

# Nordic Demographic Symposium 2025

Conference Program

# Conference Program

## Day 1

**09:00-09:30** - Pick up conference badges

**09:30-09:45** - Welcome

**09:45-10:45** - Keynote 1: Ulla Mueller (UNFPA)

**10:50-12:10** - Session 1.1 Fertility Preferences and Behavior in Times of Change

**10:50-12:10** - Session 1.2 Multimorbidity and Causes of Death

**10:50-12:10** - Session 1.3 Intergenerational Dynamics in Migration Populations

**12:10-13:10** - Lunch

**13:15-14:45** - Session 2.1 Modelling Fertility and Counterfactuals

**13:15-14:45** - Session 2.2 Inequalities in Health and Mortality (1)

**13:15-14:45** - Session 2.3 Mobility Patterns and Vulnerabilities

**14:45-15:30** - Refreshments & Poster Session 1

**15:30-17:00** - Session 3.1 Fertility Under Uncertainty and Risk

**15:30-17:00** - Session 3.2 Health and Family

**15:30-17:00** - Session 3.3 Nordic Population Registers: Methods and Insights

**17:15-18:15** - Nordic GGS User's Guide

**19:00** - Dinner

## Day 2

**09:15-10:00** - Presidential address - Peter Fallesen (ROCKWOOL Foundation)

**10:00-10:45** - Refreshments & Poster Session 2

**10:55-11:55** - Keynote 2: Jennifer Dowd (Oxford University)

**12:00-13:00** - Lunch

**13:10-14:40** - Session 4.1 Partnership, Religion, and Fertility Timing

**13:10-14:40** - Session 4.2 Inequalities in Health and Mortality (2)

**13:10-14:40** - Session 4.3 Methodological Innovations in Demographic Research

**14:45-15:30** - Refreshments & Poster Session 1

**14:50-16:20** - Session 5.1 Assisted Reproduction, Reporting Accuracy, and Diverse Family Pathways

**14:50-16:20** - Session 5.2 Ageing and Health Care

**14:50-16:20** - Session 5.3 Modeling and Explaining Demographic Shifts

**16:20** - Social activity

**17:50-18:20** - General Assembly of the Nordic Demographic Association

**19:00** - Dinner

## **Day 3**

**9:30-10:30** - Keynote 3: Tomáš Sobotka (Vienna Institute of Demography)

**10:40-12:10** - Session 6.1 Housing, Benefits, and Socioeconomic Influences on Fertility

**10:40-12:10** - Session 6.2 Healthy Longevity

**10:40-12:10** - Session 6.3 Innovations in Demographic Forecasting and Projection

**12:10-12:20** - Closing

**12:20-13:30** - Lunch

## **1.1. Fertility Preferences and Behavior in Times of Change**

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## **Fertility Preferences During Crises: An Analysis of Finnish Men and Women's Reactions to the COVID-19 Pandemic and the War in Ukraine**

*Kateryna Golovina*

Co-authors: *Kateryna Golovina, Anna Jurczak, Noora Lehtonen, Urszula Marcinkowska, Venla Berg, Anna Rotkirch*

Background: Crises and periods of uncertainty often lead to declines in fertility preferences in high-income societies. However, some groups may experience an increase in fertility preferences. Objective: This study examines how the COVID-19 pandemic and the 2022 Russian invasion of Ukraine influenced fertility preferences among young adults in Finland. Method: Using a nationally representative survey conducted in August 2022 (n=1960), we analyzed self-reported changes in fertility preferences of men and women in relation to socio-demographic variables through multinomial logistic regression. Additionally, qualitative analysis was conducted on open-ended responses to identify common themes behind these changes. Results: Overall, 17.2% of respondents reported changes in their fertility preferences: 10.1% decreased them, while 7.1% increased them. Men were more likely to increase their fertility preferences in response to both crises, whereas women tended to decrease them due to the war but not the pandemic. Parents were more likely to increase their fertility preferences due to the pandemic but not the war. Unemployed individuals were less likely to change their preferences compared to employed respondents. The four key themes that emerged from qualitative analysis related to changes in fertility preferences due to the COVID-19 pandemic were (1) importance of family as a core value, (2) overall bad situation in the world, (3) COVID-related stress, and (4) access to infertility treatments. The main themes related to the war in Ukraine were (1) uncertainty about the future and (2) fear of being attack as a country. Conclusion: The two recent crises in Europe had distinct effects on fertility preferences across different demographic groups. Family planning and social support policies should consider not only economic factors but also non-economic uncertainties, such as political and military instability.

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## **Fertility Preferences and Life Goals in Young Norwegian Couples: Insights from the YoungDyad Study on Early Adulthood Relationship Dynamics**

*Rannveig Kaldager Hart*

Co-authors: *Nicole Hiekel, Nathan Robbins*

This study explores fertility preferences and life goals among young Norwegian couples using data from the YoungDyad study, focusing on early adulthood relationships to understand fertility changes. Despite being crucial for shaping long-term fertility outcomes, research often neglects young adult partnership dynamics. In Norway, fertility rates have dropped to historic lows (TFR 1.4 in 2023), driven largely by a sharp decline in fertility among women in their 20s. The age at first birth has risen to 31 years. At the same time, early relationships are increasingly fluid, and less institutionalized. The YoungDyad study is unique in couple data from young adults in romantic partnerships. To this end, it combines data from the Norwegian Mother and Child Cohorts (respondents aged 18-25 years), with self-reported data from their romantic partners (the YoungDyad data collection, N = 369 dyads). In this first paper, we will describe how young couples diverge or converge in terms of fertility intentions, life goals and social background. Divergence in fertility intentions tend to lead to no births (“veto rights”), meaning that discordance in fertility goals among couples have potential to amplify the fertility decline. Preliminary findings reveal that while most young adults want children. Still, they prioritize career stability, education and housing before parenthood. This gives delayed and narrow timelines for achieving fertility goals. By analyzing how partners align or diverge in these priorities and fertility goals, we show how these early relationships dynamics influence future fertility trajectories. This understanding is key to forecasting fertility trends and informing policies to address declining fertility in the Nordic region.

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## **The Changing Relationship of Employment and Women's Fertility in the Post-Recession Years**

*Trude Lappegård*

Co-authors: *Tom Kornstad Axel Peter Kristensen Lars Dommermuth*

The aim of this paper is to investigate whether the relationship between fertility and women's employment has changed over time, and especially so during the post-recession years in Norway. The point of departure is a puzzling decline in fertility since 2010 where the fertility level has dropped from 1.9 to 1.40 in 2023 in Norway. At the individual level, employment and income are fundamental to people's lives and the changing role of women's employment on fertility could be a key factor in understanding the downward trend in fertility level in Norway. To test this, we will explore the effect of full-time employment, part-time employment or not being employed on fertility, and see whether this effect has changed over time in Norway, and whether such effects vary by educational attainment. We will use high-quality register data with yearly information spanning across almost three decades (1993-2020). To account for the possibility that the birth process and the employment process could be jointly determined, we apply joint modelling of hazard models for different birth transitions and employment. Preliminary results show that especially the effect of working full-time increases stronger for both entering motherhood and for higher parities.

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## **Life-Cycle Effects of Comprehensive Sex Education**

*Volha Lazuka*

Co-authors: *Annika Elwert*

Using the introduction of comprehensive sex education in Sweden as a natural experiment, we explore how educational curricula can shape social norms and impact personal well-being. Inspired by liberal values, the curriculum taught more than just biology. It instilled lessons on abstinence, rational family planning, and the importance of taking social responsibility for personal decisions. We find that the reform successfully addressed its intended outcomes, reducing unwanted pregnancies, leading to fertility postponements and increasing female labor force participation. The findings suggest that social norms, internalized through school-based sex education, persistently affect people's outcomes in significant ways.



## **1.2. Multimorbidity and Causes of Death**

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## **Competing Causes of Death: Quantifying the Probability of Dying from One Cause Before Another**

*Marie-Pier Bergeron Boucher*

Co-authors: *Cosmo Strozza*

Throughout life, individuals are exposed to multiple risks, where the occurrence of one can prevent the others. This is known as competing risks. In clinical settings, practitioners assess these risks to determine whether an elderly patient is more likely to die from one condition before benefiting from treatments for another. At the population level, understanding competing risks is crucial for accurately evaluating the burden of specific causes of death and designing effective public health interventions. Addressing the need for a clearer understanding of competing causes of death, this study introduces novel methods to quantifying the probability of dying from one cause before another. We conduct pairwise comparisons among the 10 leading causes of death in the U.S. to assess the probability that one cause leads to death before another. Using outsurvival statistics, we estimate this probability under the assumption of independence between causes. This method is then compared to the cumulative incidence function, which accounts for dependence among causes. Furthermore, we evaluate both methods using two data types: deaths where diseases are listed solely as the underlying cause of death (UCD) and deaths where both causes being compared appear on the death certificate, utilizing multiple causes of death data (MCD). Our results reveal that, when using UCD and assuming independence, there is a higher probability of dying from diseases of the circulatory system compared to other causes, highlighting their significant population burden. However, this probability decreases when accounting for dependence among causes and further decreases when analyzing MCD data. Analysis of MCD data highlights that individuals with neoplasms or diseases of the nervous system at the end of life are more likely to have these conditions as their underlying causes of death compared to other co-morbidities present on the death certificate.

