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Andreas Höhn, Gunnar Andersson,
Hill Kulu, Brad Campbell

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Childbearing Across the Generations of Immigrants and their Descendants in Sweden: A Register-Based Study

By Andreas Höhn (1), Gunnar Andersson (2), Hill Kulu (1) and Brad Campbell (1)

(1) University of St. Andrews, (2) Stockholm University

Abstract: Immigrants and their descendants increasingly shape the patterns and trends of childbearing in Europe. In our study, we investigate fertility among immigrants and their descendants in Sweden. We study the childbearing outcomes of both immigrant women and men, and we focus on the fertility trajectories of immigrants with a background in low- as well as high-fertility countries. Using Swedish register data, we identified the native Swedish population and all immigrants and their descendants, who were born between 1941 and 1999 and living in Sweden sometime between 1991 and 2017 (N=8,080,338). We applied proportional hazards models to study how the first-, second-, and third-birth rates varied between population subgroups. For most migrants who arrived in Sweden as adults, we found elevated first-birth rates shortly after arrival. Patterns for migrants who came as children were more mixed as first-birth rates were higher for some groups (e.g., Turkey, North Africa), but lower for others (e.g., Poland, India). First-birth rates were generally lower among the descendants of two migrants compared to the native Swedish population. First-birth rates among the descendants of only one foreign-born parent were similar to those of the native Swedish population, although slightly lower. Results for second births showed little variation among all population subgroups; second-birth rates were generally lower among immigrants and their descendants compared to the native Swedish population. Results for third births showed higher levels of polarization, reflecting the established high- and low-fertility backgrounds. Our results provide strong evidence that patterns of fertility among the second generation are gradually drifting away from patterns observed among immigrants and increasingly resembling those of the native Swedish population.

Keywords: fertility, immigrants, generations, Sweden

1. Introduction

Following a similar pattern as other advanced Western economies, Sweden has experienced a growth of its immigrant population particularly over the past two decades. According to Statistics Sweden, approximately 19.6% of Sweden's population in 2019 was foreign-born (SCB 2020). Statistics also show that the proportion of children born with at least one foreign born parent has increased from 16% in 1970 to 38% in 2018 (SCB 2020). The growth of immigrant populations in Western societies have attracted the attention of demographers who are particularly interested in differences in demographic behaviour between immigrants and their descendants in comparison to the native population. From a social policy perspective, it is imperative to better understand the childbearing behaviour of immigrants as their characteristics have an impact on population structures at local, regional and national levels (Castles et al., 2013). Unlike other European countries, Sweden has relatively high fertility levels, which have allowed its population to grow; its positive net migration may produce sustainable growth also in the future (Gassen and Heleniak, 2016). Notwithstanding its population growth, Sweden is also experiencing population aging and the youthful nature of its immigrant population will help counteract this demographic phenomenon. The second motive behind research into migrant fertility has been the use of fertility behaviour as an indicator of integration into mainstream society. Migrants may be considered fully integrated in terms of demographic behaviour when their fertility patterns are similar to those of Swedish natives. Meanwhile, immigrant groups with a differing pattern may be considered less integrated, which could be viewed as an indicator of their social isolation from mainstream society.

The novel contribution of this paper is three-fold. First, we investigate changes across migrant generations. To date, fertility research has overwhelmingly focused on the fertility patterns of immigrants leaving the descendants of immigrants being overlooked and understudied (Kulu et al, 2017). This research imbalance has arisen partly due to data constraints and the youthful nature of the second-generation population in Europe. In addition, research has failed to take account of the heterogeneity of the second generation and in particular distinguishing between people with two foreign-born parents and those with one foreign-born and one native-born parent. In our study we will refer to the former group as belonging to a Generation 2.0 and the latter as being part of a Generation 2.5. So far, little is known of the impact of endogamous and exogamous unions on the fertility patterns of the children born in those unions. In our study, we take this approach one step further by also considering whether the mother or the father is a migrant for the descendants with one foreign-born parent. We also distinguish between migrants who moved as adults, and those who moved during their childhood. The latter are both descendants of migrants and migrants themselves. In our presentations, we refer to this group as belong to a Generation 1.5 in Sweden. By including this specification, we can assess whether entering Sweden as a child and spending part of the childhood time in this country makes this generation more similar in behaviour to people who were born in Sweden and spent their entire childhood there or to immigrants who grew up in another country than Sweden.

Second, we investigate the extent to which the context of Sweden may have an impact on the childbearing behaviour of immigrants in this country. Many immigrants to Sweden come from countries with much lower fertility levels than those of Sweden. Others come from countries with higher fertility levels, even if the pool of countries with such characteristics is rapidly diminishing. To accomplish this, our study includes a combination of population sub-groups with backgrounds in low-

as well as high-fertility settings. The former includes immigrants and their descendants from Poland and Southern Europe, the latter includes population sub-groups with a parental or own background in India, Turkey or North Africa. Theoretical models on fertility change predict that the former groups may display a pattern of higher fertility levels for generations with more extended exposure to the Swedish context (Tønnessen & Mussino 2019, Mussino et al. 2020), while the opposite tendency would hold for migrants and their descents from a pronounced high-fertility context (Dubuc, 2012).

Finally, we study the childbearing careers of immigrant and non-immigrant women and men. Much previous research on issues related to family formation and fertility has focussed on women as study subjects. In our study, we avoid such a bias and pay equal attention to the life course trajectories of women and men. In the case of first-generation migrants such an approach may be particularly rewarding as the timing of migration and family formation may be inter-linked in different ways for migrant women and men. A gendered approach is also highly relevant when studying how different generations of women and men adjust to their life situation in their current context.

2. Theoretical Considerations

Explaining immigrant fertility

There is a growing body of literature on immigrant fertility in Europe (for reviews, please see Kulu et al. 2019; Andersson 2021). Research has proposed four competing explanations of childbearing patterns of migrants after moving from one country to another. The *socialisation hypothesis* argues that the fertility behaviour of immigrants mainly reflects the fertility preferences that prevailed in their childhood origin (Cygan-Rehm 2014). Socialisation can be considered as a lifelong process, which can be divided into different stages, i.e., as primary and secondary socialisation. Primary socialisation takes place during childhood with behavioural traits transmitted from family, school and the wider community (Kulu et al. 2019; Andersson 2021). Secondary socialisation occurs in adulthood whenever an individual encounters a new environment or context such as moving to a new country. In contrast, the *adaptation hypothesis* argues that immigrants will adapt to the social, cultural and economic situation in the host country (Cygan-Rehm 2014). As migrants are exposed to a new context, their fertility levels will converge with that of natives. Unlike the socialisation hypothesis, which argues that integration may take place slowly and often over generations, proponents of adaptation argue that convergence in behaviour can take place rather rapidly.

Research has also sought to explain fertility differentials through the lens of the *selection hypothesis* (Blau and Kahn 2007; Hervitz 1985; Kulu 2005). It is well established that immigrants are distinctive in characteristics from non-movers in their country of origin and natives in their destination country (Kulu 2005). Literature on the determinants of migration has shown that migrants are typically positively selected in terms of high education and good health and that they arrive at relatively young ages. In addition to human capital, movers also possess distinct personality traits including being adventurous, taking risks and being ambitious (Massey et al. 1993). In the fertility context, the positive selection of immigrants by educational attainment can lead to relatively low fertility of migrants from high-fertility countries. In contrast, the *interrelation of life events hypothesis* predicts that immigrants experience elevated fertility shortly after arrival. The reason for high fertility is that migration, marriage

and childbearing are often interrelated in individuals' lives (Milewski 2007). Many women also move from one country to another to marry or to join a partner and will have a child soon after migration (Andersson 2004; Kulu 2005).

Fertility of the descendants of immigrants

The fertility behaviour of the descendants of immigrants is influenced by the social environment in the country they grow up. However, this environment may significantly differ. Many descendants grow up under the influence of the majority population, i.e. they adopt or assimilate into cultural and social norms of the mainstream society (Kulu et al. 2019). Hence, the *assimilation hypothesis* predicts that fertility behaviour of the descendants is similar to that of the majority population. However, family context certainly plays a role – all descendants are influenced by their immigrant parents. Further, a wider immigrant community may matter and some descendants may socialise into a minority subculture. The *subculture hypothesis* predicts that the descendants of immigrants exhibit specific childbearing patterns that are different from those of the majority population (assuming that immigrants differ from natives) (Kulu et al. 2019). There are two additional aspects related to immigrants and their descendants. Some immigrants move with children and these children may resemble immigrants (they were born outside the country) but also the descendants of immigrants (they partly grew up in the destination country). This so-called 1.5 generation may thus exhibit patterns that are similar to both immigrants and their descendants. Another group is the descendants of one immigrant and one non-migrant. These are sometimes referred to as the 2.5 generation. Clearly, they are likely to display childbearing patterns that are similar to those of the majority population.

3. The Swedish Context

Sweden has a global reputation for its relatively liberal immigration policies and its embracement of multiculturalism. Following the Second World War, Sweden became a distinct country of immigration. During the 1950s and 1960s, it received large numbers of immigrants mainly from Finland, as supply of labour to its growing industry. In addition to economic immigration, Sweden has attracted many refugees fleeing conflict and civil unrest. For example, during the 1950s and 1960s Sweden welcomed refugees from Eastern Europe, during the 1970s from Latin America, during the 1980s from Iran, during the 1990s from the former Yugoslavia, during the 2010s from Iraq, and more recently since 2015 from Syria.

Sweden's multicultural policies can be traced back to the 1960s and 1970s (Borevi 2013). In the 1960s Sweden extended its social welfare system to its immigrant population. The change ensured that immigrants had the same social rights as the rest of the population. The policy reflected concerns that immigrants would otherwise contribute to a more stratified society; the move to universal social rights sought to ensure a more socially cohesive society. In 1975, the Swedish government adopted a new immigration policy which sought to bring 'equality, freedom of choice and partnership' to immigrants (Borevi 2013). Under the new policies, immigrants would be encouraged to maintain their cultural distinctiveness whilst simultaneously be granted equal rights to participate in Swedish society.

Sweden's fertility regime can be characterized as 'highest-low', with fertility levels being below the replacement level of 2.1 children per woman, but still high as compared to most other developed societies (Andersson 2008). Another key feature of Sweden is its fluctuating fertility level which oscillates between periods of relatively high fertility and periods with lower fertility (Andersson 2008; Hoem & Hoem 1996). Sweden's relatively high fertility levels are often explained by features of its progressive and universalistic welfare state (Neyer & Andersson 2008). The country has ensured that labour-market participation is conducive to childbearing and childrearing through a system of subsidised childcare, individual based taxation, income replacement parental leave and policies which promote gender equality (Andersson 2008).

In our study we focus on selected groups of immigrants from contexts with different fertility regimes: we provide in-depth information on migrants and their descendants with a background in Poland, Southern Europe, India, Turkey, North Africa, and the other Nordic countries (Denmark, Finland, Iceland, Norway). The first two regions of origin are low-fertility contexts, the next three are contexts characterized by somewhat higher fertility levels than those of Sweden. Migrants from other Nordic countries stem from contexts that are very similar to Sweden, but they differ from natives Swedes by their experience of being migrants.

Immigration from India is a relatively new development with levels increasing threefold since the turn of the new century (SCB 2016, 2020). Given that this is a new immigrant group, Myrvold (2012) has recommended that researchers should pay more attention to the integration patterns of this population. Myrvold (2012) shows that Indian immigrants are relatively well educated and have strong presence in the IT and healthcare sectors. In contrast, Turkish migration to Sweden began already in the 1960s with the arrival of work-seeking men who were later followed by their wives and families. Qualitative research by Bayram et al. (2009) hints at a strong attachment of first- and second-generation Turks in Sweden to Turkish culture and identity and a social distance to Swedish natives. Many study participants did not support inter-marriage with a Swedish native and favoured socialization with fellow Turks. However, immigrants from Turkey stem from several different cultural belongings: Kurdish, Turkish and Syriac/Assyrian. Immigrants from Northern Africa come from a broader set of countries and also display a certain degree of cultural diversity with migrants stemming from different Arabic and Berber speaking areas of the region.

