (2021). Gendering health differences between nonmigrants and migrants by duration of stay in Italy. *Demographic Research*, *45*, 221–258. https://doi.org/10.4054/DemRes.2021.45.7.

Väisänen, H., Remes, H., & Martikainen, P. (2022). Perinatal health among migrant women: a longitudinal register study in Finland 2000-17. *SSM - Population Health*, *20*, 101298. https://doi.org/10.1016/j.ssmph.2022.101298.

van Rooij, F., & Korfker, D. (2009). Infertile Turkish and Moroccan minority groups in the Netherlands: Patients' views on problems within infertility care. In L. Culley, N. Hudson, & F. van Rooij (Eds.), *Marginalized reproduction. Ethnicity, infertility and reproductive technologies* (pp. 134–150). Routledge.

Vanderlinden, L. K. (2011). Treating ethnic others: cultural sensitivity and minority stereotypes at a German fertility clinic. *Human Organization*, *70*(3), 253–264. https://www.jstor.org/stable/44150999

Vertovec, S. (2007). Super-diversity and its implications. *Ethnic and Racial Studies*, *30*(6), 1024–1054. https://doi.org/10.1080/01419870701599465.

Wilson, B. (2019). The intergenerational assimilation of completed fertility: comparing the convergence of different origin groups. *International Migration Review*, *53*(2), 429–457. https://doi.org/10.1177/0197918318769047.

Wolf, K. (2016). Marriage migration versus family reunification: How does the marriage and migration history affect the timing of first and second childbirth among Turkish immigrants in Germany? *European Journal of Population*, *32*(5), 731–759. https://doi.org/10.1007/s10680-016-9402-4.

Zegers-Hochschild, F., Adamson, G. D., Dyer, S., Racowsky, C., De Mouzon, J., Sokol, R., Rienzi, L., Sunde, A., Schmidt, L., Cooke, I. D., Simpson, J. L., & Van Der Poel, S. (2017). The International Glossary on Infertility and Fertility Care, 2017. *Human Reproduction*, *32*(9), 1786–1801. https://doi.org/10.1093/humrep/dex234.