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## **Trends in Educational Differences in Drug-Related Mortality in Finland, 1999–2020**

*Liina Junna*

Co-authors: *Minna Ylinen, Lasse Tarkiainen, Elina Einiö, Pekka Martikainen*

**Introduction** In many countries, drug-related deaths (DRDs) are playing an increasing role in premature mortality. This study examines trends in drug-related mortality in Finland over two decades, with a focus on differences by sex and educational attainment. **Methods** We utilized longitudinal full-population administrative register data linked with cause-of-death records to calculate drug-related death rates for the period 1999–2020. Additionally, we assessed the contribution of DRD to changes in partial life expectancy at ages 15–59 across two time periods, 1999–2009 and 2010–2020, within four educational groups. **Results** We observed a clear inverse relationship between education and drug-related mortality: the lower the educational attainment, the higher the DRD rates. Furthermore, drug-related mortality increased over the study period in all educational groups except among those with tertiary education. The largest relative increases in DRD between 1999–2009 and 2010–2020 were observed among men with upper secondary education (99%) and women with vocational education (124%). Despite these increases, the overall impact of drug-related deaths on partial life expectancy remained modest. Even among the most affected subgroup—individuals with the lowest educational attainment—the increase in drug-related mortality reduced potential gains in partial life expectancy by only 0.11 years for men and 0.08 years for women. **Conclusions** Drug-related mortality has risen in Finland over the past two decades, with a persistent educational gradient. Socioeconomic differences in drug-related deaths may be widening due to the increasing mortality burden among individuals with lower levels of education. To curb the rise in drug-related deaths, it is imperative to develop and implement effective prevention strategies targeted at those most at risk.

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## **Longitudinal Evolution of Morbidity from Age 70 to 100 in Three Swedish Birth Cohorts**

*Karin Modig*

Co-authors: *Yuge Zhang, Sven Drefahl, Marcus Ebeling, Karin Modig*

**Background:** Consistent with the observed mortality plateau at the very highest ages, the risk of accumulating specific severe diseases has been shown to slow down in ages beyond the average life expectancy. However, it remains unknown whether this observation holds when considering the full spectrum of diseases in birth cohorts for which we have complete population data. **Methods:** This register-based study of the total Swedish population examines how (multi)morbidity evolves in the population from age 70 to 100 (birth cohorts 1920-1922), and how morbidity patterns change as the number of surviving individuals decreases. The overall aim is to provide deeper insights into how population health evolves with advancing age and the potential implications of these shifts for disease prevention and management strategies. **Results:** The rate of disease accumulation increases with age but levels off at around age 90. Examining the accumulation of different numbers of diseases reveals that this deceleration primarily occurs in transitions from 0 to 1 and from 1 to 2 diseases. Among roughly 20% of the population with five or more diseases, the rate of accumulation was slower until age 85 before increasing steadily until age 100. Cardiovascular diseases contributed the most to disease burden at every age. We found no clear evidence that population level disease complexity levels off with increasing age, although the absolute increase in disease combinations was greater from age 80 to 90 than from age 90 to 100. **Conclusion:** These findings illustrate how population heterogeneity partially reflects disease patterns across aging. While the rate of disease accumulation slows around age 90, disease combinations and complexity remain substantial even at the most advanced ages.

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## **Descendants of Long-Lived Families Have a Better Genetic and Social Profile which Becomes Increasingly Pronounced if more Ancestors are Long-Lived**

*Niels van Den Berg*

Co-authors: *Ingrid van Dijk, Mar Rodriguez-Girondo, Dorret Boomsma*

Currently around 60% of the older adults (75+) in the Netherlands is diagnosed with multimorbidity while the number of older adults is predicted to increase with 43% to a total of 2 million in 2030. This shows the importance to stimulate healthy aging in the general population. Descendants of long-lived families, however, frequently survive healthily up to high ages. Research showed that these descendants have a decreased chance of dying over their entire life course. Moreover, an increasing number of long-lived ancestors associates with a decreased risk of cardiovascular diseases and multimorbidity, amounting to a 10-year difference in the onset of their first disease compared to matched controls. Most research into familial longevity has been of genetic nature, focusing on the assumption that the association between an increasing number of long-lived ancestors and healthy survival up to high ages is primarily explained by genetic predisposition. However, social factors, such as socioeconomic status, related to health are also passed on from one generation to the next. Here we investigate whether descendants from long-lived families have both a lower genetic risk for chronic diseases as well as a higher socioeconomic status compared to matched controls. We used three-generational data from the Leiden Longevity Study (N=2,297) and two generational individual-level data from statistics Netherlands (CBS; N=343,239). Preliminary results show that an increasing number of long-lived ancestors associates with a decreasing number of cardio-vascular disease alleles and an increasing educational attainment level. The results suggest that both social and genetic factors are important for healthy survival up to high ages. Follow-up of this work will focus on different indicators of socioeconomic status, such as income, larger genotyped datasets, as well as the genotypes of more traits, for example related to behavior, and the interactions between genes and environment.

### **1.3. Intergenerational Dynamics in Migration Populations**

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## **Family Influence or Individual Experience? Social Determinants of Migration Across Generations**

*Marielle Côté-Gendreau*

Co-authors: *NA*

Why do some people migrate while others stay? While most studies are constrained by data sources to focus on individual economic factors, migration decisions are known to be embedded within social contexts. This paper investigates how personal and family migration histories shape future internal migration behavior for married couples, leveraging rich historical vital micro-data spanning over two centuries and multiple generations at the scale of a full population (Quebec, Canada; 1621-1861). Using the Population Register of Historic Quebec (PRDH), I exploit two data dimensions seldom available to migration researchers: complete residential histories—reconstructed from vital events—and complete kin relations. I show that prior migration experiences in spouses' own lifetimes, but also in parental and grandparental generations, heighten the likelihood of future migration. Those associations are surprisingly gender-balanced, as the husband's and wife's backgrounds are equally predictive of their joined migration decision. Moreover, a gradation exists such that those who migrated as older children are more likely to become adult migrants than those who migrated as younger children, who are in turn more susceptible than those whose parents or grandparents migrated. The long-running and geographically diverse nature of the data allows me to assess the stability of intra- and intergenerational influences on migration across locations and time periods. Despite substantial variation in migration intensity across contexts, life-course and kin influences on migration decisions remain robust. These results highlight the long-lasting influence of personal and family migration histories across generations and suggest that migration theories should integrate these broader, long-term family dynamics.

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## **Immigrating Together: How Partnership at Arrival Shapes the Risk of Emigration among the Foreign Born**

*Camilla Härtull*

Co-authors: *Jan Saarela, Rosa Weber, Andrea Monti*

Migration is not always a one-way journey. However, while migration determinants are well studied, factors shaping subsequent moves remain less understood. Family characteristics, particularly partnership status, play a crucial role in migration decisions, yet previous research has largely overlooked couples as a unit throughout the entire migration process. Using Finnish register data, we address this gap by examining outmigration among foreign-born individuals, with a particular focus on how partnership status and couple characteristics at immigration affect the subsequent emigration risk. Our study population includes all individuals who immigrated to Finland between 1987 and 2022 at age 18 or older, were born outside Finland, and did not hold Finnish citizenship at arrival. We observe them at the end of the immigration year and assess information about their partnership by linking individuals across registers. Partnership is categorized as having no partner, a Finnish-born partner, a foreign-born partner who migrated together, or a foreign-born partner who migrated separately. Piecewise constant exponential hazard models estimate how these partnership and other sociodemographic characteristics influence emigration. Separate models are estimated by sex and group of citizenship. We find notable gender differences in partnership categories among the immigrants. Roughly half of the men and one-third of the women have no recorded partner at arrival, with considerable variation across citizenship groups. Overall, emigration rates are higher among men, and highest among Nordic citizens, followed by other Schengen citizens. Hazard models including sociodemographic variables show that, among Nordic and non-European citizens, those who immigrated with a foreign-born partner are the most likely to emigrate, while in other citizenship groups, individuals who arrived alone have the highest likelihood of emigration.



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## **Leaving the Parental Home among Middle Eastern Immigrants and their Children in Sweden,**

*Anna Tegunimataka*

Co-authors: *Rami Zalfou*

Leaving the parental home is a significant milestone in Western societies that shows economic independence and individual autonomy. However, immigrant youth often delay this transition and research into the patterns of home-leaving has explored a variety of economic, social, and cultural factors that influence this transition. This study examines the patterns of leaving the parental home among Middle Eastern and North African (MENA) immigrants and their children in Sweden. Using data from Sweden's population register (1998–2022), we track individuals aged 17 to 35 to analyse transitions from living with parents to independent living. We focus on first- and second-generation immigrants from MENA countries, comparing their home-leaving behaviours to native-born Swedes and comparable immigrants. Applying competing risks models, we investigate how economic, cultural, and neighbourhood factors influence the timing and likelihood of transitioning towards independent living. We hypothesize that larger co-ethnic communities reinforce cultural norms that delay home-leaving, while neighbourhood characteristics like unemployment rates and the share of native-born residents shape these transitions. The findings reveal persistent gaps in the transition to independent living between MENA-origin youth and their native Swedish peers. Second-generation immigrants exhibit larger gaps than the first generation, suggesting complex assimilation patterns. The influence of parental income on home-leaving is minimal, with disparities remaining significant even among higher-income families. Neighbourhood composition plays a critical role: youth in immigrant-dense, high-unemployment areas face greater barriers to independent living. The study highlights substantial heterogeneity by country of origin and gender. For instance, second-generation females from MENA backgrounds experience pronounced delays compared to males. These patterns persist after controlling for socio-economic factors, indicating the strong role of cultural and neighbourhood influences. Our research contributes to the understanding of immigrant integration, emphasizing the interplay of economic conditions, cultural norms, and residential contexts in shaping life-course transitions among immigrant youth in Sweden.