In the late 1940s and 1950s migration from Poland was heavily restricted by policies of the communist regime. However, following the easements of international travel in the late 1960s and 1970s, increasing numbers of Poles acquired passports and travelled to Sweden with the aim of no return. Many of the migrants of that time belonged to a persecuted Jewish minority. Still, it was not until the collapse of the Soviet Union in the early 1990s when Poles could freely migrate, a pattern which was further extended through Poland's accession to the European Union in 2004. During most of the time, female Polish migrants have outnumbered those of males, and many have married Swedish men. Polish migrants in Sweden have relatively high levels of education, and many have skills that are easily transferrable to the Swedish labour market (Józefowicz 1996). The same holds for migrants from Southern Europe. They come from a number of countries and thus make for a less cohesive group in Sweden. However, they all come from countries with strongly familistic systems and fertility regimes that are characterized by very low levels of childbearing.

Previous research on the fertility of immigrants to Sweden provides support for several of the hypotheses presented above. Studies show that the hypotheses are not mutually exclusive and may have different explanatory power at different stages of migrants' lives. For example, Andersson (2004) demonstrates strongly elevated fertility rates of newly arrived immigrant women to Sweden, which suggests that family formation and migration are often highly inter-linked events in the life of individuals. The same study also shows a process of rapid adaptation in terms of fertility rates with increasing duration of residence in Sweden. Andersson and Scott (2005, 2007) provide further insight into these patterns of adaptation and how they extend to the relationships between socio-economic and labour-market characteristics and fertility outcomes. Mussino et al. (2021) shows that the upward fertility adaptation of immigrants from low-fertility contexts appear less strong than adaptation in the other direction. The study also extends the focus to cover the childbearing outcomes of children who arrived in Sweden during childhood and any differences in fertility outcomes by their different ages of migration to this destination.

Research on the fertility of the descendants of immigrants have been more advanced in Sweden than in other parts of Europe. Scott and Stanfors (2011) found that descendants of immigrants generally had lower fertility than Swedish natives. In a comparative study of fertility amongst descendants of immigrants across six European countries, Kulu et al. (2017) found that the variation between second-generation groups were the smallest in Sweden. The authors attribute this to the equalising effect of Sweden's welfare system, which has enabled ethnic minorities to integrate better than in many other societies. Finally, Andersson, Persson and Obucina (2017) found that most groups of descendants of immigrants had lower fertility than Swedish natives, and that this was exhibited by lower rates of first and second births.

A shortcoming of previous studies is that they rely exclusively on data on women and provide no comparative perspective on how patterns in childbearing may differ across generations of women and men from different fertility contexts. Based on previous research and our study design we expect to find the following. First, most immigrant groups are expected to exhibit elevated fertility levels shortly after arrival in Sweden (Andersson 2004). However, it is likely that we observe such elevated fertility mostly for women and less so for men who may have arrived in Sweden before being joined by their partner. We aim at determining the extent to which such gender differences in behaviour differ between migrants from different countries of origin. Second, all migrant groups are expected to experience some degree of fertility change with their increasing duration of residence in Sweden. These patterns may differ between immigrants from high-fertility and low-fertility contexts (Tønnessen & Mussino 2019). Third, we expect the descendants of immigrant to exhibit childbearing patterns that are relatively similar to those of the native Swedish population (Kulu et al. 2017). However, it is less clear but critical to determine whether those who arrived in Sweden as children are more similar in behaviour to that of adult immigrants or to descendants to immigrants who were born in Sweden (Mussino et al. 2021). Finally, the descendants with only one migrant parent are expected to display fertility behaviour that is closer to that of natives than for the descendants of two immigrant parents. In all analyses, we apply a gender perspective and study the extent to which patterns differ when studied with focus on immigrant women or men. In the case of the descendants of one immigrant and one native-born parent, we aim at determining whether it matters in childbearing behaviour if it is the mother or the father who is a migrant or native-born Swede. In all analyses, we also pay particular attention to changes in behaviour across the generations of women and men in Sweden depending on whether they originate from a migration background with a low-fertility or high-fertility context, as

compared to that of Sweden. We are interested in determining whether any patterns of upward fertility adaptation are as strong as those in the downward direction.

4. Data and Methods

Life Course Approach

This study adopts a life course approach to study fertility differentials between the native Swedish population, immigrants, and the descendants of immigrants in Sweden. This longitudinal perspective is particularly well suited to explore how childbearing events interact with other domains in the lives of individuals and their families (Kulu & Milewski 2007). It is particularly useful as many domains in life see substantial change over the life course, such as the socioeconomic circumstances of individuals. With this nuanced and individual-level approach, we get much better insight into patterns in behaviour than what can be derived from the inspection of aggregate descriptive statistics on fertility, such as data on Total Fertility Rates (Kulu et al. 2019).

Data

In this study, we rely on individual-level register data from Sweden. These administrative data cover the entire population with legal residence in Sweden. Situated at the very centre of this administrative data collection, is the Swedish population register. Digitized in 1968 and updated continuously, the Swedish population register records all major demographic events, such as childbirths, marriages, deaths, or international migrations of the Swedish population. The quality of Swedish register data, in particular its completeness and accuracy, is widely acknowledged (Ludvigsson et al. 2016). The quality of the data makes it a unique source of information for different disciplines of research. For this study, we had access to data from the Swedish population register that covered the period 1968 to 2017.

All individuals in the Swedish population receive a unique personal identification number. This number is assigned to all individuals either immediately after being born in Sweden, or after having registered their immigration to Sweden (Ludvigsson et al. 2009). With an anonymized version of this identification number, we were able to follow individuals throughout different data sets via record linkages. For example, we were able to link records from the population register with data from the longitudinal integrated database for health insurance and labour market studies – the LISA collection of administrative register data.

Data from LISA are available since 1990 and cover all individuals aged 16 and older who are registered in Sweden (Ludvigsson et al. 2019). The register collection is updated by Statistics Sweden on a year-to-year basis. The format of the data make it reflect the status in each entire year. A detailed documentation of the LISA data is available and maintained by Statistics Sweden (SCB 2019).

For this study, we had access to data from LISA covering the period between 1990 and 2016. From LISA, we obtained information on individuals' education and employment status, as well as information on whether individuals received unemployment or student benefits within a particular year. Data on student and unemployment benefits were available as the total amount of received benefits. However, we only aimed to identify whether individuals were students at all or had any periods of unemployment within a particular year. Therefore, we did not focus on the magnitude of benefits but used a binary indicator reflecting whether individuals received any of the two benefits in the respective calendar year. We furthermore used a binary employment indicator, which is indicative of whether individuals were in any employment during the month of November in a respective year. We used this information as a proxy for employment during the entire year. Our indicator for the level of education reflects the highest achieved level of education during the respective calendar year. Our grouping is based on a harmonized classification of the Swedish SUN codes. This classification allows broad levels of education - primary, secondary, and tertiary education - to be captured consistently over time for the entire study population (SCB 2019).

Reconstructing Birth Histories and Migrant Generation

The Swedish population register provides the opportunity for inter-generational linkages. This unique opportunity is available as the personal identification number of all children can be linked with the personal identification number of both biological parents (Wall-Wieler et al. 2018). For information on the parents to be available, it is required that the parents themselves have been resident in Sweden at some point in time so that they were assigned a personal identification number themselves. This feature of the data allowed us to establish genealogies, which we used to reconstruct detailed birth histories for all individuals. These birth histories include births of all parities with an exact date of birth for each parity progression.

We used information from these genealogies for a granular classification of immigrants and their descendants. Furthermore, this classification was possible as we were able to link data on the migration history of individuals (or the individuals' parents) with data on the individuals' country of birth (or the individuals' parents' country of birth). We split first generation immigrants into the Generation 1.0 and Generation 1.5, reflecting the age at which they arrived in Sweden. The Generation 1.0 is defined as immigrants who arrived in Sweden at the age of 16 or above. Meanwhile, the Generation 1.5 reflects individuals who arrived in Sweden at age 15 or younger.

We furthermore disentangled descendants of immigrants into the Generation 2.0 and the Generation 2.5. This differentiation reflects whether individuals who are descendants of migrants were offspring from an endogamous or exogamous relationship. The Generation 2.0 encompasses second generation offspring whose both parents were born outside of Sweden, with both parents having the same country-of-origin background - and thus were in an endogamous relationship. In contrast, the 2.5 generation corresponds to descendants of immigrants whose parents were in an exogamous relationship. This means that one parent was born in Sweden while the other parent was born outside of Sweden. For the Generation 2.5, we additionally distinguished whether the mother or the father was a first-generation immigrant. In previous research, most studies tend to aggregate the Generation 2.0 and 2.5 - mainly due to data constraints. However, it has been argued that applications which

treat the Generation 2.5 as a distinct group from natives as well as from the Generation 2.0, may provide important insights into the integration of descendants of immigrants (Karthick Ramakrishnan 2004).

We differentiated migrant generations further into country-of-origin backgrounds. This was possible as data for the total Swedish population ensured that all studied population subgroups were of sufficient size for all conducted statistical analyses to be meaningful. We aimed at capturing a wide range of fertility-relevant backgrounds and captured these backgrounds consistently across all studied population subgroups. For example, we included migrants and their descendants from India, Northern Africa, and Turkey, which typically represent high-fertility backgrounds in studies of migrant fertility (Robards & Berrington 2016). In addition, we captured typical low-fertility backgrounds by studying migrants and their descendants from Poland and Southern Europe (Mussino et al. 2021).

Study Population and Study Period

Out of all individuals covered in the Swedish population register between 1968 and 2017 (N = 15,918,283), we identified all individuals (N = 15,853,707) with plausible demographic information. We considered demographic information of individuals to be implausible if one or more of the following aspects were met: (1) missing information on sex, year of birth, or country of birth, (2) implausible date of birth when compared with date of death, (3) reaching age 113 at the end of the follow-up period on 31 December 2017. We also excluded individuals whose parents did not have plausible demographic information. Implausible demographic information were mostly clustered among the cohorts born before 1968 and before the start of the digitization of the population register in Sweden. Overall, the amount of implausible demographic information in the population register was small, underlining the high quality of the data.

Out of all remaining 15,853,707 individuals, we identified all individuals who were born between 1 January 1941 and 31 December 2000 (N = 8,080,338). The rationale for this range of birth cohorts was that we studied the reproductive ages between ages 15 and 49 throughout the actual study period. The actual study period, reflected in time-to-event analyses, lasted from 1 January 1991 to 31 December 2017.

In a next step, we excluded all individuals for which the coverage in the register was less than 30 consecutive days and who would have never been at risk of either a first, second or third birth throughout the study period between the ages of 15 and 49. Major causes for exclusion were, for example, cases of death or out-migration before age 15 or immigration after age 50. This resulted in a preliminary study-population size of 7,286,140 individuals.

In a last step, we accounted for over-coverage in the population register. Over-coverage represents a common phenomenon in most administrative data sources. Despite its high data quality, over-coverage has also been highlighted for the Swedish population register (Monti et al. 2020). One of the major factors contributing to this phenomenon is the under-reporting of out-migration, particularly among the reproductive and working ages. It is highly recommended to correct for over-coverage in all register-based research with a strong focus on the fertility of foreign-born individuals (Monti et al. 2020). While multiple approaches exist to identify and account for over-coverage in the

Swedish register, there is currently no consensus on a standardized algorithm for this procedure. We therefore used our own register-trace-approach to identify and correct for over-coverage in the Swedish population register.

For this purpose, we examined whether individuals of the study population, who were registered in Sweden within the study period, showed any signs of inactivity within the study period. We defined inactivity as having consistently missing information on the following domains: taxable income, student and unemployment benefits, labour market activity, and completion of / enrolment in education – despite having no record of out-migration or death. We fully excluded individuals in case we were able to observe them for five or more years, and if 50% or more of these years were inactive. This resulted in a final study-population size of N = 7,265,899 individuals. In addition, we censored the follow-up time of individuals in case we observed that an individual became inactive for two or more consecutive years. We applied this rule irrespective of whether individuals returned to an active status at a later point in time. As this censoring did not lead per se to any exclusion of individuals, it did not alter the sample size.

Out of all remaining 7,265,899 individuals we identified those individuals who were at risk of a first birth in Sweden. This meant that we excluded all individuals who already had their first birth in or outside of Sweden. This further reduced the sample size to 5,322,242 individuals. We aimed for comparability across all population subgroups with respect to higher parity births. This meant that we only followed those individuals for higher parity births, for which we recorded a first birth during the study period in Sweden. This meant, for example, that only those individuals were considered at risk of a second birth for which we observed a first birth in Sweden between 1991 and 2017.

