



Fertility Decline in Iceland, 2013–2022

Trends and Structures

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Fertility Decline in Iceland, 2013–2022: Trends and Structures

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Abstract

Iceland is one of the Western countries that have experienced an unexpected fertility decrease in the 2010s. In this study the aggregate Icelandic fertility decline is dissected to explore which fertility components are the main drivers behind the decline since 2010 to better understand whether the development is associated with compositional changes or linked to changes such as increased propensities of childlessness and decreased propensities to have another child. Official administrative register data is analysed by means of event-history analysis. Findings are presented as parity-specific birth risks and in the form of Kaplan-Meier estimates of synthetic period-based cohorts of women and men progressing to parity one over calendar years. Results show that the fertility decline was concentrated around first births, and the decline can principally be attributed to women under the age of thirty. Propensities to remain childless have increased since 2013, while there were no declines in the intensities to have a second and a third child. The development in Iceland appears to be driven by clear postponement of parenthood but not altered childbearing behaviour in terms of propensities to have a second and a third child. Socioeconomic differentials in first-birth fertility in Iceland and factors affecting postponement and ultimate childlessness should be explored further.

Keywords: fertility, fertility trends, Iceland



Background

For roughly three decades, between 1980 and 2010, the Total Fertility Rate (TFR) of Iceland remained relatively high and stable. The TFR averaged around 2.1 child per woman and fluctuations in the rates were relatively small. Icelandic fertility was among the highest in Europe and the country surpassed the other Nordic countries, Denmark, Finland, Norway, and Sweden, in terms of fertility outcomes (Jónsson 2017). However, during the past decade, fertility has declined almost continuously from one year to the next, repeatedly reaching new historically low levels. In 2022 the TFR was 1.59 – a new all-time low for the country. Prior to 2013, the relatively sturdy TFR of Iceland had hardly dropped below 2.0: 1.93 was the previous lowest point in the mid-1980s and again in 2002 (Statistics Iceland 2023). While Iceland is not an island in this regard – fertility has declined in most developed countries since the great recession of 2007/2008 (Matysiak et al. 2021; Vignoli et al. 2020a) – this is nevertheless remarkable. In the words of Vignoli and his colleagues (2020a, p. 1): “[c]ontemporary Europe is facing a new fertility winter”; and Iceland appears to be one of the countries that are freezing.

To a large extent, the usual suspects in terms of explaining fertility change, such as fluctuations in the business cycle (Sobotka et al. 2011; Andersson 2000), reforms in family policies (Duvander et al. 2019; Jónsson 2018; Andersson 2004), and development in gender relations (McDonald 2000; Goldscheider et al. 2015), appear to be shooting blanks when it comes to providing insight into this recent development. In Iceland, economic development was positive during most of the past decade (Statistics Iceland 2023). Reforms in family policies were also made during this time; the parental leave was extended from nine months to twelve, and the cap on parental leave benefits was raised (Alþingi 2020). In relation to gender equality, Iceland is still considered as the most gender-equal country in the world (World Economic

Forum 2023). Moreover, we do not fully know whether this development is fuelled by compositional effects related to previous fertility and changes in parity-specific age schedules, or whether reasons are connected to changes in the underlying childbearing behaviour as such. As a fertility measurement, the TFR has shortcomings. The TFR does not account for parity or birth intervals, and thus, the actual group under exposure may be distorted (Jónsson 2017; Ni Bhrolcháin 1987). To gain knowledge about the determinants behind the fertility development, we need to establish which fertility components are the main drivers behind the decline, i.e., whether the engine is fuelled by the postponement of becoming a parent; increased levels of childlessness; declining propensities to have a second and a third child; or if it is a full-fledged fertility decline, irrespective of birth order. Different explanations may apply to each of these factors, depending on its contribution to the fertility decline.