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## **How Neighborhood Context Determines Inequality Later in Life: Quasi-Experimental Evidence for the Children of Refugees in Sweden**

*Ben Wilson*

Co-authors: *Elena Pupaza, Lisa Harber-Aschan*

More than 2.5 million refugees have been granted residence in Europe over the last ten years and their long-run adaptation is a fundamental societal challenge. Adaptation can be measured in different ways, but here we focus on spatial determinants of socioeconomic inequalities experienced by the second generation. Our analysis uses longitudinal data for the whole Swedish population, and the research design is based on a refugee dispersal policy, which quasi-randomly allocated refugees to municipalities all over the country between 1987-1993. Our findings reveal that co-ethnic networks do not uniformly affect socioeconomic outcomes, which indicates an intersectional socialization process. In general, we find considerable heterogeneity in the role of neighborhood context for the children of refugees—by sex, parental background, and the type of socioeconomic outcome that is considered. Notably co-ethnic networks have a negative impact on the education, unemployment, and income of male children of Iranian refugees at age 25, but not for females. There is also limited evidence of a material effect of co-ethnic networks for men or women whose parents were refugees from Iraq, Lebanon or Chile. Overall, this study provides valuable insights for policymakers and practitioners working to support the successful integration of refugees and their descendants.

## **2.1. Modelling Fertility and Counterfactuals**

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## The Exponential Hazard of Fertility

Annette Baudisch

Co-authors: *Lazlo Nemeth, Ryohei Mogi, Trifon Missov*

The hazard of death rises exponentially over decades of adult ages. A similarly strong and simple regularity for patterns of birth is unknown. Here we search for such a regularity motivated by preliminary results that birth patterns seem to behave exponentially over parts of the reproductive age range when expressed by the hazard of birth. This hazard of birth derives from a recently developed new method called born once die once. Here we thoroughly test the hypothesis that patterns of birth rise exponentially over reproductive ages using data on birth counts for women from the human fertility database for all countries, for period and cohort, and across the available years. We confirm that the hazard of birth rises exponentially for some of the years, in some of the countries over some of the ages. These ages cover ages associated with reproductive senescence. The pace of exponential increase takes values of around 0.1, like the pace previously known for mortality. We propose that such similar pace and shared exponential pattern in birth and death over senescent ages points to shared underlying constraints imposed by aging. We propose that the exponential change is an expression of the senescent decline in the physiological capacity to reproduce and survive over age. If our proposal is correct, we expect to see that the exponential pattern in birth counts should be stronger (meaning either covering more ages or a larger percentage of births) in countries, periods and cohorts that pertain to more pronounced postponement of reproduction and later mean age at birth. We predict analogous observations for mortality for countries with higher life-expectancy. Our results suggest new insights into aging may derive from studying birth and death patterns jointly.

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## **More Education and Fewer Children: the Contribution of Educational Enrollment and Attainment to the Fertility Decline in Norway**

*Kathryn Beck*

Co-authors: *Julia Hellstrand, Mikko Myrskylä*

Period fertility has declined rapidly in Norway in the 2010s, reaching record lows. While the decline in cohort fertility—which is not sensitive to the timing of births—shows a less steep decline, it is projected to decline significantly across more recent cohorts. To explain these observed fertility trends, educational expansion has often been tied to changes in both the timing of births, and the overall number of children. Although there is a clear education-fertility dynamic, significant educational shifts have occurred since the 1960s and it's unclear how much this contributed to recent fertility declines. To disentangle this, we utilize high-quality Norwegian register data and model yearly transitions between educational enrollment, attainment and childbearing for men and women born in 1964-2006. Using a counterfactual approach, we explore the contribution of educational expansion versus lower fertility by education to the decline in period and cohort fertility. Forecasting is used to complete fertility for cohorts aged 30+. We found that educational expansion contributed partially to the observed cohort fertility decline (2.11-1.98) for 1964-1978 female cohorts but stagnated for younger cohorts and the predicted decline thereafter (1.59 by the 1992 cohort), and the 2010s period fertility decline, is fully driven by decreased fertility across educational levels. For men, educational expansion was slower and didn't contribute to the fertility decline. For both genders, the contribution of changed fertility behavior was strongest among the lower educated, particularly for predicted ultimate childlessness. Our results suggest that increased education isn't the main fertility barrier in contemporary Norway. Instead, socioeconomic resources may increasingly promote childbearing for both genders.

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## **Fertility behavior and international migration. The case of Iceland**

*Ólöf Garðarsdóttir*

Co-authors: *Ari Klængur Jónsson*

This paper addresses the effects of international migration on fertility behaviors in Iceland. The study is based on a longitudinal dataset which covers the total Icelandic female population born between 1950 and 1990. The dataset includes information on childbirths, international migration and other vital events, as well as information on educational attainment. From a Nordic comparative perspective, Iceland is an interesting case in point. Until recently, fertility levels in Iceland were considerably higher than in the other Nordic countries and the proportion of childless women much lower. Another distinctive feature of Icelandic demographic trends is the geographical mobility of the population. Icelanders are thus several times more likely to emigrate than their Nordic neighbors. At the same time, return migration rate is high, and 70% of all Icelandic emigrants return within seven years from emigrating. Here we compare women who never emigrated with those who emigrated but returned before the age of 50. Our preliminary results show that migration had notable impact on the fertility behavior of Icelandic-born women, especially in terms of the oldest birth cohorts in the study. Women who had a migration history, gave birth later than their peers who never migrated, had fewer children and were more likely to remain childless.

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## Completing Incomplete Cohort Fertility by Curve Matching

*Marianne Frank Hansen*

Co-authors: NA

Curve matching is introduced as a novel approach to complete cohort fertility schedules for the population of Danish origin born in 1977 to 1991. The unknown part of each incomplete cohort fertility schedule is completed by a weighted average of already completed schedules across cohorts and countries from the Human Fertility Database. The completed schedules used for this imputation are characterized as being the nearest neighbours to the known part of the incomplete fertility schedule. The optimal number and the specific choice of nearest neighbours depends on the length of the known part of schedule and is found by minimizing the prediction error when applying the method to completed schedules of the Danish population. As the prediction error increases substantially when the turning point of the age dependent schedule is unknown, the matching approach is only applied to cohorts where data up until at least age 32 is available. For cohorts who have not yet turned 32, i.e. the generations born in 1992 or later, total completed cohort fertility is assumed to be at the level of the most recent cohort imputed by curve matching, i.e. generation 1991. As the known part of the age schedule tends to show a continuing tendency to a decrease in young age fertility, the assumption of constant total completed cohort fertility implies that fertility will catch up at older ages. This assumption might imply, that cohort fertility is overrated in the long run. However, this precautionary principle must be assessed in relation to the considerable uncertainty associated with predicting fertility of the youngest cohorts. Presently, the matching procedure compares the levels of age dependent cohort fertility schedules. However, the methodology could be extended to include parity or focus on changes in age dependent fertility between consecutive cohorts rather than levels.

## **2.2. Inequalities in Health and Mortality (1)**



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## **Dynamic Perspectives on Aging: Prospective Old-Age and Homecare Uptake Across Societal Groups in Sweden**

*Ida Johansson*

Co-authors: *Ida Johansson*

As life expectancy increases and birth rates decline, the population continues to grow older and faces a rising dependency ratio. Meanwhile, improvements in living conditions, healthcare, and medical treatments have extended healthy life expectancy, although these gains are not distributed evenly across population subgroups. This disparity calls for new, dynamic measures of old age that capture the varying patterns of aging across different groups. As societies face this shifting age structure, understanding these heterogeneities is crucial for policy decisions regarding retirement, pensions and elderly care. This study examines heterogeneities in aging and formal homecare uptake among the elderly in Sweden, stratified by foreign background, sex, and education. Using linked Swedish administrative registers from 1990-2022, I combine two approaches to measure aging: the prospective old age threshold (POAT)—defined as the age at which remaining life expectancy is 15 years—and patterns of homecare use. I calculate POATs by constructing annual period mortality life tables for each gender, educational level and country of birth combination. I employ event history analysis to examine timing and patterns of homecare usage with the POAT as the time of entry. The POAT approach offers a dynamic alternative to the commonly used fixed chronological threshold of 65 or 70 years, by accounting for improvements in survival over time. This has the potential to reveal previously hidden inequalities between societal groups. Additionally, by examining homecare usage patterns from the onset of prospective old age, this study provides insights into levels and variations of care dependency across population groups. This research contributes to a more nuanced understanding of the aging processes and care needs in an aging society, and its relationship to social inequalities in life expectancy and health.

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## **Understanding Japan's Longevity Advantage: A Comparison of Long-Term Care and Healthy Older Populations in Japan and Sweden using the Ageing and Health Cohort and the LIFE Study**

*Shunsuke Murata*

Co-authors: *Marcus Ebeling, Rei Ono, Megumi Maeda, Fumiko Murata, Haruhisa Fukuda, Karin Modig*

Background: Japan has the longest life expectancy in the world. Sweden also ranks well but can still be considered an average European country in terms of life expectancy. Both Japan and Sweden have well-developed healthcare systems. This study aims to more accurately describe and compare mortality rates and life expectancy between Sweden and Japan across age and level of long-term care, in order to better understand why Japan has higher life expectancy, especially in the older population, than the rest of the world. Methods: We included the entire population aged 75+ in Sweden and nine Japanese municipalities and classified them into three groups: no care, home care, and care home residence. We compared remaining life expectancy and age-standardized mortality rates by long-term care status between Sweden and Japan. We additionally investigated how the different compositions of care utilization within each country contributed to the overall mortality differences using decomposition. Results: Swedish older adults had higher mortality rates and shorter life expectancy than their Japanese counterparts, with more pronounced differences among those with more long-term care needs. The mortality difference within each long-term care status, particularly among those receiving home care and living in care homes, largely increased the overall mortality difference. For men, the share was 50% for those receiving home care and 40% for those in care homes. For women, the share was 50% for home care recipients and 54% for those in care homes. Conclusions: Our findings show that Japan's mortality advantage over Sweden is primarily attributable to the frail segment of the population. Whether this disparity reflects superior LTC, more extensive life-saving treatments within the frail population, or an overall healthier LTC population in Japan compared to Sweden warrants further investigation.