Start and End of Individuals' Observation Periods

For all Swedish-born individuals, the start of the observation period was defined as the latest of the following events: 1 January 1991, the date the individual turned 15 - or, in a small number of cases, the earliest return to Sweden in case the first recorded migration event for a Swedish-born individual was an in-migration to Sweden. For foreign-born individuals who arrived in Sweden before the age of 15, the starting point of the observation period was determined in an analogous way and as the latest of: 1 January 1991 or the date the individual turned 15. The period of observation for all migrants who arrived in Sweden after the age of 15 was defined as the either 1 January 1991 or the date of earliest arrival in Sweden - whichever date were the latest.

We defined the end of individuals' observation periods similar across all population subgroups. The end of the observation period was defined as the earliest of the following events: death, earliest out-migration (including becoming “inactive”), reaching age 50, or a third birth.

Data Setup and Statistical Modelling

To allow for a study design with time-updated covariates, we applied a long-format splitting of the data. Determined by the start and end date of individuals' observation periods, we created 1-year time

intervals for all individuals. The resulting long-format data set allowed for all socioeconomic covariates to be merged in a time-updated manner. This setup enabled us to use parity-specific subsets of the data for parity-specific fertility analyses. Within each parity-specific subset, we only covered the relevant at-risk population within the relevant period of follow-up. Each of these subsets contained its parity-specific time scale as well as the accordingly adjusted the interval start and end dates to reflect the entry and exit from the at-risk population.

We incorporated all socioeconomic covariates with a lag of one year. This means that all socioeconomic characteristics of an individual for a particular year *t* reflect the characteristics of this individual in year *t-1*. In other words: the socioeconomic information for a parity-specific birth reflects the situation in the year the child was conceived - rather than the circumstances of individuals during the year it was born. We chose this design to reduce problems of reversed causality, and as we did not intend to capture changes in the socioeconomic characteristics due to a parity-specific childbirth.

For foreign-born individuals, we furthermore applied a specific lag to correct for missing information on education during the first years after arrival in Sweden. Research for Sweden has shown that the administrative data sources are prone to recording information on education for foreign-born individuals with some years of delay (Saarela & Weber 2017). For foreign-born individuals in the immediate period after arrival in Sweden, we therefore applied the following rule: We used information on education from the second year if information if data in the first year was missing, and information from the third year if information for the first and the second year was missing. This specific correction was only used for education data for foreign-born individuals.

Time Scales and Statistical Modelling

For all analyses of first births, we used woman or man's age as the time scale. We used age 49 as the upper age limit and defined age 15 to be the zero time point. All analyses for second births used time since first birth as time scale, while all analyses for third births used time since second birth as the time scale.

In a first step, we estimated Kaplan-Meier survival curves for the transitions to a first, second and third birth. As immigrants entering Sweden after age 15 represent late entries into the study, and are typically selected to arrival ages and life-course stages when fertility levels are increased, their Kaplan-Meier survival estimates for first births should not be directly compared with the survival curves of individuals who were born in Sweden and enter the at-risk population at age 15. In contrast, there were no late entries with respect to higher parity births as we used time since previous birth as the time scale in these cases. This allows for direct comparisons of Kaplan-Meier survival curves across all studied population subgroups for second and third births.

We used Cox proportional hazards models to examine the main effect of migrant generation on having a first, second, and third birth in Sweden in comparison with the native Swedish population. Models for first births included covariates for calendar period, educational attainment, student allowances, unemployment benefits, and employment status. For all individuals of the Generation 1.0 we furthermore included time since first arrival in Sweden as a time-varying covariate in all analyses of first births. Models for second and third births included covariates for calendar period, level of

education, student status, unemployment benefits, employment status, and time since last previous birth.

All models were estimated separately for men and women. We reported Hazard Rations (HR) and corresponding 95% confidence intervals (95% CIs). Data preparation and statistical modelling were carried out using R Version 4.1.1 (R Core Team 2021). The R-package *data.table* was used for data preparation, in particular for the memory- and computationally intensive tasks of long-format splitting and time-updated merging (Dowle et al. 2021). All Cox proportional hazards models were estimated using the R package *survival* (Therneau et al. 2021).

5. Results

First Birth

We studied 5,322,242 men and women who were at risk of a first birth during the study period, lasting from 1 January 1991 to 31 December 2017. Within this period, we observed 2,315,687 first births. An overview of the men and women at risk of first birth by population subgroup is provided in **Table 1**. Men and women with a native Swedish background formed the largest part of the study population (65%), followed by first-generation immigrants (Generation 1.0: 18%; Generation 1.5: 6%), and the second-generation immigrant groups (Generation 2.0: 4%; Generation 2.5 - Mother Migrant: 3%; Generation 2.5 - Father Migrant: 4%). A detailed overview of the population at risk of first birth by country-of-origin background is provided in **S-1 Table**.

Table 1: Overview of the study population at risk of first birth and number of first births.

Population Subgroup	N Males	N Females	N Total	N Total %	Males Birth	Females Birth
Native Swedish	1858844	1605907	3464751	65.10	815448	827415
Generation 1.0	534847	407913	942760	17.71	152847	161478
Generation 1.5	159601	145297	304898	5.73	53122	60687
Generation 2.0	119158	108639	227797	4.28	37401	41018
Generation 2.5 - Mother Migrant	98929	85638	184567	3.47	39370	40070
Generation 2.5 - Father Migrant	103216	94253	197469	3.71	41707	45124

For all studied population subgroups, we examined the transition to first birth using Kaplan-Meier survival curves. **Figure 1** provides an overview of the results of this analysis. Immigrants who came to Sweden as adults (Generation 1.0) represent late entries with respect to this analysis. Their survival curve has therefore been omitted.

As shown in **Figure 1**, all population subgroups followed a very similar trajectory of transition to first birth. We generally found that women, on average, have a first birth earlier than men. The levels of childlessness were slightly higher among men than among women by the end of the studied age range. Men and women of Generation 1.5 have a first birth earlier their counterparts in the other population subgroups. Thereafter and starting in their late 20s, native Swedish men and women had the highest first-birth rates. We found that levels of childlessness at age 49 differed only marginally between population subgroups. However, the final levels of childlessness at age 49 were consistently the smallest for native Swedish men and women when compared to the other population subgroups. For example, by age 49, 25% of all native Swedish men were childless, while 29% of all men from migrant Generation 2.0 were childless. For women, the corresponding levels were 17% among native Swedish women and 21% among women of Generation 2.0. These levels of childlessness are higher than what has been observed for the completed fertility of actual birth cohorts of women and men in Sweden (Jalovaara et al. 2019), with the levels for our synthetic period-based cohorts being inflated by falling first-birth rates in the last decade of our study period (Ohlsson-Wijk & Andersson 2022).

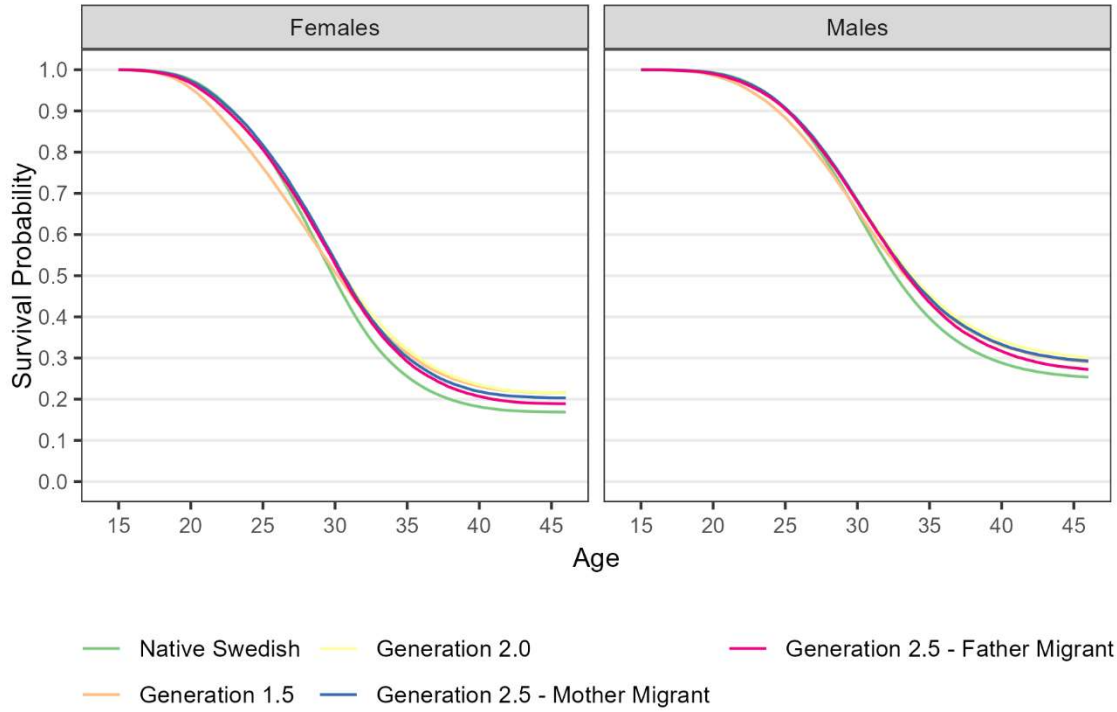

Figure 1: Kaplan-Meier survival curves for transitions to first birth. *Note:* The x-axis is truncated in the plot and does not correspond to the upper age limit (age 49) when censoring.

In a next step, we examined differences in first birth rates across all studied population subgroups. We differentiated by sex and country-of-origin background, and we controlled for calendar period as well as time-updated socioeconomic characteristics. As shown in **Table 2**, first birth rates were generally highest among immigrants who arrived in Sweden as adults – particularly within the first two years following their arrival in Sweden. However, this pattern was not entirely consistent for all country-of-origin subgroups. For women from Turkey who arrived in Sweden as adults, first birth rates were substantially increased in the first two years after arrival in Sweden when compared to native Swedish women (HR: 5.62 (5.43-5.81)). Although levels decreased thereafter, they remained significantly higher than first birth rates observed among native Swedish women (HR: 2.88 (2.73-3.03) and 1.37 (1.29-1.46)). In contrast to this pattern among immigrants from high-fertility backgrounds, we found an opposite pattern among immigrants from the low-fertility backgrounds we cover. For example, for women from Southern Europe who arrived in Sweden as adults, we found first birth rates to be consistently lower when compared to native Swedish women, but that they increased over time (HR: 0.63 (0.59-0.68), 0.84 (0.79-0.89), and 0.89 (0.83-0.95)). For immigrants who arrived in Sweden as adults, we found these patterns of polarization and change over time to be relatively consistent across both men and women.

We found first birth rates among immigrants who arrived in Sweden as children to be generally in between the first birth rates observed among their respective counterparts who arrived in Sweden as adults and the native Swedish population. At the same time, we observed a similar polarization into high- and low-fertility backgrounds. For example, first birth rates were elevated

among women who arrived in Sweden as children from Turkey (HR: 1.29 (1.24-1.35)), but depressed among the women who arrived as children in Sweden from Southern Europe (HR: 0.76 (0.70-0.82)).

Across most studied country-of-origin groups, first-birth rates were depressed among the second-generation groups, when compared with the first birth rates of their respective immigrant group. First birth rates of the descendants were much closer to the levels observed among the native Swedish population when compared to immigrants. At the same time, however, first birth rates tended to be depressed among the second generation. While there was still some reflection of typical high- and low-fertility backgrounds, this polarization was much less pronounced in the second generation. For example, women who were descendants of two Turkish immigrants had slightly higher first birth rates than native-Swedish women (HR: 1.07 (1.03-1.10)), while women who were descendants of two Southern European immigrants had lower first birth rates (HR: 0.73 (0.69-0.78)) than native Swedish women.

For both men and women, we found that first birth rates among the second generation who were descendants of an exogamous relationship were generally closer to the native Swedish population than the levels observed among the second-generation immigrants who were descendants of an endogamous relationship. For example, in comparison with native Swedish men, first birth rates among men whose both parents were immigrants from Turkey were elevated (HR: 1.11 (1.07-1.15)), while levels among their counterparts from an exogamous relationship were not (HR: 0.84 (0.64-1.11) and 0.97 (0.89-1.06)).