The main objective of this contribution is to provide insight into the trend of recent fertility decline by focusing on each of these fertility components using a period perspective. For the first time we also provide information on first-birth fertility patterns of men in Iceland. An in-depth analysis of Icelandic childbearing trends advances our understanding of this intriguing development as well as contributes empirical evidence to ongoing theorisation within current fertility debates (see e.g., Comolli et al. 2021; Vignoli et al. 2020b). The Icelandic saga is an interesting case-study as the country is considered one of the forerunners of family-demographic change (Hellstrand et al. 2021; Jónsson 2020, 2021), and as such has the potential to provide novel insights that are relevant also for a broader contextual setting.

Data and Methods

To fulfil our objectives, we use administrative register data from Statistics Iceland that cover the total population born in Iceland at relevant ages for childbearing during the study period. We construct life-course histories of everyone residing in Iceland during 1998–2022 and follow them between ages 15 and 46. By means of event-history analysis, we calculate the relative risks of giving birth to a first, second, and third child, standardized for age and, where appropriate, duration from previous birth, using parity-specific, piecewise constant exponential models, and depict them as annual indices of the force of fertility during a period of 25 years (cf. Hoem 1993; Andersson 1999; Jónsson 2017). As such, the estimates are standardized period rates that reflect the childbearing behaviour of the relevant population at risk (Ní Bhrolcháin 1992; Andersson 1999). We also provide Kaplan-Meier non-parametric estimates for synthetic period-based cohorts in their progressions to become a parent for women and men and changes in birth spacing over the study period in terms of the progressions to a second and third child. Combined, the analyses advance our knowledge about whether the fertility decline during the past decade was driven by compositional changes or if it was mainly related to changes in the underlying childbearing behaviour at different birth orders. To gain deeper context and detect potential changes that had begun already before our study period of interest we start the observations in 1998. For a detailed discussion about methodology see: Hoem (1993); Andersson (1999, 2000); and Jónsson (2017).

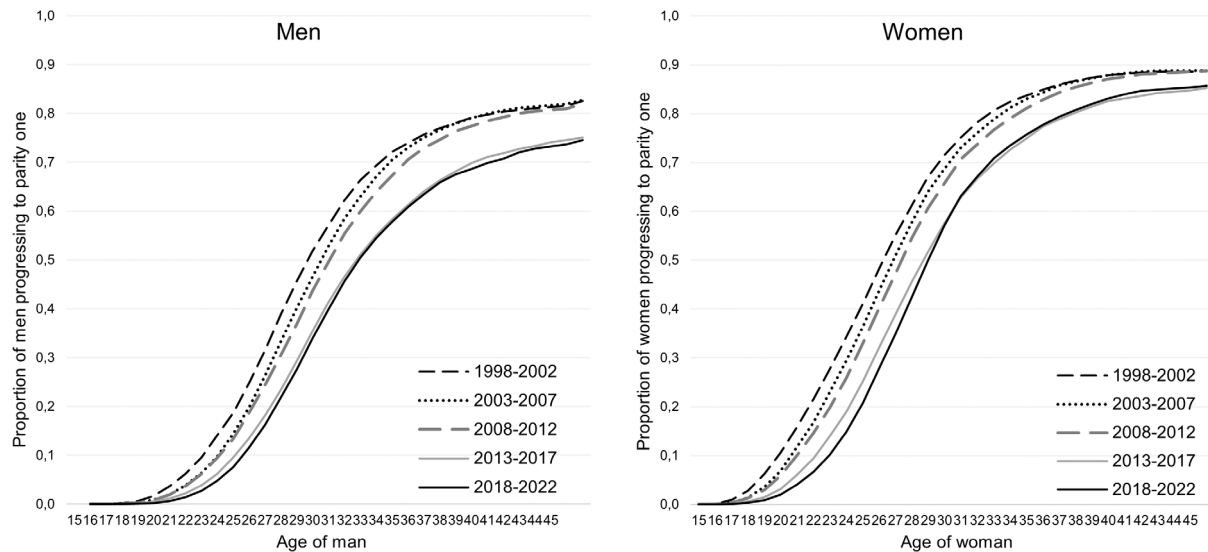
Variables

In terms of first births, our main duration variable is the subject's age. The time unit is measured in person-months and categorized into 31 single-year age groups (15–45). Childless individuals