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## **Changes in the Parental Socioeconomic Composition of Birth Cohorts Conceived During the COVID-19 Pandemic: A Register-Based Study of 77.9 Million Live Births in 15 Countries**

*Moritz Oberndorfer*

Co-authors: *Moritz Oberndorfer, Juha Luukkonen, Hanna Remes, Pekka T Martikainen*

The COVID-19 pandemic continues to offer opportunities to study how in-utero and early life exposure to environmental changes can affect health and socioeconomic outcomes throughout the life course. However, inferences from such studies and resulting policies may be flawed if the pandemic changed the socioeconomic composition of parents. Using register data covering over 77.9 million live births from January 2015 to December 2021 from 15 countries (Americas: Brazil, Ecuador, Colombia, Mexico, the United States; and Europe: Austria, England, Denmark, Finland, the Netherlands, Scotland, Spain, Sweden, Wales; and from the state South Australia) we compared the observed socioeconomic composition (regarding parental income, education, and area deprivation) of babies born between December 2020 and December 2021 with their estimated counterfactual composition had the pandemic not occurred. In the United States and all included European countries (except for Denmark and Sweden), the December 2020–December 2021 birth cohort had a 0.6% [95%CI: 0.2; 0.6] (Netherlands) to 2.5% [95%CI: 2.2; 2.9] (Spain) higher proportion of babies born to socioeconomically advantaged parents compared with their counterfactual compositions. In included Latin American countries, the proportion of babies born to advantaged parents was -0.3% [95%CI: -0.4; -0.2] (Mexico) to -3% [95%CI: -3.3; -2.7] (Ecuador) lower than their counterfactual proportions. For Denmark, Sweden, and South Australia, we found little to no evidence for changes in socioeconomic composition. The compositional changes found for 12/15 countries may cause between-cohort differences in life course outcomes that are affected by the socioeconomic position of parents. Little to no effects on socioeconomic composition in Denmark, South Australia, and Sweden may be explained by less stringent lockdown measures and generous economic support. Cross-country differences in our results suggest that changes in a birth cohort's socioeconomic composition in response to macro-level shocks depend on policy responses and how socioeconomic position relates to agency in fertility decisions.

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## Differences in Health Reporting by Gender and Sexual Orientation

*Sofie Quermann*

Co-authors: *Estelle Knoblauch, Jennifer Caputo, Anna Oksuzyan*

Self-Rated Health (SRH) is a widely used measure to assess overall health. This study explores differences in reporting of general health across different sexual orientation and gender groups. We utilized the National Health Interview Survey data from waves 2013-2023. Generalized ordered probit models are applied to regress SRH onto two sets of independent variables modeling actual underlying health and reporting behavior driven by demographic characteristics. In reporting behavior an age pattern is more prevalent than a gender pattern: people (across all genders and sexual orientations) assess their health more pessimistically in younger ages (18-59) while at older ages (60-70+) they turn more optimistic. This aligns with results of previous studies that did not account for sexual orientation. Straight women over-report their poor health to a greater extent than lesbian women while lesbian women are at a greater disadvantage of health across all ages. Gay men of ages 50+ show an advantage in health compared to their heterosexual counterparts while being at a disadvantage in earlier years. Our findings can contribute to research challenging traditional beliefs that women over-report and men under-report health problems, and they highlight the variability in gender disparities in health reporting across gender and sexual orientation groups.

## **2.3. Mobility Patterns and Vulnerabilities**

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## **Geographical Mobility of Older Workers: Evidence from Sweden**

*Sebastian Hanika*

Co-authors: *Mikhail Martynovich*

Previous research on older individuals' migration largely focuses on amenities and family ties. However, as older workers now constitute a substantial and growing share of the labour force, it becomes relevant to consider work-related geographical mobility of older individuals, that is switching region of employment. To our best knowledge research on this topic is rather limited. To fill this gap in the literature we map interregional flows of workers aged 60-74 in Sweden between 2007 and 2019 and compare those to interregional mobility of younger workers. We explain those flows by exploring regional characteristics that act as attraction and retention factors for older workers. In particular, we examine demographic factors (e.g., regional age distribution and population density) and local labour market features (e.g., industry composition, specialization versus diversity in regional employment mix, and the role of the public sector). We also compare whether older workers are impacted differently by these factors compared to younger workers. Our analysis is expected to provide a more nuanced understanding of factors shaping spatial behaviours of older workers that constitute an expanding and increasingly relevant segment of the labour market.

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## **Mobility's Impact on Population Change in the EU: A Regional Typology**

*Timothy Heleniak*

Co-authors: *NA*

According to projections, the EU population size will not change drastically in the next decades. However, we will probably observe significant changes in population and its concentration on a country and a regional level. Already now, it is visible that some regions, e.g., capital regions of the EU countries, are growing but others, like some small towns and villages, are experiencing depopulation and rapid ageing. One of the major causes of this process is mobility—national, the EU and international movements. In this paper we want to explore differences and similarities in mobility patterns of native-born and selected foreign-born populations for all mobility types and propose the typology of regions (NUTS3) based on contribution of mobility and other demographic processes into population reproduction. We apply modification of the method of measuring of impact of migration on population turnover using the detailed register data for Denmark, Netherlands, Spain and Sweden. Our findings show significant temporal and spatial differences in importance of mobility for population reproduction. We distinguish regions that have positive or negative effect of different mobility movements and different subpopulations, for example population replacement in regions where natives migrated to large cities and were replaced first by migrants from the EU countries and then, when those left, by Third country nationals (e.g. in Spain). In the paper we also present our typology applied in the countries under consideration.

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## **Automation Risk and Migrant Vulnerability: A Household-Level Analysis**

*Marcin Stonawski*

Co-authors: *NA*

Co-author: Vegard Skirbekk (NIPH, Norway) In today's world, there is a mega-trend towards automation and migration. In Europe, depopulation, ageing populations and high levels of education are driving immigration to countries within the region. Migrants from outside Europe tends to occupy positions in the labour market that are likely to be replaced by automation in the near future. As a result, these individuals are at increased risk of unemployment and may inadvertently place an additional burden on the host society rather than providing a solution to the problem. It is therefore important to establish whether this increased individual risk is mitigated at the household level. For example, the consequences of losing one's job may be less severe if one's partner is employed in a secure position, and more significant if one is the main breadwinner with many dependants. The present study focuses on assessing the risk of technology-related job loss among migrants, based on individual data from Danish registers and the RTI methodology. The data allow us to assess both individual and household vulnerability to technological change and to create a typology of households in this respect. The preliminary results indicate considerable diversity among individuals and households with regard to the risk of job loss.



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## **Immigrants? Migration Within and Out of Norway**

*Marianne Tønnessen*

Co-authors: *NA*

The regional distribution of immigrant populations in Western countries has changed over the last decades. Such changes are usually explained by changes in immigrants' initial settlements and/or their subsequent internal migration patterns. This paper draws attention to a third factor: emigration. When urban areas have higher emigration rates than rural areas, this contributes to a deurbanization of the immigrant population. Using Norwegian data, this study follows immigrant cohorts—categorized by reason for immigration—during their first ten years after arrival in Norway. The results show how emigration from the most urban areas has contributed to a less urbanized (remaining) immigrant population. For some immigrant groups, this de-urbanizing emigration outweighed the urbanizing effects of internal migration.

### **3.1. Fertility under Uncertainty and Risk**

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## **The Rise of the Nulliparitocracy? Public Economy, Political Philosophy and Demography**

*Linus Andersson*

Co-authors: *NA*

Fertility decline is often viewed through vertical structural change—aging and dependency ratios. This study shifts focus to horizontal change: a growing share of non-parents and declining “exposure to dependent children ratio” (EDCR). With sizable public transfers going to parents, will new political cleavages emerge as fewer people are linked to children? Using Swedish register data (2011–2023), I measure EDCR through parental status, co-residence, custodianship, kinship, and occupational roles. EDCR fell by 2–7 percentage points over this period, suggesting that shifts in everyday life experiences and public transfers linked to children follow from fertility decline and emphasize the importance of data such as National Transfer Accounts. Survey data (GGS, LNU) show disparities in policy preferences between parents and non-parents and by childbearing intentions. The ongoing fertility decline reshapes societies by removing the ubiquity of exposure to children. This trend may influence views on welfare, redistribution, and the social contract—highlighting a potential political divide based on parenthood.

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## **Economic Uncertainty and Postponed Parenthood: A Review.**

*Mogens Christoffersen*

Co-authors: NA

Economic uncertainty can induce a short-term reduction in fertility due to postponement of decisions to have a child. Strategic chosen objective indications which substantiate the assertion will be presented. Postponement of fertility had been known as a strategy to cope with economic insecurity. Women born 1840-44 in Denmark gave birth to 4.5 child in average. Many couples had postponed parenthood to secure access to land and production resources, many women remained childless, and the infant mortality rate among unmarried women were high. Studies of the Great Depression, World War II, the economic shocks in Central and Eastern Europe after 1989, and the Great Recession 2008-2009 support the assertion that sudden change in unemployment rate tends to influence couples' decisions and induce perceptions and expectations of job instability, and economic insecurity. Recessions often lead to a postponement of childbearing, and rising rates of childlessness. Other indicators reflect aspects of economic uncertainty such as temporary contracts, seasonal work, dispatch work, involuntary part time work and flexible jobs have documented a negative association of non-standard employment with childbearing for both men and women. Women who reported greater economic insecurity had higher odds of having considered abortion. Studies have shown a strong negative effect of shocks of unemployment on the hazards of first births among men and women below 30 years old, because young people are in an employment position especially sensitive to economic downturn. They will be the first to be dismissed, and on the other hand they will be the first to be hired in an economic upturn. Postponement of fertility after 1970 is closely related to the expansion of education. Number of children with a teenage mother had steadily declined since 1964 due to expansions of education possibilities and vocational training. In order to understand the present decline in fertility it is important to know if the present decline in birthrates is a response to transitory changes in economic opportunities.