Our results for first births indicate that there was no clear polarization into high- and low-fertility backgrounds among descendants of immigrants who are offspring of an exogamous relationship. In this regard, first birth rates among all studied the Generation 2.5 groups were very similar to the rates observed among the native Swedish population. However, we consistently found a slightly stronger similarity of the Generation 2.5 with the native Swedish population among men than among women, and in cases where the father was the immigrant in the exogamous relationship (rather than the mother).

A comprehensive overview of the discussed Cox models for transitions to first births among men and women, including all utilized covariates and their respective parameter estimates, is provided in **S-2A Table** (for women) and **S-2B Table** (for men).

Table 2: Results of Cox proportional hazards models for transitions to first birth by population subgroup and country-of-origin background, separately for men and women. *Note:* All HRs are controlled for period, education, unemployment and student allowances, and employment status.

	Females			Males		
Population Subgroup	**Hazard Ratio**	**95% CI lower**	**95% CI upper**	**Hazard Ratio**	**95% CI lower**	**95% CI upper**
Generation 1.0 - Nordic (0,2] (Ref: Native Swedish)	1.08	1.05	1.11	1.63	1.57	1.68
Generation 1.0 - Nordic (2,5]	1.17	1.14	1.21	1.40	1.35	1.45
Generation 1.0 - Nordic (5,Inf]	0.86	0.83	0.88	0.84	0.82	0.87
Generation 1.0 - Poland (0,2]	1.84	1.78	1.90	1.18	1.12	1.23
Generation 1.0 - Poland (2,5]	1.36	1.30	1.41	1.22	1.16	1.27
Generation 1.0 - Poland (5,Inf]	0.95	0.91	0.99	1.02	0.97	1.07
Generation 1.0 - Turkey (0,2]	5.62	5.43	5.81	3.93	3.79	4.08
Generation 1.0 - Turkey (2,5]	2.88	2.73	3.03	1.88	1.80	1.97
Generation 1.0 - Turkey (5,Inf]	1.37	1.29	1.46	1.78	1.71	1.86
Generation 1.0 - Europe South (0,2]	0.63	0.59	0.68	0.96	0.90	1.02
Generation 1.0 - Europe South (2,5]	0.84	0.79	0.89	0.96	0.90	1.01
Generation 1.0 - Europe South (5,Inf]	0.89	0.83	0.95	0.99	0.94	1.04
Generation 1.0 - Africa North (0,2]	5.93	5.73	6.13	2.37	2.26	2.48
Generation 1.0 - Africa North (2,5]	2.52	2.36	2.70	1.11	1.05	1.17
Generation 1.0 - Africa North (5,Inf]	1.44	1.31	1.57	1.77	1.69	1.85
Generation 1.0 - India (0,2]	1.97	1.86	2.09	1.00	0.93	1.07
Generation 1.0 - India (2,5]	1.69	1.57	1.82	0.81	0.75	0.88
Generation 1.0 - India (5,Inf]	1.12	1.00	1.26	1.18	1.09	1.26
Generation 1.0 - All Other (0,2]	2.48	2.45	2.50	1.78	1.76	1.80
Generation 1.0 - All Other (2,5]	1.56	1.54	1.58	1.52	1.50	1.54
Generation 1.0 - All Other (5,Inf]	1.09	1.08	1.11	1.47	1.46	1.49
Generation 1.5 - Nordic	0.97	0.95	0.99	0.91	0.89	0.93
Generation 1.5 - Poland	0.89	0.85	0.92	0.95	0.91	1.00
Generation 1.5 - Turkey	1.29	1.24	1.35	1.58	1.52	1.64
Generation 1.5 - Europe South	0.76	0.70	0.82	0.98	0.92	1.05
Generation 1.5 - Africa North	1.21	1.08	1.36	1.12	1.00	1.26
Generation 1.5 - India	0.79	0.76	0.82	0.68	0.64	0.72
Generation 1.5 - All Other	1.03	1.02	1.04	1.07	1.06	1.08
Generation 2.0 - Nordic	1.04	1.02	1.05	0.97	0.95	0.98
Generation 2.0 - Poland	0.72	0.68	0.77	0.84	0.79	0.90
Generation 2.0 - Turkey	1.07	1.03	1.10	1.11	1.07	1.15
Generation 2.0 - Europe South	0.73	0.69	0.78	0.89	0.84	0.94
Generation 2.0 - Africa North	0.84	0.77	0.92	0.88	0.80	0.98
Generation 2.0 - India	0.42	0.35	0.50	0.49	0.40	0.61
Generation 2.0 - All Other	0.81	0.80	0.83	0.89	0.88	0.91
Generation 2.5 - Mother Migrant - Nordic	0.96	0.95	0.97	0.93	0.92	0.95
Generation 2.5 - Mother Migrant - Poland	0.76	0.73	0.80	0.81	0.77	0.85

Generation 2.5 - Mother Migrant - Turkey	0.78	0.60	1.01	0.84	0.64	1.11
Generation 2.5 - Mother Migrant - Europe South	0.84	0.79	0.91	1.00	0.93	1.07
Generation 2.5 - Mother Migrant - Africa North	0.68	0.54	0.86	0.76	0.58	0.99
Generation 2.5 - Mother Migrant - India	0.72	0.60	0.87	0.86	0.70	1.04
Generation 2.5 - Mother Migrant - All Other	0.83	0.82	0.85	0.91	0.89	0.93
Generation 2.5 - Father Migrant - Nordic	1.04	1.03	1.05	1.01	0.99	1.02
Generation 2.5 - Father Migrant - Poland	0.87	0.81	0.94	0.96	0.88	1.04
Generation 2.5 - Father Migrant - Turkey	0.88	0.82	0.96	0.97	0.89	1.06
Generation 2.5 - Father Migrant - Europe South	0.88	0.85	0.91	0.95	0.92	0.98
Generation 2.5 - Father Migrant - Africa North	0.86	0.81	0.91	0.90	0.84	0.96
Generation 2.5 - Father Migrant - India	0.76	0.66	0.88	0.84	0.74	0.97
Generation 2.5 - Father Migrant - All Other	0.89	0.87	0.90	0.95	0.93	0.96

Second Birth

Next, we followed all 2,315,687 individuals for which we recorded a first birth in Sweden during the study period for their transition to any second birth. This at-risk population accounted for a total number of 1,628,724 second births throughout the study period.

An overview of the at-risk population for second births, by population subgroup, is provided in **Table 3**. Again, men and women with a native Swedish background formed the largest part of the at-risk population (71%), followed by the immigrant groups (Generation 1.0: 14%; Generation 1.5: 5%), and the second generation groups (Generation 2.0: 3%; Generation 2.5 - Mother Migrant: 3%; Generation 2.5 - Father Migrant: 4%). **S-3 Table** provides a more detailed overview of the population at risk of second birth by country-of-origin background.

Table 3: Overview of the study population at risk of second birth and number of second births.

Population Subgroup	N Males	N Females	N Total	N Total %	Males Birth	Females Birth
Native Swedish	815448	827415	1642863	70.94	583744	609947
Generation 1.0	152847	161478	314325	13.57	94259	95382
Generation 1.5	53122	60687	113809	4.91	35251	40716
Generation 2.0	37401	41018	78419	3.39	25410	28047
Generation 2.5 - Mother Migrant	39370	40070	79440	3.43	27262	28364
Generation 2.5 - Father Migrant	41707	45124	86831	3.75	28773	31569

For all individuals for which we recorded a first birth throughout the study period, we examined the transition to a second birth using Kaplan-Meier survival curves. **Figure 2** shows the results of this

analysis. As time since first birth has been used as the time scale, Kaplan-Meier survival curves were comparable for all studied population subgroups.

As shown in **Figure 2**, and as observed for first births, all population subgroups followed a very similar trajectory regarding their transitions to a second birth. Overall, our results indicate that there was only a small amount of heterogeneity between aggregated population subgroups (and between men and women). However, immigrant women who arrived in Sweden as adults represented an exception: fewer in this group had a second child than, for example, native Swedish women during the follow-up period. The highest second birth rates are observed for native Swedish women.

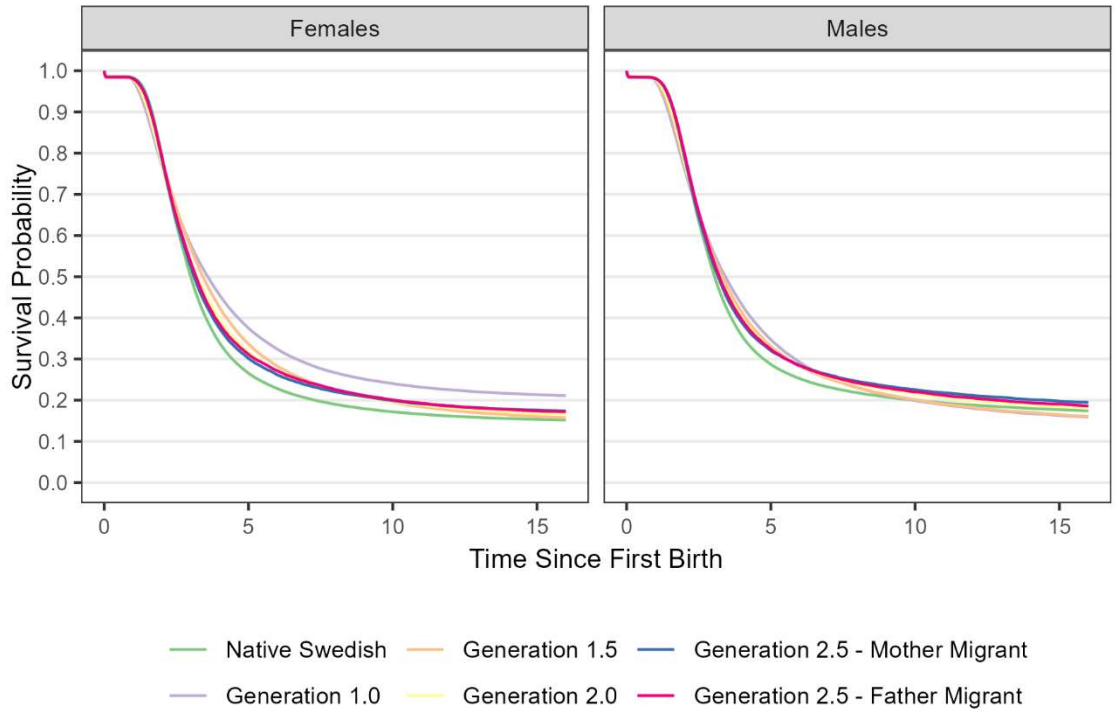

Figure 2: Kaplan-Meier survival curves for transitions to second birth. *Note:* The x-axis is truncated in the plot and does not correspond to the upper age limit when censoring.

In a next step, we estimated Cox proportional hazards models to study differences in second birth risks across all studied population subgroups, by country-of-origin background. Models were estimated separately for men and women, and we controlled for time since first birth, calendar period and time-updated socioeconomic characteristics. As shown in **Table 4**, we generally observed little heterogeneity between population subgroups in their second-birth behaviour.

For the immigrant groups with high-fertility backgrounds, we found that second birth rates were relatively close to the levels observed among the native Swedish population. For example, second birth rates among first-generation immigrant women from Turkey who arrived in Sweden as adults were not significantly different from the rates observed among native Swedish women (HR:

0.99 (0.96-1.03)). In contrast, we observed that some low-fertility groups kept their low-fertility behaviour also when in Sweden, as evident among immigrant women from Southern Europe (HR: 0.86 (0.81-0.91)). At the same time, depressed second birth rates were also observed for immigrant groups who did not show any signs of depression with respect to first births. For example, we observed depressed second birth rates for immigrant women from Poland who arrived in Sweden as adults (HR: 0.54 (0.52-0.55)).

In summary, these patterns underline that second birth rates were generally high among native Swedish men and women. At the same time, these patterns indicate that the selection process that shape the decision of having a second child might be stronger among immigrants than among their descendants. As for first births, we found a general depression of second birth rates among most second generation groups, when compared with the native Swedish population. However, this depression was slightly less pronounced than for first births. Again, there was no clear polarization into high- and low-fertility backgrounds for the offspring of immigrants from exogamous relationships, which underlines their strong similarity to the native Swedish population. Differences between the offspring from endogamous and exogamous relationships were rather small and only observed in a small number of cases, such as men who are descendants of Turkish immigrants (HR: Generation 2.0: 1.21 (1.16-1.26); Generation 2.5 - Mother Migrant: 0.79 (0.55-1.15); Generation 2.5 - Father Migrant: 0.84 (0.75-0.94))

A comprehensive overview of the Cox models for transitions to second birth among men and women, including all utilized covariates and their respective parameter estimates, is provided in **S-4A Table** (for women) and **S-4B Table** (for men).