become exposed at age 15 and they enter the analysis in 1998 or the month they turn 15 – whichever comes last. The subjects are followed until they become a parent or are censored: i.e., if they emigrate, die, turn 46, or reach the end of the study period in December 31, 2022 – whichever comes first. When it comes to birth orders two and three, women become exposed at the time of previous birth (in this part of the analyses we only include women). Mothers enter the analyses at that time or in 1998, whichever comes last. The main duration variable is the age of last-born child, measured in months from birth, and categorized into nine groups: 1–12 months; 13–24 months; 25–36 months; 37–48 months; 49–60 months; 61–72 months; 73–96 months; 97–120 months; and 121 months and more. The mother’s age is categorized into 12 groups. Mothers are right-censored on the same grounds as for first births and left-censored if they had multiple births the first/second time, were older than 45 when they had their last child or emigrated before giving birth to their first/second child. Calendar year is included in 25 single-year categories (1998–2022) in Figures 2, 3 and 4 and in five-year groups in Figures 1 and 5: 1998–2002; 2003–2007; 2008–2012; 2013–2017; 2018–2022. Observational spells that refer to periods before 1998 are excluded from the analyses (left-truncated).

Results

Figure 1: First-birth Kaplan-Meier cumulative probability estimates for Iceland in 1998–2022, by age of women and men over calendar-year synthetic cohorts



Source: Icelandic register data, author's calculations

Figure 1 shows Kaplan-Meier cumulative probability estimates of synthetic cohorts of childless men and women progressing to parity one before turning 46 by calendar-year groups. The figure depicts a postponement of parenthood during the full study period as the estimates indicate that the age at which half of the men and women have progressed to parenthood increased by about three years between the first and last years of observation. The non-parametric estimates also demonstrate that the tendency of remaining childless became much stronger from 2013 onward, and more so for men than women. According to the estimates, approximately 11% of women and 17–18% of men were prone to become childless at age 46 prior to 2013, but 14–15% and 25% respectively during 2013–2022.

Figure 2: Relative risks of first birth in Iceland 1998–2022. Standardized for age of women and men. Rates are relative to first-birth rates in 2004 for each group (separate models)



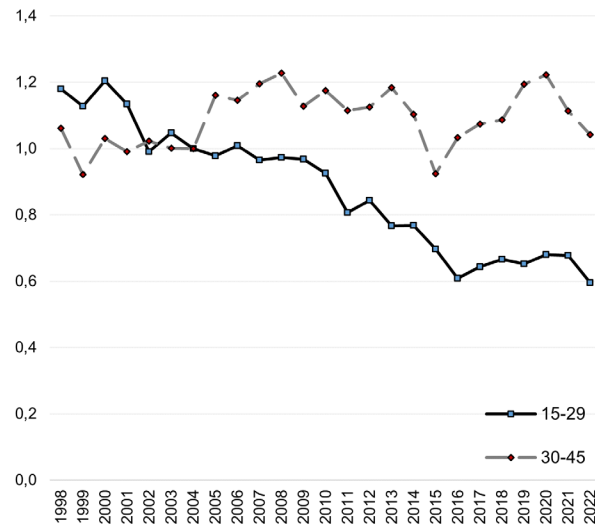
Source: Icelandic register data, author's calculations

Figure 2 displays first-birth risks relative to the year 2004. The estimates show that after a relatively stable period during 2002–2009, the first-birth intensities declined quite drastically between 2010 and 2016. In 2016 onward, the decline in first-birth rates seems to have come to a halt.

Figure 3 is based on women only and depicts this development in more detail. Here we use two separate models, one for ages 15–29 and another one for ages 30–45. As such, the estimates are only comparable within models and do not tell about absolute differences between the two categories in the propensity to become a mother. As Figure 3 shows, the decline in the first-birth rate was mainly driven by decreasing first-birth intensities among women in the younger age bracket. This decline seems to have stopped in the period after 2016. However,

during the Covid-19 pandemic, with births occurring in 2022 in particular, we see a tendency of renewed decline.