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## **The Fertility Puzzle 2010-2020**

*Gosta Esping-Andersen*

Co-authors: *Teodora Maksimovic*

There are actually very few systematic comparative studies addressing the issue of the sudden fertility drop and absence of any recovery in many OECD countries in the 2010-20 decade. Our study breaks new ground by combining macro and micro level analyses, and by focusing on countries with declining-, but also with stable and rising fertility. The macro-level study adopts cross-section, time-series estimation for 29 countries, 2000-2020. The data support the broadly accepted view that the sudden decline in fertility in the early 2010s was biased towards first births, and was related to the preceding Great Recession and rising unemployment. We address two explanations that have been voiced in recent debates. The first tests the argument that post-modern value change depresses fertility through rising individualism and a declining inclination to form partnerships and families. The second addresses the hypothesis that declining births are related to economic uncertainties, including job insecurity and exploding housing costs. The micro-level analyses compare Denmark, Sweden, Norway, the Netherlands and the UK, all of which experienced a significant fertility drop, and two countries (Germany and Czechia) which in contrast experienced rising fertility over the same period. We adopt event history analysis and simultaneous equation estimation using GGS-II data. The focus here is to identify, at the level of individuals (and cohorts), the dynamics of remaining childless as opposed to childbearing. We focus in particular on birth probabilities in the post-recession years of economic recovery (i.e., post-2013). Our leading hypothesis is centred on the eroding socio-economic status of less skilled males (which intensified in the Great Recession), and how a significant fall in partnering within this population combines with fertility postponement and, ultimately, rising childlessness.

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## Climate Risk Perception and Fertility Intentions

Gerda Neyer

Co-authors: *Livia Olah*

Since the 2010s, many of the industrialized countries around the globe have encountered falling fertility rates, partly to the lowest levels ever recorded. The decline occurred irrespective of economic conditions, family support or level of gender equality in a country. Researchers therefore assumed that perception of economic and other uncertainties lies behind this fertility decline. Based on theories of post-modern societies as “world risks societies” we investigate to what extent perceptions of and worries about climate change are associated with fertility intentions in Sweden. We use data of the Swedish Generations and Gender Survey of 2021 (GGS2021) which contained a module specifically geared to capture respondents’ worries about global uncertainties, including climate change. The quantitative analysis is complemented by qualitative interviews carried out in 2022 with participants in the GGS2021 to explore in-depth how and in which way climate change perceptions affect their considerations to have a(nother) child. Analyses of the GGSs in Sweden and other countries reveal no clear picture about the link between climate and fertility intentions. On the surface, the qualitative interviews seem to back the quantitative findings. However, our interviewee’s in-depth reflections on climate change and whether or not to have a child in light of its risks reveals that the links and the process of decision making are much more complex as different temporal, spatial, and political aspects of climate change are weighted against other personal factors. The findings have implications for research on the links between climate change and fertility outcome in developed countries. They call for an expansion and reframing of the current theoretical and methodological approaches to climate change and fertility and for new designs of studies that link external risks and personal behavior.

### 3.2. Health and Family

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## **The Intergenerational Transmission of Lifespan: Evidence from Sweden 1860-2020**

*Isa Barraclough*

Co-authors: *Ingrid van Dijk*

A large literature has established the degree of and developments in intergenerational persistence in income, wealth and other markers of socioeconomic status. Yet these questions remain underexplored for intergenerational persistence in lifespan. Addressing such family correlations in mortality provides a lens into developments in lifespan inequalities between individuals. We use full-count census data for Sweden 1880-1920 and part of the census of 1930, with nationwide follow-up on mortality until 2020. We apply intergenerational and rank correlations to address intergenerational persistence in lifespan in Sweden for the birth cohorts 1860-1920. We find that intergenerational persistence is consistent over time, with a small but significant correlation between relatives. Intergenerational persistence is strongest between parents and children but also found between grandparents and grandchildren, and correlations are stronger between mother-daughter and father-son pairs. Moreover, we find that the correlation with siblings is stronger than with previous generations (grandparents and parents). Finally, the correlations are not explained by socioeconomic status of the family of origin or own socioeconomic status in adulthood. We conclude that there is significant evidence for a long-term correlation in the length of life that is weaker than for socioeconomic status estimates but consistent over time, despite social and epidemiological change during the 20th and 21st centuries.



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## **Intergenerational Transfer of Disadvantage: Parent Accidents and Children's School Performance and Wellbeing**

*Ea Hoppe Blaabæk*

Co-authors: *Peter Fallesen, Lars Højsgaard Andersen*

In line with the concept of linked lives, research shows that unexpected health shocks impact not only the life course of affected individuals but also their immediate family. Due to the unequal distribution of adverse health shocks, this means disadvantage spills over across family members and is intergenerationally transmitted. The empirical literature on health shocks mostly focuses on the impact of severe but rare events. We contribute by studying the impact of more common events that impact a much larger part of the population. Using Danish registry data on 11 cohorts of children (born 1997-2007), we study whether a parent experiencing a health shock (an accident requiring an ER visit) negatively affects children's educational performance (reading test) and wellbeing. We use a difference-in-differences design and compare children's outcomes before and after a parent's accident to outcomes across the same grades for children (a) whose parents suffer an accident later and (b) whose parents do not suffer accidents. This design nets out level differences between comparison groups and identifies the causal effect of parent accidents under the assumption that event timing is unrelated to children's test score progression—a reasonable assumption given the unexpected nature of parent accidents. We find that parent accidents (in particular, more severe events) negatively impact both children's reading performance and their wellbeing. Further, children of parents with lower income and education are more likely to experience a parent having an accident. This means the negative effects contribute to socioeconomic gradients in child outcomes and increase inequality of opportunity. These results contribute to research on linked-lives family spillovers of adverse events by showing that even minor health shocks have intergenerational consequences. Further, the results contribute to research on stratification in child outcomes by highlighting parental minor health shocks as a mechanism that has received little attention previously.

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## **Linked Lives and the Mental Health Effects of Life Events among Separated Parents**

*Philipp Dierker*

Co-authors: *Mine Kühn Sanna Kailaheimo-L`nnqvist (University of Helsinki)*  
*Mikko Myrskyl%o (Max Planck Institute for Demographic Research)*

**Objective:** This study examines how life events of ex-partners with a shared child affect each other's mental health. **Background:** Existing literature has examined linked lives within a family, such as interdependencies between parents and children or between partners in a couple. We extend the linked lives concept from life course theory and argue that parents' lives remain interdependent even after separation, unlike separations between partners without children. Accordingly, life events experienced by the ex-partner (re-partnering, separation, childbirth, cancer diagnosis, death, and death of a parent) could affect individuals' mental health. **Method:** This study uses Finnish total population register data and panel data methods, including fixed effects, fixed effects with individual slopes, and dynamic difference-in-difference models. The sample includes families in which parents separated while their firstborn child was a minor. Mental health is operationalized by psychotropic medication purchasing. **Results:** Positive life events of the ex-partner such as re-partnering and childbirth, reduce the probability of psychotropic medication purchasing in the former partner. Conversely, negative life events, including the ex-partner's cancer diagnosis and death, increase this probability, with stronger effects observed for women. The more distant life events such as the separation of the ex-partner or the death of the ex-partner's parent were not associated with psychotropic medication purchasing. **Conclusion:** These findings support the hypothesis of enduring links among separated parents. More distal events, such as the death of an ex-partner's parents and post-re-partnering separations, show inconsistent effects, suggesting that while the lives of separated parents are interconnected, links weaken across generations and transitions. Generally, compared to events experienced by non-separated parental couples, the impact of ex-partners' life events is rather weaker.

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## **Health and Wealth Trajectories in Childless Families: How Childlessness Shapes Cumulative Inequalities over the Life Course**

*Anastasia Lam*

Co-authors: *Philipp M. Lersch*

Childlessness is increasing worldwide, raising questions of how childless individuals will fare as they get older. Childless individuals generally accumulate more wealth over their life course so might have more resources for healthcare services, and higher wealth is associated with better health, but the relationship between childlessness and health is less clear. Therefore, this study aims to examine the bidirectional relationship between health and wealth over time and how it differs by childlessness status, while paying particular attention to cumulative (dis-)advantage processes. Using seven waves (2004-2022) of the Survey of Health, Aging, and Retirement in Europe (SHARE), we conduct multivariate growth models to assess joint trajectories of health and wealth over age, by childlessness status. Health is defined using a 58-item frailty index and wealth is couple-level net non-housing wealth. Both outcomes are percentile rank transformed, with higher values indicating either better health or higher wealth. We find that health and wealth are positively correlated, indicating that individuals with higher wealth also have better health. Childlessness has a larger effect for individuals who have less wealth, but better health, highlighting the complex relationship between health, wealth, and childlessness. Further, the speed of wealth accumulation decreases with age, while the speed of accumulating health deficits increases, suggesting potential ceiling effects and selective survival, respectively. These findings have important implications for our understanding of how wealth and health inequalities develop over time within the context of changing family structures. Future analyses will assess the role of other health indicators and welfare states.