Table 4: Results of Cox proportional hazards models for transitions to second birth by population subgroup and country-of-origin background, separately for men and women. *Note:* All HRs are controlled for calendar period, age at previous birth, education level, unemployment and student allowances, and employment status.

	Females			Males		
Population Subgroup	**Hazard Ratio**	**95% CI lower**	**95% CI upper**	**Hazard Ratio**	**95% CI lower**	**95% CI upper**
Generation 1.0 - Nordic (Ref: Native Swedish)	0.93	0.91	0.95	0.95	0.93	0.98
Generation 1.0 - Poland	0.54	0.52	0.55	0.60	0.57	0.62
Generation 1.0 - Turkey	0.99	0.96	1.03	1.01	0.98	1.04
Generation 1.0 - Europe South	0.86	0.81	0.91	0.96	0.92	1.00
Generation 1.0 - Africa North	1.26	1.22	1.31	1.12	1.09	1.16
Generation 1.0 - India	0.63	0.59	0.67	0.63	0.59	0.67
Generation 1.0 - All Other	0.92	0.91	0.92	1.08	1.07	1.09
Generation 1.5 - Nordic	0.84	0.82	0.87	0.89	0.87	0.91
Generation 1.5 - Poland	0.76	0.73	0.80	0.78	0.73	0.82
Generation 1.5 - Turkey	1.00	0.96	1.05	1.19	1.15	1.25
Generation 1.5 - Europe South	0.90	0.82	0.99	1.02	0.95	1.11
Generation 1.5 - Africa North	0.95	0.83	1.09	1.11	0.96	1.28

Generation 1.5 - India	0.79	0.75	0.82	0.90	0.83	0.97
Generation 1.5 - All Other	0.88	0.87	0.89	0.99	0.98	1.00
Generation 2.0 - Nordic	0.91	0.89	0.93	0.90	0.88	0.92
Generation 2.0 - Poland	0.84	0.77	0.91	0.92	0.84	1.00
Generation 2.0 - Turkey	0.96	0.93	1.00	1.21	1.16	1.26
Generation 2.0 - Europe South	0.92	0.85	0.98	1.04	0.98	1.11
Generation 2.0 - Africa North	0.97	0.86	1.09	1.12	0.98	1.29
Generation 2.0 - India	0.97	0.77	1.23	1.17	0.89	1.54
Generation 2.0 - All Other	0.94	0.92	0.95	0.98	0.96	1.00
Generation 2.5 - Mother Migrant - Nordic	0.96	0.94	0.97	0.94	0.92	0.95
Generation 2.5 - Mother Migrant - Poland	0.90	0.85	0.95	0.92	0.87	0.98
Generation 2.5 - Mother Migrant - Turkey	0.79	0.56	1.14	0.79	0.55	1.15
Generation 2.5 - Mother Migrant - Europe South	0.92	0.85	1.01	0.87	0.80	0.96
Generation 2.5 - Mother Migrant - Africa North	0.86	0.63	1.17	1.42	1.01	2.00
Generation 2.5 - Mother Migrant - India	1.12	0.88	1.43	0.90	0.71	1.15
Generation 2.5 - Mother Migrant - All Other	0.97	0.95	0.99	0.96	0.94	0.99
Generation 2.5 - Father Migrant - Nordic	0.93	0.92	0.95	0.92	0.91	0.94
Generation 2.5 - Father Migrant - Poland	0.94	0.85	1.03	0.92	0.83	1.01
Generation 2.5 - Father Migrant - Turkey	0.89	0.81	0.99	0.84	0.75	0.94
Generation 2.5 - Father Migrant - Europe South	0.92	0.89	0.96	0.90	0.86	0.94
Generation 2.5 - Father Migrant - Africa North	0.94	0.87	1.01	0.94	0.86	1.02
Generation 2.5 - Father Migrant - India	0.99	0.84	1.17	1.06	0.91	1.25
Generation 2.5 - Father Migrant - All Other	0.94	0.93	0.96	0.97	0.95	0.98

Third Birth

In a last step, we studied all 1,628,724 men and women for whom we previously recorded a first and second birth in Sweden. Within our study period, this population accounted for 471,362 observed third births. **Table 5** shows the population at risk of a third birth, by aggregated population subgroup and separately for men and women. A more detailed overview of this at-risk population by country-of-origin background is provided in **S-5 Table**.

Table 5: Overview of the study population at risk of third birth and number of third births.

Population Subgroup	N Males	N Females	N Total	N Total %	Males Birth	Females Birth
Native Swedish	583744	609947	1193691	73.29	161632	168443
Generation 1.0	94259	95382	189641	11.64	34446	31736
Generation 1.5	35251	40716	75967	4.66	12228	13635
Generation 2.0	25410	28047	53457	3.28	7572	8444
Generation 2.5 - Mother Migrant	27262	28364	55626	3.42	7835	8039
Generation 2.5 - Father Migrant	28773	31569	60342	3.70	8160	9192

We next examined the transition to a third birth for all individuals for which we had recorded a first and second birth, using Kaplan-Meier survival curves. We used time since second birth as the time scale. The results of this analysis are shown in **Figure 3**. In contrast to results for first and second births, we find a stronger polarization among immigrants and their descendants.

The polarization is reflected in the proportion of individuals who have a third child within 15 years from the second birth. For example, among migrant two-child fathers who arrived as adults in Sweden, the relative frequency to have a third child was 55%. For native Swedish men, the corresponding fraction was 35%.

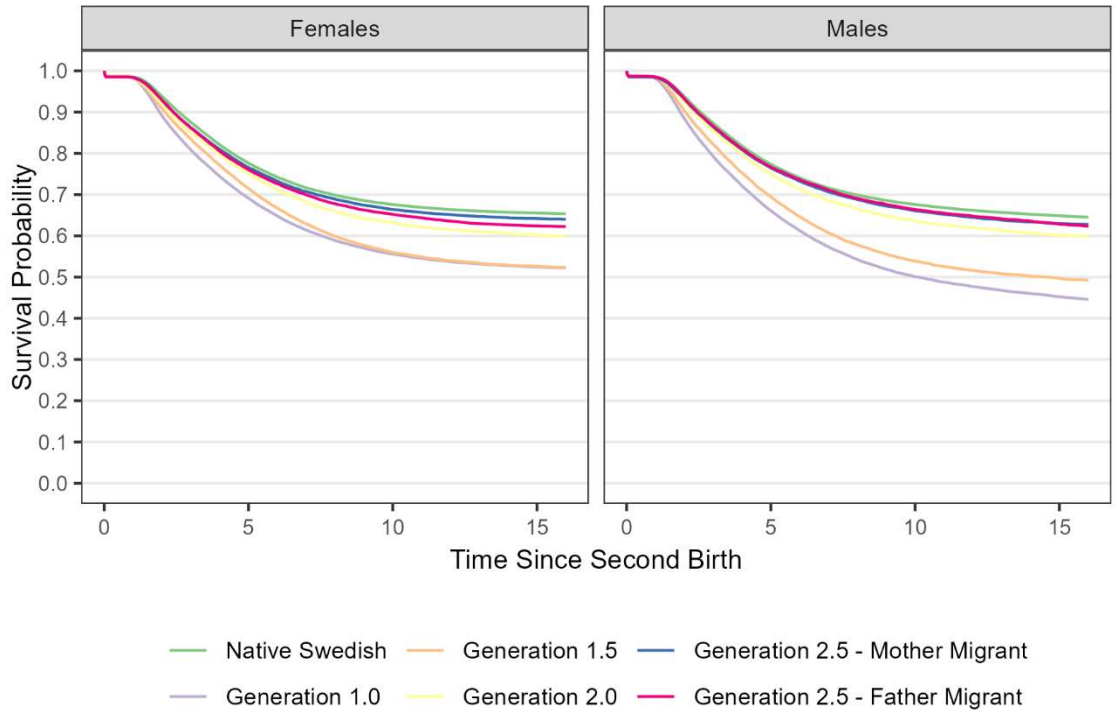

Figure 3: Kaplan-Meier survival curves for transitions to third birth. *Note:* The x-axis is truncated in the plot and does not reflect the upper age limit at censoring.

Next, we used Cox proportional hazards models to study differences in third birth rates among all studied population subgroups, separately for men and women. We controlled for time since second birth, calendar period and time-updated socioeconomic characteristics. The results shown in **Table 6** indicate significant heterogeneity in terms of third-birth risks.

In regard to third births, we found clear evidence of elevated third birth rates among immigrant groups from a high-fertility context. We observed this both among those who arrived in Sweden as adults and among those who arrived during childhood. For example, third birth rates among men who

arrived from Turkey as an adult were elevated (HR: 1.56 (1.49-1.63)), while the same holds among men who arrived from Turkey as a child (HR: 1.95 (1.84-2.06)), when compared to native Swedish men. At the same time, third birth rates remained slightly depressed among immigrant men and women from Poland.

Still, we found less of depressed patterns of third-birth rates of immigrants and their descendants than what we found for first and second births. Among men who are descendants of immigrants, and in particular for individuals from endogamous high-fertility backgrounds, we found elevated third birth rates when compared with the native Swedish population. For example, rates were elevated among men who are descendants of two immigrants from Turkey (HR: 1.59 (1.48-1.71)) and North Africa (HR: 1.57 (1.23-2.00)). As no similar elevation was observed among their counterparts from exogamous relationships, this reveals clear differences between the Generations 2.0 and 2.5.

A comprehensive overview of the Cox proportional hazards models for transitions to third birth, including all utilized covariates and their respective parameter estimates, is provided in **S-6A Table** (for women) and **S-6B Table** (for men).

Table 6: Results of Cox proportional hazards models for transitions to third birth by population subgroup and country-of-origin background, separately for men and women. *Note:* All HRs are controlled for age at second birth, calendar period, educational level, unemployment and student allowances, and employment status.

	Females			Males		
Population Subgroup	**Hazard Ratio**	**95% CI lower**	**95% CI upper**	**Hazard Ratio**	**95% CI lower**	**95% CI upper**
Generation 1.0 - Nordic (Ref: Native Swedish)	1.14	1.09	1.20	1.04	0.99	1.10
Generation 1.0 - Poland	0.69	0.64	0.75	0.78	0.71	0.87
Generation 1.0 - Turkey	1.23	1.17	1.29	1.56	1.49	1.63
Generation 1.0 - Europe South	1.00	0.88	1.14	1.02	0.93	1.13
Generation 1.0 - Africa North	1.91	1.81	2.01	2.88	2.74	3.03
Generation 1.0 - India	0.74	0.63	0.86	1.10	0.95	1.27
Generation 1.0 - All Other	1.37	1.35	1.39	1.83	1.81	1.86
Generation 1.5 - Nordic	1.02	0.97	1.08	1.07	1.02	1.12
Generation 1.5 - Poland	0.92	0.84	1.02	0.95	0.86	1.06
Generation 1.5 - Turkey	1.61	1.51	1.72	1.95	1.84	2.06
Generation 1.5 - Europe South	1.01	0.85	1.21	1.18	1.02	1.36
Generation 1.5 - Africa North	1.63	1.33	2.00	1.56	1.25	1.96
Generation 1.5 - India	0.90	0.82	0.99	1.02	0.88	1.19
Generation 1.5 - All Other	1.17	1.15	1.20	1.38	1.34	1.41
Generation 2.0 - Nordic	1.02	0.99	1.06	1.04	1.00	1.07
Generation 2.0 - Poland	0.80	0.68	0.94	0.95	0.80	1.13
Generation 2.0 - Turkey	1.50	1.41	1.59	1.59	1.48	1.71
Generation 2.0 - Europe South	0.89	0.77	1.02	1.00	0.89	1.14
Generation 2.0 - Africa North	1.44	1.18	1.77	1.57	1.23	2.00