Figure 3: Relative risks of first birth in Iceland 1998–2022. Standardized for age of women, two age groups. Rates are relative to first-birth rates in 2004 for each age group (separate models)

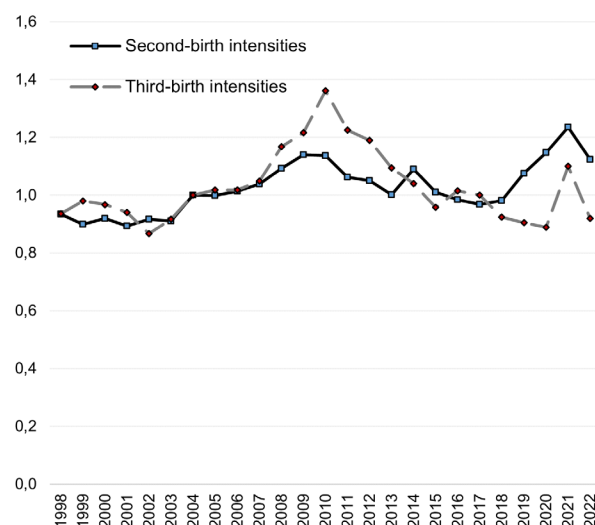


Source: Icelandic register data, author's calculations

The estimates for second- and third-birth intensities in Figure 4 are derived from two separate models and presented with risks relative to the year 2004 for each parity. The figure shows that during the past twenty years there has been no decline in second-birth intensities. In contrast, they have constantly been higher than what they were in 1998–2003, i.e., before a new parental leave legislation was fully implemented and that was associated with shorter birth intervals (Jónsson 2018). There was even a small peek in 2008–2010, around the time Iceland was going through an economic crisis, and again in 2021–2022, i.e., during the pandemic.

The fluctuations in third-birth rates are much stronger, and not only moving in an upward direction. The culprit behind this is mainly the development during the economic crisis in 2008–2012 when third-birth rates were higher than in most other years (see Jónsson 2018; Comolli et al. 2021). On average, however, between 2013–2022, the propensity to have a third child was similar to what it was prior to the economic recession, albeit with sizable variation. A peak occurred in 2021, during the Covid-19 pandemic (Figure 4).

Figure 4: Relative risks of second and third births in Iceland 1998–2022. Standardized for age of mother and age of youngest child. Rates are relative to the rates in 2004 for each birth order (separate models)