### **3.3. Nordic Population Registers: Methods and Insights**

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## **Estimating Sweden's Unregistered Population: A Demographic Approach**

*Lena Lundkvist*

Co-authors: *NA*

**Introduction:** The Swedish government tasked the Swedish Tax Agency (Skatteverket) with creating a situation report on Sweden's population. This report aims to provide current information on residents and visitors in Sweden. The agency will also estimate other relevant groups not registered with the Tax Agency but present in Sweden, with or without permission. Statistics Sweden will assist by estimating this group using demographic measures based on data from the Tax Agency on deceased and newborns without personal or coordination numbers. **Deceased:** The hypothesis is to use observed mortality rates in Sweden to estimate the unregistered population, assuming they have the same mortality rate as registered residents. The data from the Tax Agency includes 3,563 deceased individuals from 2013-2023. **Newborns:** The hypothesis is to use the number of newborns without personal numbers to estimate the unregistered population. The data includes 16,487 children born without personal numbers from 2013-2023. The estimated population of women in childbearing age (15-45 years) is higher than men due to missing data on fathers. **Temporary Residents:** The report also considers individuals temporarily in Sweden, such as tourists, short-term visitors, and foreign workers. These groups contribute to the estimated population without personal numbers. For example, tourists and short-term visitors are converted into "full-year persons" based on their average stay duration. This estimation adds to the overall count of unregistered individuals in Sweden. **Conclusions:** The estimates from different demographic events vary significantly. Mortality data can estimate the population for all ages, while birth data is limited to certain age groups. The estimated population without personal numbers in 2023 ranges between 110,000 and 185,000, excluding temporary visitors. The report highlights the uncertainty in these estimates and the assumptions made.

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## **Invisible Emigrants: A Research Note Uncovering Population Over-Coverage Bias in Socio-Demographic Rates**

*Eleonora Mussino*

Co-authors: *Eleonora Mussino, Bruno Santos Mimmi Lounela, Sven Drefahl*

This research note examines the impact of population over-coverage on socio-demographic indicators among migrants in Sweden. Over-coverage occurs when emigrants or deceased individuals remain in population registers, resulting in an overestimation of the resident population. This issue is particularly relevant for migrants due to increasing return, onward, and circular migration patterns. As register-based systems for population data collection become more prevalent, addressing over-coverage bias is critical. Using a Multiple Systems Estimation (MSE) method, this study adjusts for over-coverage in the Swedish population register and calculates accurate demographic and socio-economic rates. Administrative register data from 2003 to 2016 were analyzed to compute age-specific fertility rates, mortality rates, employment and unemployment rates, Total Fertility Rate, and Life Expectancy, focusing on foreign-born individuals. The results demonstrate that over-coverage substantially affects demographic and economic indicators, particularly at typical migration ages, with mortality rates exhibiting the largest bias at older ages. Consistent alignment of numerators and denominators, based on individuals' age and year of occurrence, ensured a robust analysis. These findings highlight the importance of addressing over-coverage to improve the reliability of socio-demographic insights in register-based population systems.

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## Family Configurations and Leaving the Parental Home in Finland

*Katrin Schwanitz*

Co-authors: *Schwanitz, Katrin*

Previous research has demonstrated the diverse effects of family stability and configurations on the timing of leaving the parental home. Young adults from non-intact families, particularly those from single-parent and step-families, tend to leave home earlier than their peers from intact families (van den Berg et al., 2018; Gillespie, 2020; Gillespie & Lei, 2021). A limitation of such studies is that family configurations are often measured crudely as time-constant characteristics—such as whether a respondent’s parents separated before age 15 or experienced a divorce. To address this, I employ a novel approach—Sequence History Analysis (SHA)—to examine how dynamic changes in family configurations during childhood and adolescence influence the likelihood of leaving home. Applying this method to the Finnish context, I use Finnish register data for the 1992 birth cohort ( $N = 62,285$ ). First, I conduct a sequence analysis to identify past family configuration trajectories. Then, using a discrete-time model, I estimate the effect of these trajectories on the probability of leaving home. Preliminary results suggest that dynamic family configurations involving lone parents, as well as the arrival or departure of siblings, accelerate home-leaving. Further analyses will explore whether, and to what extent, these effects are explained by socioeconomic background. This distinction is important, as different mechanisms may underlie the relationship between family configurations and home-leaving. Changes due to parental break-up, divorce, death, or re-partnering—as well as the addition of step-siblings or half-siblings into the household—may be associated with disadvantages in terms of both social and economic resources within the parental home.

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## **LifeLines - a Longitudinal Population Register for Denmark**

*Peter Tibert Stoltze*

Co-authors: *Ilya Kashnitsky*

LifeLines is a relatively new longitudinal population register at Statistics Denmark, designed to enhance demographic research by linking individual-level data across time. Built on Denmark's rich administrative data, it provides a structured framework for studying demographic changes with high precision. The register integrates multiple data sources, ensuring consistent and accurate representation of the population over time. This presentation will cover the construction of LifeLines, key data sources, and examples of applications, including when it may be a better choice compared to cross-sectional registers. Additionally, it will outline how researchers can access LifeLine for demographic and social science research.



## **4.1. Partnership, Religion, and Fertility Timing**

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## **Union Dissolution in Sweden: A Driver of Declining Fertility Rates?**

*Gunnar Andersson*

Co-authors: *Stefanie Möllborn, Kaare Christensen, Anna Oksuzyan*

Previous research indicates that the falling fertility rates during 2010 onwards were due to the declining propensities of childless cohabiting people to become parents. The decline in first-birth rates was paralleled with an equally strong and independent drop in marriage formation. In contrast, there was no decline in the propensities to form new cohabiting unions. These developments together indicate a declining willingness of childless cohabiting women and men to enter more long-term commitments. In this study we take a deeper look into the dynamics in cohabiting couples in Sweden to examine how their propensities to exit from their unions have evolved during the period of changing family dynamics. If childless couples have become less willing to make more long-term commitments, they may instead have become increasingly prone to dissolve their unions and no longer be at risk of becoming a parent. Our preliminary findings show no increases during 2010-2023 in cohabitation dissolution rates or divorce risks among childless couples. It seems that more people than before remain in the family form of the childless cohabiting couple. However, given the relative instability of this family form, people may eventually find themselves experiencing union dissolution, even in the absence of any changes in the duration-specific rates of union dissolution. In our study, we will present descriptive data on the competing risks of the fractions of childless people that ever become a parent, marry, experience union dissolution, or remain in their union, based on a synthetic cohort approach with data from 2012-2014 and 2022-2024. Altogether, these analyses reveal developments in union (in)stability that are interesting in themselves, while also providing a more nuanced picture of the potential role of union dynamics for the declining first-birth trends in Sweden.

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## Partnership Trajectories Toward Late Motherhood in Denmark

*Mengni Chen*

Co-authors: *Yanzhen Luo*

Objective “Late motherhood” or “late transition to motherhood” generally refers to becoming a first-time mother at ages 35+, when women’s fecundity declines at an accelerating rate. Drawing on the life course perspective, this study examines the pre-parenthood partnership trajectories of late mothers in Denmark. Although becoming first-time parents at a late age is very common, little is known about the within-group heterogeneity in partnership trajectories leading to late motherhood and their sociodemographic correlates. Method Based on the Danish registry data over the period 1985-2018 (including 46,251 women born in 1960-1979), this study conducts descriptive analysis, sequence analysis and multinomial regression to reveal patterns of partnership trajectories. Preliminary Results The descriptive analysis shows that during the 10 years leading up to the childbirth year (altogether 11 years of observation), late mothers spent 5.6 years in partnership. They had been through 1.5 relationships on average. Specifically, 8% experienced no relationship, 51% experienced 1 relationship, 30% experienced 2 relationships and 11% had been through 3+ relationships. Furthermore, the sequence analysis identified three clusters of partnership trajectories: “prolonged singlehood” (28%); “long stable marriage” (19%); “unstable cohabitation” (53%). Women who belong to the “prolonged singlehood” cluster spent 8.3 years in singlehood on average and 25% of them remained single at the year of childbirth. Women who belong to the “long stable marriage” spent 9.4 years in relation and 89% were married at the childbirth year. 60% of this group experienced only 1 relationship within the study period. For those in the “unstable cohabitation” cluster, they spent 8.5 years in relation and 56% were cohabiting at the childbirth year. 18% of them had experienced 3+ relationships. Sociodemographic correlates of these partnership patterns including birth cohort, education attainment, relative income, whether had a late-childbearing mother, whether experienced parental divorce at childhood are investigated and discussed in details.

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## **Religiosity and Fertility in Communist and Post-Communist Estonia**

*Mark Gortfelder*

Co-authors: *NA*

The Second demographic transition (SDT) framework holds values to be of the central importance for fertility behaviour and sees more “traditional” values often linked to religion to be pronatalist and thus producing higher fertility for the (more) religious. Studies have confirmed higher fertility for the (more) religious for a number of countries. However, these countries lack a past of Communist and hence atheist dictatorship under which the ability of the religious to spread its message and customs concerning childbearing or otherwise was severely restricted. In this presentation the focus is on Estonia, commonly described as among the most secular societies in the world, which was for a half-century under Soviet occupation and its anti-religious policies. First, population-level census and register data is used to track the religiosity and fertility of women and men born 1930–1984. The study uses both descriptive methods to focus on trends in the mean number of children and childlessness, as well as Poisson regression models. The preliminary results do not show the religious to have had higher fertility among the studied cohorts although atheists do have somewhat smaller number of children compared to the religiously indifferent and well as those without a substantive answer on the question of religion. Second, recent survey data is used to study fertility intentions of younger cohorts. Here, we do find that the (more) religious have greater intentions of having children in line with the results of other studies. The preliminary interpretation is that the Communist dictatorship inhibited the spread of religious teaching and regulation and the weakness of established religion has continued also in the post-Communist time. However, most recently values have started to matter more as a determinant of fertility as the relevance of parenthood has weakened in line with the SDT.