Generation 2.0 - India	0.87	0.48	1.56	1.36	0.79	2.35
Generation 2.0 - All Other	1.01	0.97	1.04	1.04	1.00	1.08
Generation 2.5 - Mother Migrant - Nordic	1.04	1.02	1.07	1.07	1.04	1.10
Generation 2.5 - Mother Migrant - Poland	1.05	0.93	1.17	1.02	0.89	1.16
Generation 2.5 - Mother Migrant - Turkey	1.24	0.65	2.39	0.49	0.16	1.53
Generation 2.5 - Mother Migrant - Europe South	0.98	0.83	1.16	1.11	0.94	1.31
Generation 2.5 - Mother Migrant - Africa North	0.90	0.45	1.79	0.81	0.39	1.70
Generation 2.5 - Mother Migrant - India	1.64	1.07	2.51	0.81	0.46	1.42
Generation 2.5 - Mother Migrant - All Other	1.08	1.04	1.13	1.05	1.00	1.09
Generation 2.5 - Father Migrant - Nordic	1.05	1.02	1.08	1.01	0.98	1.04
Generation 2.5 - Father Migrant - Poland	1.10	0.92	1.31	1.05	0.87	1.27
Generation 2.5 - Father Migrant - Turkey	0.93	0.76	1.13	1.22	1.00	1.49
Generation 2.5 - Father Migrant - Europe South	1.06	0.98	1.15	1.13	1.04	1.22
Generation 2.5 - Father Migrant - Africa North	1.25	1.09	1.42	1.19	1.02	1.39
Generation 2.5 - Father Migrant - India	1.45	1.10	1.92	1.04	0.76	1.44
Generation 2.5 - Father Migrant - All Other	1.08	1.05	1.12	1.03	0.99	1.06

6. Discussion

The aim of this study was to investigate fertility among immigrants and their descendants in Sweden. We developed previous research in the following ways: First, we moved beyond a simple immigrant-descendant dichotomy by distinguishing subgroups of immigrants and their descendants. We distinguished between immigrants who arrived in Sweden as adults (1.0 G) and those who moved as children (1.5 G). Next, we distinguished between second-generation individuals with two migrant parents (2.0 G) and those with only one foreign-born parent (2.5 G). We additionally classified descendants of multiple origin based on whether their father or mother was born in Sweden. Second, we included in analyses both immigrants from high- and low-fertility countries and their descendants. Third, we conducted analysis both among women and men.

Our analysis showed elevated first birth rates shortly after arrival for most migrants who moved to Sweden as adults, especially for women. However, fertility rates rapidly declined over the duration of residence for all groups. Patterns for migrants who came as children were more mixed as first-birth rates were higher for some groups (e.g., Turkey, North Africa), but lower for others (e.g., Poland, Southern Europe, India). First-birth rates were generally lower among the descendants of immigrants with two foreign-born parents compared to the native Swedish population. First-birth rates among the descendants with one foreign-born parent were in-between the rates observed for those with two foreign-born parents and the native Swedes but varied by their origin. Women had a first child earlier than men as expected. Second-birth rates varied less across population subgroups and they were generally lower among immigrants and their descendants compared to the native Swedish population. Results for third births revealed high levels of heterogeneity, reflecting the established high- and low-fertility backgrounds. Third-birth rates were high among immigrants and their descendants of Turkish and North African origin, whereas they were relatively low among those of Polish descent. Interestingly, however, third-birth rates among those with only one immigrant parent

were not different from those of the native Swedish population. Overall, the variation in second- and third-birth rates by migrant groups was relatively similar for men and women.

Our study supports findings of previous studies on immigrants showing that factors related to family formation, socialisation, adaptation and selectivity all shape immigrant fertility behaviour after arrival. We observed elevated fertility after migration, and rapid decline thereafter, but also high and low third-birth rates for some groups. Relatively low fertility among population of Indian origin supports the importance of migrant selectivity. In line with the assimilation hypothesis, we expected fertility levels among immigrant children and the descendants of immigrants to be between those of immigrants and the native Swedish population. This was largely true, although third-birth rates varied significantly across groups. Importantly, however, the descendants of immigrants from mixed marriages had first-, second- and third-birth rates similar to those of the native Swedish population. This suggests that mixed marriages are the most important mechanism for assimilation in terms of fertility behaviour. Overall, our results provide strong evidence that fertility patterns among the second generation are gradually drifting away from childbearing patterns observed among immigrants and are approaching those of the native Swedish population.

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9. Supplementary Material

First Birth

S-1 Table: Overview of the study population at risk of a first birth by sex, population subgroup, and country-of-origin background

Population_Subgroup	N_Males	N_Females	N_Total	N_Total_Percent	Males_Birth	Females_Birth
Native Swedish	1858844	1605907	3464751	65.10	815448	827415
Generation 1.0 - Nordic	65306	57343	122649	2.30	10749	12946
Generation 1.0 - Poland	26080	21484	47564	0.89	5327	8054
Generation 1.0 - Turkey	14615	8896	23511	0.44	7087	5756
Generation 1.0 - Europe South	19204	12077	31281	0.59	3777	2733
Generation 1.0 - Africa North	12087	7211	19298	0.36	4916	4668
Generation 1.0 - India	16015	6862	22877	0.43	2263	2201
Generation 1.0 - All Other	381540	294040	675580	12.69	118728	125120
Generation 1.5 - Nordic	20386	16091	36477	0.69	8116	7341
Generation 1.5 - Poland	6187	5699	11886	0.22	2138	2338
Generation 1.5 - Turkey	4745	4127	8872	0.17	2674	2457
Generation 1.5 - Europe South	2377	1870	4247	0.08	866	663
Generation 1.5 - Africa North	972	787	1759	0.03	278	304
Generation 1.5 - India	2539	4876	7415	0.14	939	2521
Generation 1.5 - All Other	122395	111847	234242	4.40	38111	45063
Generation 2.0 - Nordic	31045	26571	57616	1.08	15906	16520
Generation 2.0 - Poland	3011	2865	5876	0.11	863	1003
Generation 2.0 - Turkey	9024	8580	17604	0.33	2896	3554
Generation 2.0 - Europe South	2750	2557	5307	0.10	1273	1190
Generation 2.0 - Africa North	1866	1808	3674	0.07	345	498
Generation 2.0 - India	652	652	1304	0.02	87	110
Generation 2.0 - All Other	70810	65606	136416	2.56	16031	18143
Generation 2.5 - Mother Migrant - Nordic	59281	50203	109484	2.06	25904	26245
Generation 2.5 - Mother Migrant - Poland	4661	4360	9021	0.17	1472	1731
Generation 2.5 - Mother Migrant - Turkey	301	271	572	0.01	50	57
Generation 2.5 - Mother Migrant - Europe South	1834	1708	3542	0.07	710	777

Population_Subgroup	N_Males	N_Females	N_Total	N_Total_Percent	Males_Birth	Females_Birth
Generation 2.5 - Mother Migrant - Africa North	236	250	486	0.01	54	74
Generation 2.5 - Mother Migrant - India	528	521	1049	0.02	99	109
Generation 2.5 - Mother Migrant - All Other	32088	28325	60413	1.14	11081	11077
Generation 2.5 - Father Migrant - Nordic	43274	38638	81912	1.54	18956	20326
Generation 2.5 - Father Migrant - Poland	1641	1566	3207	0.06	606	648
Generation 2.5 - Father Migrant - Turkey	1858	1687	3545	0.07	500	606
Generation 2.5 - Father Migrant - Europe South	7235	6775	14010	0.26	3159	3467
Generation 2.5 - Father Migrant - Africa North	2757	2630	5387	0.10	895	1081
Generation 2.5 - Father Migrant - India	587	513	1100	0.02	204	198
Generation 2.5 - Father Migrant - All Other	45864	42444	88308	1.66	17387	18798

S-2A Table: Comprehensive overview of results of multivariate cox proportional hazards models for transitions to first birth for females, differentiated by country-of-origin background.

Parameter	Hazard Ratio	HR_95lower	HR_95upper
Generation 1.0 - Nordic (0,2] (Ref: Native Swedish)	1.08	1.05	1.11
Generation 1.0 - Nordic (2,5]	1.17	1.14	1.21
Generation 1.0 - Nordic (5,Inf]	0.86	0.83	0.88
Generation 1.0 - Poland (0,2]	1.84	1.78	1.90
Generation 1.0 - Poland (2,5]	1.36	1.30	1.41
Generation 1.0 - Poland (5,Inf]	0.95	0.91	0.99
Generation 1.0 - Turkey (0,2]	5.62	5.43	5.81
Generation 1.0 - Turkey (2,5]	2.88	2.73	3.03
Generation 1.0 - Turkey (5,Inf]	1.37	1.29	1.46
Generation 1.0 - Europe South (0,2]	0.63	0.59	0.68
Generation 1.0 - Europe South (2,5]	0.84	0.79	0.89
Generation 1.0 - Europe South (5,Inf]	0.89	0.83	0.95
Generation 1.0 - Africa North (0,2]	5.93	5.73	6.13
Generation 1.0 - Africa North (2,5]	2.52	2.36	2.70
Generation 1.0 - Africa North (5,Inf]	1.44	1.31	1.57
Generation 1.0 - India (0,2]	1.97	1.86	2.09
Generation 1.0 - India (2,5]	1.69	1.57	1.82
Generation 1.0 - India (5,Inf]	1.12	1.00	1.26
Generation 1.0 - All Other (0,2]	2.48	2.45	2.50
Generation 1.0 - All Other (2,5]	1.56	1.54	1.58
Generation 1.0 - All Other (5,Inf]	1.09	1.08	1.11
Generation 1.5 - Nordic	0.97	0.95	0.99
Generation 1.5 - Poland	0.89	0.85	0.92
Generation 1.5 - Turkey	1.29	1.24	1.35
Generation 1.5 - Europe South	0.76	0.70	0.82
Generation 1.5 - Africa North	1.21	1.08	1.36
Generation 1.5 - India	0.79	0.76	0.82
Generation 1.5 - All Other	1.03	1.02	1.04
Generation 2.0 - Nordic	1.04	1.02	1.05
Generation 2.0 - Poland	0.72	0.68	0.77
Generation 2.0 - Turkey	1.07	1.03	1.10
Generation 2.0 - Europe South	0.73	0.69	0.78
Generation 2.0 - Africa North	0.84	0.77	0.92
Generation 2.0 - India	0.42	0.35	0.50

Parameter	Hazard Ratio	HR_95lower	HR_95upper
Generation 2.0 - All Other	0.81	0.80	0.83
Generation 2.5 - Mother Migrant - Nordic	0.96	0.95	0.97
Generation 2.5 - Mother Migrant - Poland	0.76	0.73	0.80
Generation 2.5 - Mother Migrant - Turkey	0.78	0.60	1.01
Generation 2.5 - Mother Migrant - Europe South	0.84	0.79	0.91
Generation 2.5 - Mother Migrant - Africa North	0.68	0.54	0.86
Generation 2.5 - Mother Migrant - India	0.72	0.60	0.87
Generation 2.5 - Mother Migrant - All Other	0.83	0.82	0.85
Generation 2.5 - Father Migrant - Nordic	1.04	1.03	1.05
Generation 2.5 - Father Migrant - Poland	0.87	0.81	0.94
Generation 2.5 - Father Migrant - Turkey	0.88	0.82	0.96
Generation 2.5 - Father Migrant - Europe South	0.88	0.85	0.91
Generation 2.5 - Father Migrant - Africa North	0.86	0.81	0.91
Generation 2.5 - Father Migrant - India	0.76	0.66	0.88
Generation 2.5 - Father Migrant - All Other	0.89	0.87	0.90
1995-1998 (Ref: 1991-1994)	0.83	0.83	0.84
1999-2002	0.82	0.81	0.83
2003-2006	0.88	0.87	0.88
2007-2010	0.90	0.89	0.90
2011-2014	0.83	0.83	0.84
2015-2017	0.77	0.77	0.78
Education Secondary (Ref: Primary)	0.85	0.84	0.85
Education Tertiary	0.92	0.91	0.92
Education Missing	0.67	0.66	0.68
Unemployment Benefits: Yes (Ref: No)	1.12	1.12	1.13
Student Benefits: Yes (Ref: No)	0.39	0.39	0.39
In Employment: No (Ref: Yes)	0.68	0.68	0.69

S-2B Table: Comprehensive overview of results of multivariate cox proportional hazards models for transitions to first birth for males, differentiated by country-of-origin background.