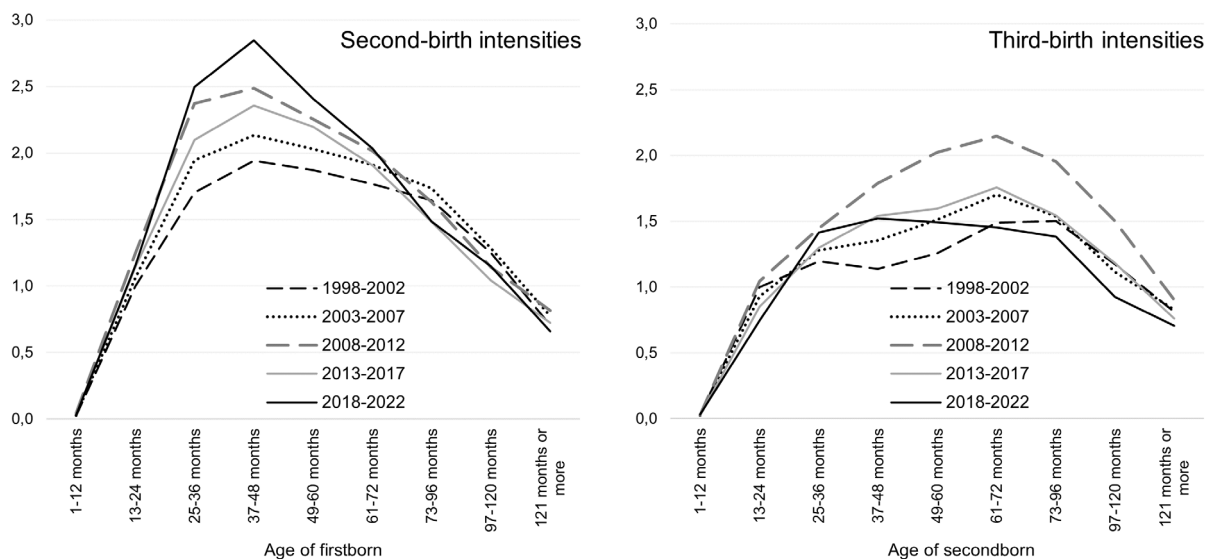


Source: Icelandic register data, author's calculations

We conclude with an analysis of the developments in birth spacing patterns between subsequent children (Figure 5). The estimates are relative to the risks of mothers whose youngest child was in its second year in 1998–2002. For second births, we can detect a pattern where birth intervals get shorter and second-birth intensities higher. When we examine the birth spacing patterns between second and third child, Figure 5 suggests that the period during the economic

crisis (2008–2012) was somewhat of an anomaly. The propensity to have a third child increased over all durations since the birth of the second child during this period, thus indicating not only changes in tempo but also in the quantum of childbearing. After this third-birth fertility retracted to previous levels.

Figure 5: Second- and third-birth risks in Iceland 1998–2022 by time since previous birth. Standardized for age of mother. Rates are relative to duration 13–24 months in 1998–2002



Source: Icelandic register data, author's calculations

Discussion

The objective of this study was to dissect the Icelandic childbearing trends and investigate whether the aggregate fertility decline during the past decade was related to compositional changes, previous childbearing history, or linked to changes such as increased propensities of childlessness and decreased propensities to have another child. Our analysis shows that the fertility development in Iceland was entirely driven by a decline in the propensities to become a

parent. This resembles what has also been found in Sweden and Finland (Ohlsson-Wijk and Andersson 2022; Hellstrand et al. 2020), i.e., that there were no declines in the propensities to have a second and third child but a clear decline in the propensity to become a parent. In Iceland, the first-birth intensities declined strongest during 2012–2016, and the decline can be attributed to women younger than thirty years. Hence, contrary to the other Nordic countries, we did not observe any declines in the first-birth risks among women in their 30s and 40s, suggesting that the decline in first-birth childbearing may be related more to fertility postponement than actual declines in the ultimate levels of becoming a parent. Nevertheless, our Kaplan-Meier synthetic-cohort estimates indicate that the tendency of remaining childless increased slightly during 2013–2022.

Hellstrand et al. (2021) estimated that 26% of the aggregate fertility decline in Iceland between 2010 and 2018 could be attributed to a decrease in the number of third births. Our findings also show that the third-birth intensities declined compared to the economic-crisis period in 2008–2012. However, the third-birth risks during that period were exceptionally high, compared to the periods before and after the economic recession. In terms of second births, we find pattern of steady increasing birth rates, which was largely driven by a movement toward even shorter intervals between the first and second child. As for third births, we found higher levels of second births during the pandemic period, a pattern that has also been found in other Nordic countries.

Future research should investigate whether the recent evidence of increased childlessness in Iceland is mainly a temporary phenomenon or rather part of a more long-term trend. It should also investigate how it is associated with socioeconomic status and, for example, whether it is more prominent among the less educated, as Jalovaara and colleagues (2019) have found in the

case of the other Nordics. As a matter of fact, we do not know how educational attainment and first-birth fertility is related in Iceland, opposite to what holds for the other Nordic countries (Comolli et al. 2021). Finally, researchers should explore why higher-order birth intensities appear to increase in the short-term in Iceland during periods of very adverse circumstances, such as during the economic crisis of 2008 and the Covid-19 pandemic, and the interplay of childbearing and the welfare system during these periods.

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