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## **Partnership Status and Childbearing Intentions in Sweden: Developments of the Past Decade**

*Livia Olah*

Co-authors: \*Glenn Sandström

Gerda Neyer [Dept. of Sociology/SUDA, Stockholm University, Sweden, e-mail: [gerda.neyer@sociology.su.se](mailto:gerda.neyer@sociology.su.se)]\*

Solid research evidence about the importance of partnership status for childbearing provide the rationale for this paper. We seek to contribute to an explanation of the ongoing Swedish fertility decline by exploring i) how short-term childbearing intentions changed across partnership statuses in the 2010s; ii) whether uncertainty for longer-term childbearing plans increased and for which partnership statuses and iii) how individuals' reflections about the importance of a partner for childbearing changed in the past decade. We analyze data on childless women and men aged 24–44 from the Swedish GGS 2012 and 2021 along with 120 in-depth interviews conducted in 2012 and 2022. Our multi-methods research design includes binomial and multinomial logistic regression models and text analyses. The main findings suggest beyond a general postponement for ages under 30, a decline in positive fertility intentions across all partnership statuses over time with slight variations for some groups. Partnership uncertainty (no partner or LAT) reduces intentions among most disadvantaged men (lower-educated, foreign-born, not in paid work [for singles] and students [if LAT]). Among women mainly those with a partner (co-resident and LAT) exhibit lower intentions in 2021 independently of educational level, employment status and ethnic origin. For co-resident women, the much lower intentions relate to a pronounced decline among the foreign-born over time. Combining short- and long-term intentions we find again evidence of partnership uncertainty (no partner or LAT) reducing especially men's intentions with a strong increase in “not in 3 years, not later” and “probably not in 3 years, not later” intentions in 2021. The interviews in turn reveal an increasing uncertainty about relationships enduring along with growing expectations of gender equal parenting by the early 2020s, a recognition of the possibility that neither members of a couple want to have children, and an emerging view of a partner not being necessary for childbearing.

## **4.2. Inequalities in Health and Mortality (2)**

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## **Decomposing and Understanding the Suicide Trends in Belgium and Finland**

*Joan Damiens*

Co-authors: *Joachim Gotink, Lasse Tarkiainen, Sylvie Gadeyne, Pekka Martikainen.*

Suicide trends have been decreasing in most European countries, but not at the same pace in all countries. For instance, suicide rates have decreased much faster in Finland than in Belgium, and higher-educated women in Belgium show unexpectedly high suicide rates, higher than their primary-educated counterparts. With Register-based Finnish and Belgian data, we will investigate how the relationship between education and suicide has varied through three decades and the differences between men and women. We will use the two-factor Retherford-Cho method. We define four components that might contribute to the change in the suicide rate over time: a) the population ageing; b) the rise in higher education in each age group; c) the change in suicide rates per age-group among the population with a primary or secondary educational level; d) and with a tertiary educational level. For now, we have analysed the evolution of age-, gender- and educational level-specific suicide rates in Finland between 2002-2006 and 2011-2015. In Finland, the changes in the suicide rate for the lower-educated men are responsible for most of the suicide decline (43.8%), followed by the decrease in suicide rates of the high-educated men (26.6%). The decline in suicide rates for low-educated and higher-educated women contributed to 23.5% in the suicide rate decrease. In Belgium, we do not expect women's increase in educational attainment to participate to that degree in Belgium's decrease, as higher-educated women present higher suicide rates than primarily educated women. We also aim to explore the determinants of these differences and the role of family life (parental and civil status) in the relationship between education and suicide for men and women in the two countries. Our objective is to understand to what extent differences in family policy can explain the differences in suicide rates for women between Finland and Belgium.

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## **Working Longer, Living Longer? Retirement Timing, Migration Background and Mortality in Sweden**

*Sven Drefahl*

Co-authors: *Eleonora Trappolini*

Health is central to the timing of retirement, and retirement may have varying effects on health and mortality. While late retirement is generally associated with better health outcomes, this association is confounded by socioeconomic position and may differ fundamentally for immigrants, who often work longer than native-born individuals due to lower accumulated pension rights. Using total-population register data from Sweden, this study investigates how retirement timing is associated with mortality and how these patterns vary between native-born and foreign-born individuals. After statutory retirement age, we distinguish between three groups: the Fully Employed (people who continue working full-time without claiming any part of their pension), the Fully Retired (complete work cessation with full pension), and the Partially Retired (individuals who reduce their working hours (for example, to 50%) and take a partial pension). Using Cox proportional hazard models, we estimate mortality risks across these retirement categories, controlling for demographic- and socioeconomic factors. Initial results suggest that the mortality advantage of late retirement is substantially reduced among immigrants compared to native-born individuals, particularly among those from low- and middle-income countries. This pattern suggest that extended working lives may have different health implications and causes for immigrant populations.



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## **Quantifying Health Inequality Applying Entropic Measures on Pseudopopulations**

*Sören Möller*

Co-authors: *NA*

Equality in health and mortality is at the center of public and political discourse in many countries, both with regards to socio-economic factors and with regards to spatial geographic variation. Studying inequality and developing initiatives towards more equal health is challenged by the often crude measures used to quantify inequality in health. Inspired by existing research on economic inequality, we in this project apply ideas from entropy theory to quantify inequality. Namely, we utilize the Kullback-Leibler divergence and mutual information, applying them to the multivariate distribution of health outcomes and possible sources of inequality. As these distributions are unknown in real-world settings, e.g., population based epidemiological studies, we make this approach feasible by estimating these measures on the empirical distributions of pseudo-populations, predicted from our epidemiological data. Based on these methodological considerations, we apply our suggested measures on somatic health inequality between blind individuals in Denmark and the remainder of the population as part of the ongoing AVID (Addressing Health and Socio-economic Disparities among Visually Impaired Individuals in Denmark) research project. Here our health outcome of interests are somatic comorbidities identified from the National Patient Registry, and we evaluate the magnitude of inequality associated with blindness compared with the variation in health associated with other exposures, e.g., age, sex and geography.

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## **Decomposing the Change in Cardiovascular Disease-Free Life Expectancy in Finland by Gender and Education (2000-04 and 2016-20): A Multistate Decomposition Based on Total Population Register Data**

*Shubhankar Sharma*

Co-authors: *Timothy Riffe, Pekka Martikainen, Mikko Myrskylä, Margherita Moretti*

**Background:** While extensive studies have documented declining cardiovascular disease (CVD) mortality in high-income countries, limited attention has been given to changes in the disease-free aspects. We analyze changes in CVD-free life expectancy (HLE) at age 40 between 2000-04 and 2016-20 by gender and educational attainment in Finland, where CVD remains a major public health concern. **Method:** Using multistate models and high-quality register data (aged 40-100) linked to hospital discharge and death registers, we calculate HLEs at age 40 in both periods. We then decompose the changes in HLE analytically into contributions from the changes in cardiovascular health prevalence at age 40 and age-structured CVD onset and CVD-free mortality. Furthermore, we apply Kitagawa decomposition to assess the contribution of improved educational profiles to the changes in HLE. **Results:** Men experience a greater HLE increase than women (2.3 vs 1.5 years), with the increase for both primarily driven by CVD risk and CVD-free mortality reductions, especially the former. At initial ages, both genders face an increased CVD risk, but among women (especially the secondary and tertiary educated), this development suppressed their HLE increase substantially. Negative contributions of age-40 cardiovascular health largely offset positive contributions of improved educational profile for both genders. Tertiary-educated adults benefit more from reduced CVD risk and CVD-free mortality than their basic educated counterparts, leading to the former's greater HLE increase. **Discussion:** We observe disparities in cardiovascular health progress within the Finnish population, with men benefiting more from reductions in CVD risk and mortality in CVD-free state. Adverse developments related to CVD risk at earlier ages among secondary and tertiary educated women highlight the need for targeted interventions. The use of total population registers and hospital diagnoses mitigates selection, attrition, and reporting biases. Furthermore, multistate decomposition addresses endogeneity biases present in Sullivan-based decompositions.

### **4.3. Methodological Innovations in Demographic Research**

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## **Connecting Patterns of Micro and Macro Segregation Across Swedish Metropolitan Areas over Time: Are Ethnic Enclaves on the Rise?**

*Karen Haandrikman*

Co-authors: *Juta Kawalerowicz*

As increasing levels of segregation and its consequences are of substantial concern to contemporary urban policy, an improved understanding of segregation indicators and patterns is indispensable. We aim to investigate how micro and macro-level segregation patterns have developed over time in Swedish metropolitan areas. Our approach is based on the progress geographers have made in segregation research in the last two decades, stressing the importance of geographical scale in understanding the patterns, causes and consequences of segregation. Neighbourhoods are increasingly conceptualized on different scales as perceived by its residents, but the quantification of scale and how they impact residents' life outcomes has not kept pace by this theorization. We use segregation profiles, a convenient tool of showing the extent of segregation across local environments at different scales, using register data for the period 1990-2023 for Stockholm, Malmö and Gothenburg. Preliminary results based on 8,000 distance-based individualized neighbourhoods for Stockholm show that native Swedes are most segregated in isolated segregation areas, with no non-natives present. We find areas with steep segregation in northwestern and southern Stockholm, some dispersed micro-enclaves as well as diverse areas, that be more conducive to integration processes. Further studies will compare places and patterns over time and include outcomes such as intermarriage.

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## **Most Reputable Demographic Journals According to Demographers**

*Ilya Kashnitsky*

Co-authors: NA

What are the most valued journals in a specific academic discipline? Why don't we ask the researchers who published in this discipline? This study is designed to figure out which demographic journals are most valued by demographers themselves. I conducted an online survey of demographers and asked them to list the top seven demographic journals according to their subjective view of the journals' cumulative reputation. I invited every scholar who co-authored at least two research papers in the selected 15 top demographic journals, with at least one of the papers featuring them as the first author. Potential respondents were contacted via emails sent to the addresses sourced from the "Corresponding author" metadata field of the papers published in the last 10 years. In total 2382 researchers were invited to take part in the survey, and 469 did. The idea behind this survey is very straightforward. Every specific researcher can easily outline a very subjective and necessarily biased list of top journals in their field. Once we average over hundreds of such individual biased subjective opinions of domain experts, we obtain a common view of published demographers. My bold hypothesis is that the reputation-based ranking better reflects the perceived quality of the journals than the formal rankings.