Parameter	Hazard Ratio	HR_95lower	HR_95upper
Generation 1.0 - Nordic (0,2] (Ref: Native Swedish)	1.63	1.57	1.68
Generation 1.0 - Nordic (2,5]	1.40	1.35	1.45
Generation 1.0 - Nordic (5,Inf]	0.84	0.82	0.87
Generation 1.0 - Poland (0,2]	1.18	1.12	1.23
Generation 1.0 - Poland (2,5]	1.22	1.16	1.27
Generation 1.0 - Poland (5,Inf]	1.02	0.97	1.07
Generation 1.0 - Turkey (0,2]	3.93	3.79	4.08
Generation 1.0 - Turkey (2,5]	1.88	1.80	1.97
Generation 1.0 - Turkey (5,Inf]	1.78	1.71	1.86
Generation 1.0 - Europe South (0,2]	0.96	0.90	1.02
Generation 1.0 - Europe South (2,5]	0.96	0.90	1.01
Generation 1.0 - Europe South (5,Inf]	0.99	0.94	1.04
Generation 1.0 - Africa North (0,2]	2.37	2.26	2.48
Generation 1.0 - Africa North (2,5]	1.11	1.05	1.17
Generation 1.0 - Africa North (5,Inf]	1.77	1.69	1.85
Generation 1.0 - India (0,2]	1.00	0.93	1.07
Generation 1.0 - India (2,5]	0.81	0.75	0.88
Generation 1.0 - India (5,Inf]	1.18	1.09	1.26
Generation 1.0 - All Other (0,2]	1.78	1.76	1.80
Generation 1.0 - All Other (2,5]	1.52	1.50	1.54
Generation 1.0 - All Other (5,Inf]	1.47	1.46	1.49
Generation 1.5 - Nordic	0.91	0.89	0.93
Generation 1.5 - Poland	0.95	0.91	1.00
Generation 1.5 - Turkey	1.58	1.52	1.64
Generation 1.5 - Europe South	0.98	0.92	1.05
Generation 1.5 - Africa North	1.12	1.00	1.26
Generation 1.5 - India	0.68	0.64	0.72
Generation 1.5 - All Other	1.07	1.06	1.08
Generation 2.0 - Nordic	0.97	0.95	0.98
Generation 2.0 - Poland	0.84	0.79	0.90
Generation 2.0 - Turkey	1.11	1.07	1.15
Generation 2.0 - Europe South	0.89	0.84	0.94
Generation 2.0 - Africa North	0.88	0.80	0.98
Generation 2.0 - India	0.49	0.40	0.61
Generation 2.0 - All Other	0.89	0.88	0.91

Parameter	Hazard Ratio	HR_95lower	HR_95upper
Generation 2.5 - Mother Migrant - Nordic	0.93	0.92	0.95
Generation 2.5 - Mother Migrant - Poland	0.81	0.77	0.85
Generation 2.5 - Mother Migrant - Turkey	0.84	0.64	1.11
Generation 2.5 - Mother Migrant - Europe South	1.00	0.93	1.07
Generation 2.5 - Mother Migrant - Africa North	0.76	0.58	0.99
Generation 2.5 - Mother Migrant - India	0.86	0.70	1.04
Generation 2.5 - Mother Migrant - All Other	0.91	0.89	0.93
Generation 2.5 - Father Migrant - Nordic	1.01	0.99	1.02
Generation 2.5 - Father Migrant - Poland	0.96	0.88	1.04
Generation 2.5 - Father Migrant - Turkey	0.97	0.89	1.06
Generation 2.5 - Father Migrant - Europe South	0.95	0.92	0.98
Generation 2.5 - Father Migrant - Africa North	0.90	0.84	0.96
Generation 2.5 - Father Migrant - India	0.84	0.74	0.97
Generation 2.5 - Father Migrant - All Other	0.95	0.93	0.96
1995-1998 (Ref: 1991-1994)	0.82	0.81	0.82
1999-2002	0.78	0.78	0.79
2003-2006	0.86	0.85	0.87
2007-2010	0.90	0.89	0.91
2011-2014	0.84	0.84	0.85
2015-2017	0.77	0.76	0.77
Education Secondary (Ref: Primary)	1.00	0.99	1.00
Education Tertiary	1.03	1.03	1.04
Education Missing	0.59	0.58	0.60
Unemployment Benefits: Yes (Ref: No)	1.08	1.07	1.09
Student Benefits: Yes (Ref: No)	0.57	0.56	0.57
In Employment: No (Ref: Yes)	0.51	0.50	0.51

Second Birth

S-3 Table: Overview of the study population at risk of a second birth by sex, population subgroup, and country-of-origin background

Population_Subgroup	N_Males	N_Females	N_Total	N_Total_Percent	Males_Birth	Females_Birth
Native Swedish	815448	827415	1642863	70.94	583744	609947
Generation 1.0 - Nordic	10749	12946	23695	1.02	5696	7225
Generation 1.0 - Poland	5327	8054	13381	0.58	2362	3831
Generation 1.0 - Turkey	7087	5756	12843	0.55	4873	4139
Generation 1.0 - Europe South	3777	2733	6510	0.28	2017	1339
Generation 1.0 - Africa North	4916	4668	9584	0.41	3215	3178
Generation 1.0 - India	2263	2201	4464	0.19	857	897
Generation 1.0 - All Other	118728	125120	243848	10.53	75239	74773
Generation 1.5 - Nordic	8116	7341	15457	0.67	5688	5180
Generation 1.5 - Poland	2138	2338	4476	0.19	1328	1477
Generation 1.5 - Turkey	2674	2457	5131	0.22	2182	1939
Generation 1.5 - Europe South	866	663	1529	0.07	628	441
Generation 1.5 - Africa North	278	304	582	0.03	187	209
Generation 1.5 - India	939	2521	3460	0.15	634	1679
Generation 1.5 - All Other	38111	45063	83174	3.59	24604	29791
Generation 2.0 - Nordic	15906	16520	32426	1.40	11216	12223
Generation 2.0 - Poland	863	1003	1866	0.08	531	601
Generation 2.0 - Turkey	2896	3554	6450	0.28	2033	2494
Generation 2.0 - Europe South	1273	1190	2463	0.11	897	790
Generation 2.0 - Africa North	345	498	843	0.04	211	283
Generation 2.0 - India	87	110	197	0.01	52	69
Generation 2.0 - All Other	16031	18143	34174	1.48	10470	11587
Generation 2.5 - Mother Migrant - Nordic	25904	26245	52149	2.25	18044	18924
Generation 2.5 - Mother Migrant - Poland	1472	1731	3203	0.14	937	1133
Generation 2.5 - Mother Migrant - Turkey	50	57	107	< 0.01	28	30
Generation 2.5 - Mother Migrant - Europe South	710	777	1487	0.06	477	541
Generation 2.5 - Mother Migrant - Africa North	54	74	128	0.01	33	41
Generation 2.5 - Mother Migrant - India	99	109	208	0.01	64	66
Generation 2.5 - Mother Migrant - All Other	11081	11077	22158	0.96	7679	7629
Generation 2.5 - Father Migrant - Nordic	18956	20326	39282	1.70	13050	14468
Generation 2.5 - Father Migrant - Poland	606	648	1254	0.05	393	426
Generation 2.5 - Father Migrant - Turkey	500	606	1106	0.05	302	384

Population_Subgroup	N_Males	N_Females	N_Total	N_Total_Percent	Males_Birth	Females_Birth
Generation 2.5 - Father Migrant - Europe South	3159	3467	6626	0.29	2130	2403
Generation 2.5 - Father Migrant - Africa North	895	1081	1976	0.09	560	712
Generation 2.5 - Father Migrant - India	204	198	402	0.02	147	139
Generation 2.5 - Father Migrant - All Other	17387	18798	36185	1.56	12191	13037

S-4A Table: Results of multivariate cox proportional hazards models for transitions to second birth for females, differentiated by country-of-origin background.

Parameter	Hazard Ratio	HR_95lower	HR_95upper
Generation 1.0 - Nordic (Ref: Native Swedish)	0.93	0.91	0.95
Generation 1.0 - Poland	0.54	0.52	0.55
Generation 1.0 - Turkey	0.99	0.96	1.03
Generation 1.0 - Europe South	0.86	0.81	0.91
Generation 1.0 - Africa North	1.26	1.22	1.31
Generation 1.0 - India	0.63	0.59	0.67
Generation 1.0 - All Other	0.92	0.91	0.92
Generation 1.5 - Nordic	0.84	0.82	0.87
Generation 1.5 - Poland	0.76	0.73	0.80
Generation 1.5 - Turkey	1.00	0.96	1.05
Generation 1.5 - Europe South	0.90	0.82	0.99
Generation 1.5 - Africa North	0.95	0.83	1.09
Generation 1.5 - India	0.79	0.75	0.82
Generation 1.5 - All Other	0.88	0.87	0.89
Generation 2.0 - Nordic	0.91	0.89	0.93
Generation 2.0 - Poland	0.84	0.77	0.91
Generation 2.0 - Turkey	0.96	0.93	1.00
Generation 2.0 - Europe South	0.92	0.85	0.98
Generation 2.0 - Africa North	0.97	0.86	1.09
Generation 2.0 - India	0.97	0.77	1.23
Generation 2.0 - All Other	0.94	0.92	0.95
Generation 2.5 - Mother Migrant - Nordic	0.96	0.94	0.97
Generation 2.5 - Mother Migrant - Poland	0.90	0.85	0.95
Generation 2.5 - Mother Migrant - Turkey	0.79	0.56	1.14
Generation 2.5 - Mother Migrant - Europe South	0.92	0.85	1.01
Generation 2.5 - Mother Migrant - Africa North	0.86	0.63	1.17
Generation 2.5 - Mother Migrant - India	1.12	0.88	1.43
Generation 2.5 - Mother Migrant - All Other	0.97	0.95	0.99
Generation 2.5 - Father Migrant - Nordic	0.93	0.92	0.95
Generation 2.5 - Father Migrant - Poland	0.94	0.85	1.03
Generation 2.5 - Father Migrant - Turkey	0.89	0.81	0.99
Generation 2.5 - Father Migrant - Europe South	0.92	0.89	0.96
Generation 2.5 - Father Migrant - Africa North	0.94	0.87	1.01
Generation 2.5 - Father Migrant - India	0.99	0.84	1.17

Parameter	Hazard Ratio	HR_95lower	HR_95upper
Generation 2.5 - Father Migrant - All Other	0.94	0.93	0.96
1995-1998 (Ref: 1991-1994)	0.87	0.86	0.88
1999-2002	0.90	0.89	0.91
2003-2006	0.96	0.95	0.97
2007-2010	0.95	0.94	0.96
2011-2014	0.91	0.90	0.92
2015-2017	0.90	0.89	0.91
Age at Previous Birth	0.95	0.94	0.95
Education Secondary (Ref: Primary)	1.30	1.29	1.31
Education Tertiary	1.81	1.80	1.83
Education Missing	1.41	1.38	1.44
Unemployment Benefits: Yes (Ref: No)	0.91	0.90	0.92
Student Benefits: Yes (Ref: No)	0.54	0.53	0.54
In Employment: No (Ref: Yes)	0.90	0.89	0.90

S-4B Table: Results of multivariate cox proportional hazards models for transitions to second birth for males, differentiated by country-of-origin background.

Parameter	Hazard Ratio	HR_95lower	HR_95upper
Generation 1.0 - Nordic (Ref: Native Swedish)	0.95	0.93	0.98
Generation 1.0 - Poland	0.60	0.57	0.62
Generation 1.0 - Turkey	1.01	0.98	1.04
Generation 1.0 - Europe South	0.96	0.92	1.00
Generation 1.0 - Africa North	1.12	1.09	1.16
Generation 1.0 - India	0.63	0.59	0.67
Generation 1.0 - All Other	1.08	1.07	1.09
Generation 1.5 - Nordic	0.89	0.87	0.91
Generation 1.5 - Poland	0.78	0.73	0.82
Generation 1.5 - Turkey	1.19	1.15	1.25
Generation 1.5 - Europe South	1.02	0.95	1.11
Generation 1.5 - Africa North	1.11	0.96	1.28
Generation 1.5 - India	0.90	0.83	0.97
Generation 1.5 - All Other	0.99	0.98	1.00
Generation 2.0 - Nordic	0.90	0.88	0.92
Generation 2.0 - Poland	0.92	0.84	1.00
Generation 2.0 - Turkey	1.21	1.16	1.26
Generation 2.0 - Europe South	1.04	0.98	1.11
Generation 2.0 - Africa North	1.12	0.98	1.29
Generation 2.0 - India	1.17	0.89	1.54
Generation 2.0 - All Other	0.98	0.96	1.00
Generation 2.5 - Mother Migrant - Nordic	0.94	0.92	0.95
Generation 2.5 - Mother Migrant - Poland	0.92	0.87	0.98
Generation 2.5 - Mother Migrant - Turkey	0.79	0.55	1.15
Generation 2.5 - Mother Migrant - Europe South	0.87	0.80	0.96
Generation 2.5 - Mother Migrant - Africa North	1.42	1.01	2.00
Generation 2.5 - Mother Migrant - India	0.90	0.71	1.15
Generation 2.5 - Mother Migrant - All Other	0.96	0.94	0.99
Generation 2.5 - Father Migrant - Nordic	0.92	0.91	0.94
Generation 2.5 - Father Migrant - Poland	0.92	0.83	1.01
Generation 2.5 - Father Migrant - Turkey	0.84	0.75	0.94
Generation 2.5 - Father Migrant - Europe South	0.90	0.86	0.94
Generation 2.5 - Father Migrant - Africa North	0.94	0.86	1.02
Generation 2.5 - Father Migrant - India	1.06	0.91	1.25

Parameter	Hazard Ratio	HR_95lower	HR_95upper
Generation 2.5 - Father Migrant - All Other	0.97	0.95	0.98
1995-1998 (Ref: 1991-1994)	0.82	0.81	0.83
1999-2002	0.81	0.80	0.82
2003-2006	0.88	0.87	0.89
2007-2010	0.88	0.87	0.89
2011-2014	0.86	0.85	0.87
2015-2017	0.85	0.84	0.86
Age at Previous Birth	0.97	0.97	0.97
Education Secondary (Ref: Primary)	1.13	1.13	1.14
Education Tertiary	1.52	1.51	1.54
Education Missing	1.07	1.04	1.10
Unemployment Benefits: Yes (Ref: No)	0.90	0.90	0.91
Student Benefits: Yes (Ref: No)	0.84	0.83	0.85
In Employment: No (Ref: Yes)	0.75	0.74	0.76

Third Birth

S-5 Table: Overview of the study population at risk of a third birth by sex, population subgroup, and country-of-origin background

Population_Subgroup	N_Males	N_Females	N_Total	N_Total_Percent	Males_Birth	Females_Birth
Native Swedish	583744	609947	1193691	73.29	161632	168443
Generation 1.0 - Nordic	5696	7225	12921	0.79	1353	1791
Generation 1.0 - Poland	2362	3831	6193	0.38	380	633
Generation 1.0 - Turkey	4873	4139	9012	0.55	2049	1740
Generation 1.0 - Europe South	2017	1339	3356	0.21	422	237
Generation 1.0 - Africa North	3215	3178	6393	0.39	1561	1409
Generation 1.0 - India	857	897	1754	0.11	178	164
Generation 1.0 - All Other	75239	74773	150012	9.21	28503	25762
Generation 1.5 - Nordic	5688	5180	10868	0.67	1800	1593
Generation 1.5 - Poland	1328	1477	2805	0.17	360	384
Generation 1.5 - Turkey	2182	1939	4121	0.25	1212	986
Generation 1.5 - Europe South	628	441	1069	0.07	191	122
Generation 1.5 - Africa North	187	209	396	0.02	77	91
Generation 1.5 - India	634	1679	2313	0.14	175	435
Generation 1.5 - All Other	24604	29791	54395	3.34	8413	10024
Generation 2.0 - Nordic	11216	12223	23439	1.44	3537	3912
Generation 2.0 - Poland	531	601	1132	0.07	129	139
Generation 2.0 - Turkey	2033	2494	4527	0.28	784	1047
Generation 2.0 - Europe South	897	790	1687	0.10	244	196
Generation 2.0 - Africa North	211	283	494	0.03	65	93
Generation 2.0 - India	52	69	121	0.01	13	11
Generation 2.0 - All Other	10470	11587	22057	1.35	2800	3046
Generation 2.5 - Mother Migrant - Nordic	18044	18924	36968	2.27	5327	5539
Generation 2.5 - Mother Migrant - Poland	937	1133	2070	0.13	225	293
Generation 2.5 - Mother Migrant - Turkey	28	30	58	< 0.01	< 10	< 10
Generation 2.5 - Mother Migrant - Europe South	477	541	1018	0.06	143	137
Generation 2.5 - Mother Migrant - Africa North	33	41	74	< 0.01	< 10	< 10
Generation 2.5 - Mother Migrant - India	64	66	130	0.01	12	21
Generation 2.5 - Mother Migrant - All Other	7679	7629	15308	0.94	2118	2032
Generation 2.5 - Father Migrant - Nordic	13050	14468	27518	1.69	3742	4391
Generation 2.5 - Father Migrant - Poland	393	426	819	0.05	107	123
Generation 2.5 - Father Migrant - Turkey	302	384	686	0.04	99	100

Population_Subgroup	N_Males	N_Females	N_Total	N_Total_Percent	Males_Birth	Females_Birth
Generation 2.5 - Father Migrant - Europe South	2130	2403	4533	0.28	635	666
Generation 2.5 - Father Migrant - Africa North	560	712	1272	0.08	163	222
Generation 2.5 - Father Migrant - India	147	139	286	0.02	37	49
Generation 2.5 - Father Migrant - All Other	12191	13037	25228	1.55	3377	3641

S-6A Table: Results of multivariate cox proportional hazards models for transitions to third birth for females, differentiated by country-of-origin background.

Parameter	Hazard Ratio	HR_95lower	HR_95upper
Generation 1.0 - Nordic (Ref: Native Swedish)	1.14	1.09	1.20
Generation 1.0 - Poland	0.69	0.64	0.75
Generation 1.0 - Turkey	1.23	1.17	1.29
Generation 1.0 - Europe South	1.00	0.88	1.14
Generation 1.0 - Africa North	1.91	1.81	2.01
Generation 1.0 - India	0.74	0.63	0.86
Generation 1.0 - All Other	1.37	1.35	1.39
Generation 1.5 - Nordic	1.02	0.97	1.08
Generation 1.5 - Poland	0.92	0.84	1.02
Generation 1.5 - Turkey	1.61	1.51	1.72
Generation 1.5 - Europe South	1.01	0.85	1.21
Generation 1.5 - Africa North	1.63	1.33	2.00
Generation 1.5 - India	0.90	0.82	0.99
Generation 1.5 - All Other	1.17	1.15	1.20
Generation 2.0 - Nordic	1.02	0.99	1.06
Generation 2.0 - Poland	0.80	0.68	0.94
Generation 2.0 - Turkey	1.50	1.41	1.59
Generation 2.0 - Europe South	0.89	0.77	1.02
Generation 2.0 - Africa North	1.44	1.18	1.77
Generation 2.0 - India	0.87	0.48	1.56
Generation 2.0 - All Other	1.01	0.97	1.04
Generation 2.5 - Mother Migrant - Nordic	1.04	1.02	1.07
Generation 2.5 - Mother Migrant - Poland	1.05	0.93	1.17
Generation 2.5 - Mother Migrant - Turkey	1.24	0.65	2.39
Generation 2.5 - Mother Migrant - Europe South	0.98	0.83	1.16
Generation 2.5 - Mother Migrant - Africa North	0.90	0.45	1.79
Generation 2.5 - Mother Migrant - India	1.64	1.07	2.51
Generation 2.5 - Mother Migrant - All Other	1.08	1.04	1.13
Generation 2.5 - Father Migrant - Nordic	1.05	1.02	1.08
Generation 2.5 - Father Migrant - Poland	1.10	0.92	1.31
Generation 2.5 - Father Migrant - Turkey	0.93	0.76	1.13
Generation 2.5 - Father Migrant - Europe South	1.06	0.98	1.15
Generation 2.5 - Father Migrant - Africa North	1.25	1.09	1.42
Generation 2.5 - Father Migrant - India	1.45	1.10	1.92

Parameter	Hazard Ratio	HR_95lower	HR_95upper
Generation 2.5 - Father Migrant - All Other	1.08	1.05	1.12
1995-1998 (Ref: 1991-1994)	0.85	0.81	0.89
1999-2002	0.96	0.92	1.01
2003-2006	1.12	1.07	1.18
2007-2010	1.18	1.13	1.24
2011-2014	1.13	1.08	1.18
2015-2017	1.11	1.06	1.16
Age at Previous Birth	0.88	0.88	0.89
Education Secondary (Ref: Primary)	0.87	0.86	0.89
Education Tertiary	1.18	1.16	1.19
Education Missing	1.24	1.19	1.29
Unemployment Benefits: Yes (Ref: No)	0.91	0.90	0.93
Student Benefits: Yes (Ref: No)	0.61	0.60	0.62
In Employment: No (Ref: Yes)	1.25	1.23	1.26

S-6B Table: Results of multivariate cox proportional hazards models for transitions to third birth for males, differentiated by country-of-origin background.

Parameter	Hazard Ratio	HR_95lower	HR_95upper
Generation 1.0 - Nordic (Ref: Native Swedish)	1.04	0.99	1.10
Generation 1.0 - Poland	0.78	0.71	0.87
Generation 1.0 - Turkey	1.56	1.49	1.63
Generation 1.0 - Europe South	1.02	0.93	1.13
Generation 1.0 - Africa North	2.88	2.74	3.03
Generation 1.0 - India	1.10	0.95	1.27
Generation 1.0 - All Other	1.83	1.81	1.86
Generation 1.5 - Nordic	1.07	1.02	1.12
Generation 1.5 - Poland	0.95	0.86	1.06
Generation 1.5 - Turkey	1.95	1.84	2.06
Generation 1.5 - Europe South	1.18	1.02	1.36
Generation 1.5 - Africa North	1.56	1.25	1.96
Generation 1.5 - India	1.02	0.88	1.19
Generation 1.5 - All Other	1.38	1.34	1.41
Generation 2.0 - Nordic	1.04	1.00	1.07
Generation 2.0 - Poland	0.95	0.80	1.13
Generation 2.0 - Turkey	1.59	1.48	1.71
Generation 2.0 - Europe South	1.00	0.89	1.14
Generation 2.0 - Africa North	1.57	1.23	2.00
Generation 2.0 - India	1.36	0.79	2.35
Generation 2.0 - All Other	1.04	1.00	1.08
Generation 2.5 - Mother Migrant - Nordic	1.07	1.04	1.10
Generation 2.5 - Mother Migrant - Poland	1.02	0.89	1.16
Generation 2.5 - Mother Migrant - Turkey	0.49	0.16	1.53
Generation 2.5 - Mother Migrant - Europe South	1.11	0.94	1.31
Generation 2.5 - Mother Migrant - Africa North	0.81	0.39	1.70
Generation 2.5 - Mother Migrant - India	0.81	0.46	1.42
Generation 2.5 - Mother Migrant - All Other	1.05	1.00	1.09
Generation 2.5 - Father Migrant - Nordic	1.01	0.98	1.04
Generation 2.5 - Father Migrant - Poland	1.05	0.87	1.27
Generation 2.5 - Father Migrant - Turkey	1.22	1.00	1.49
Generation 2.5 - Father Migrant - Europe South	1.13	1.04	1.22
Generation 2.5 - Father Migrant - Africa North	1.19	1.02	1.39
Generation 2.5 - Father Migrant - India	1.04	0.76	1.44

Parameter	Hazard Ratio	HR_95lower	HR_95upper
Generation 2.5 - Father Migrant - All Other	1.03	0.99	1.06
1995-1998 (Ref: 1991-1994)	0.80	0.76	0.83
1999-2002	0.86	0.82	0.90
2003-2006	0.98	0.94	1.03
2007-2010	1.04	0.99	1.09
2011-2014	1.00	0.96	1.05
2015-2017	0.99	0.94	1.03
Age at Previous Birth	0.93	0.93	0.93
Education Secondary (Ref: Primary)	0.85	0.84	0.86
Education Tertiary	1.01	1.00	1.03
Education Missing	0.97	0.91	1.02
Unemployment Benefits: Yes (Ref: No)	1.06	1.05	1.08
Student Benefits: Yes (Ref: No)	0.97	0.95	0.99
In Employment: No (Ref: Yes)	1.16	1.14	1.17