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## **Lifetime Lost from Time Series of Counts: A Convolution Formulation of Mortality Displacement**

*Jonas Schöley*

Co-authors: *NA*

One can only die once and thus, in a closed cohort, any excess death relates to a missing death at a different point in time. This mortality displacement across age and time can be formulated as a convolution—a re-shuffling of one time series to yield another. Central to the convolution is an object of scientific and public interest: the distribution of life time lost (or gained) due to an intervention. This intervention can be a heat-wave, a pandemic, a war, or, on the positive side, an improvement in perinatal care. After introducing the convolution formulation of mortality displacement I demonstrate how to estimate the distribution of life time lost during a summer heatwave.

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## Locating the Limit: Insights Across Demographic Processes

Serena Vigezzi

Co-authors: *Annette Baudisch*

The question of an impending limit to human lifespan has long been debated and it remains unsolved. One inherent obstacle to an answer is that death ends an individual's existence and thus precludes direct observation at a potential limit or beyond. In contrast, the limit to human reproduction is directly observable as women continue to live after menopause. To take advantage of this simple fact, we propose to study mortality and fertility dynamics together. We hypothesize that despite their apparent differences, both processes might share underlying constraints, which shape shared dynamics. For this project, we investigate the persistent patterns of postponement of mortality and fertility to later ages. We use data about female populations in the HMD and the HFD, which include high-quality data on mortality and fertility schedules in various high-income countries, representing the forefront of both mortality and fertility delay. We estimate changes in the age of different percentiles (e.g. the age at which a quarter of people have died/children have been born) of old-age mortality (age 65+) and adult fertility (age 20+). Firstly, these analyses show that since the 1950s for mortality and the 1990s for fertility, the age of different percentiles has increased at a steady pace of around 0.1. That mortality and fertility share the same pace of postponement is striking and suggests that there may indeed be common constraints driving both mortality and fertility delays. Secondly, despite the known biological limit to fertility, fertility improvements show no sign of a slowing down. Notably, current ages of the observed top percentiles of fertility are about 15-20 years below the upper estimate of the known biological limit to fertility. This suggests that we may not be able to reveal the presence of a limit to lifespan that is similarly close—or maybe much farther away.

## **5.1. Assisted Reproduction, Reporting Accuracy, and Diverse Family Pathways**



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## **Social Gradients in Medically Assisted Reproduction Treatment Take-Up and Success Rates in Denmark, 2007-2017**

*Simone Norlund Vering Johansen*

Co-authors: *Marco Cozzani, Peter Fallesen*

Over the last five decades, the use of medically assisted reproduction (MAR) to fulfill fertility desires has increased at an unprecedented rate. However, research has highlighted significant socio-economic disparities, with socially advantaged individuals being more likely to have MAR births. Despite this, knowledge of the mechanisms underlying these disparities remains limited. In this study, we provide novel evidence on socio-economic disparities in both MAR take-up and treatment success. We utilize population register data from Denmark covering the period between 2007 and 2017. Preliminary results indicate substantial educational gaps in both MAR take-up and treatment success. Future steps will involve examining additional social gradients and a detailed examination of various heterogeneities within our study population.

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## **Sexual Minority Parenting, Same-Sex Partnership, and Child Health**

*Stefanie Möllborn*

Co-authors: *Richard Bränström Bethany Everett*

The international demographic literature on families has found that children of same-sex parents thrive, yet the health literature has found that children of sexual minority mothers often experience health disadvantages. How can these disparate findings be reconciled? Using the Swedish Hälsa på Lika Villkor survey (N>300,000) that includes self-reported sexual orientation and partnership, we assess an explanation: Same-sex couples are a very small, positively selected subgroup of all self-identified sexual minorities. The latter group disproportionately includes unpartnered individuals, and many self-identified sexual minorities live in different-sex relationships. Because data are less frequently available to measure this larger group and sample sizes for the smaller subset are often too small in representative samples, same-sex couples often become a proxy for sexual minorities. We investigate the prevalence of chronic health conditions and disabilities among coresident children with a parent with a sexual minority identity (gay/lesbian or bisexual). This group is further divided by partnership status to consider whether children of partnered gay/lesbian parents have disproportionately better health and whether it differs from those of children of heterosexual-identified parents from similar situations. Given the striking health disparities we have identified when examining adults' self-rated health, we expect that the large group of children with sexual minority-identified parents will more frequently experience health problems and disability. Those with married or cohabiting gay/lesbian parents will experience health benefits relative to this group, potentially on par with health among children with married or cohabiting heterosexual-identified parents. These expected findings would imply that it is important for future research not to rely on parents in same-sex couples to represent all sexual minorities when examining outcomes for children. Instead, considering both self-identified sexual orientation and same- and different-sex partnership status may be crucial for understanding the heterogeneous implications of parent sexual orientation for child health.

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## **Advanced Maternal Age and Birth Outcomes in Pregnancies from Donated Gametes**

*Hanna Remes*

Co-authors: *Agneta Cederström, Pekka Martikainen, Alice Goisis*

Assisted reproductive technology (ART) has lowered the biological barriers to childbearing at older ages, although the likelihood of live birth remains dependent on maternal age. In this study, we examine whether the association between advanced maternal age and birth outcomes differ in first births among women conceiving through ART using either the couples' own gametes, donated oocytes, or donated sperm. We linked all live births in Sweden in 2007–2017 with information on ART pregnancies from the Swedish National Quality Registry for Assisted Reproduction, and information on birth outcomes (e.g., birth weight, low birth weight [ $<2,500$ g], preterm birth [ $<37$  weeks], small for gestational age) and parental sociodemographic characteristics (e.g., education, household income, marital status, country of origin, smoking during pregnancy) from the medical birth register and the population registers. We restricted our analyses to nulliparous women as most pregnancies from donated gametes are first births that are more prone to adverse birth outcomes, as well as maternal ages 25–34, 35–39, and 40 and over due to our focus on advanced maternal age and the low number of ART treatments among young women. As expected, we found a consistent maternal age gradient in naturally conceived pregnancies, with poorer birth outcomes among older first-time mothers. In contrast, maternal age made little difference for birth outcomes in ART pregnancies from own gametes. No consistent age gradient could neither be observed in birth outcomes of pregnancies from donated oocytes or donated sperm, but the relatively small number of cases lends some uncertainty to the results. Adjusted for parental sociodemographic characteristics, the birth outcomes in ART pregnancies from both own or donated gametes were overall similar or slightly poorer than in naturally conceived pregnancies but the risks were not more pronounced among women of advanced maternal age.

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## Miscarriage (Mis)Reporting in Finland: a Comparison of Self-Reported and Register Data

*Heini Väisänen*

Co-authors: *Heini Väisänen, Hanna Remes, Pekka Martikainen, Lara Lehtoranta, Marie-Caroline Compans*

Estimated one in four women experience a miscarriage, which may affect fertility intentions and lead to adverse mental and physical health outcomes. Yet, there is a lack of research on the topic. In part this is due to poor quality of miscarriage data with both surveys and administrative health registers missing some pregnancy losses. We used Finnish register data on miscarriages treated at within the healthcare system, which were linked to self-reported miscarriage data in ante-natal appointments; as well as in a national epidemiological survey (FinHealth 2017). Among all women over 80% of had consistent miscarriage numbers in registers and self-reports, but among those who had at least one miscarriage in at least one source, the share was only around 40%. Reporting was inconsistent in both directions between administrative and self-reported sources, that is, people self-reported more (“over” reports) or fewer (underreports) miscarriages than are seen in registers. “Over” reporting (around 10% among all women; almost 50% of those with miscarriage(s)) was more common than underreporting (under 5% among all women, around 10% among those with miscarriage(s)). Misreporting (that is, “over”- or underreporting) was associated with older age, higher parity and lower education. While underreporting might stem from unwillingness to disclose miscarriages in surveys, some of the “over” reporting is likely due to people including pregnancy outcomes not typically regarded as miscarriages in the academic sense in this category. Another suspected reason is some miscarriages being managed outside the healthcare system. Overall both sources (registers and self-reports) include some missingness and/or misreporting. We will discuss the implications of these findings for statistical analyses of pregnancy loss and its risk factors. This is important, as a better understanding of this common reproductive event can help policy makers improve reproductive health and increase our understanding of its risk factors.

## **5.2. Ageing and Health Care**

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## **Seven-Year Care Use Before Death by Age and Time to Death in Finland Between 2005 and 2018**

*Luca Dei Bardi*

Co-authors: *Luca Dei Bardi, Margherita Moretti, Laura Cacciani, Kaarina Korhonen, Pekka Martikainen*

One of the concerns about population aging is the increase in care use. Other than age, time to death and the cause of death are strong predictors of care use. Finland, in line with other high-income countries, has undergone rapid population aging and, thanks to its exhaustive register data coverage, offers a unique context to study care use at the end of life. Our main objective was to analyze trends in care use in Finland between 2005 and 2018 by age, time to death and cause of death. To do so, we linked different administrative registers, gathering information on people who died at age 65 or older, and examined the months spent in health and social care facilities in the seven years before death. We then ran multinomial logistic models to examine the time spent in health and social care facilities, stratifying our analyses by time to death and gender. Between 2005 and 2018, care use became increasingly concentrated in the last years of life for all-cause and cause-specific mortality. Concurrently, the effect of age decreased slightly over time but remained relevant, as younger people in their last year of life spent seven months less in care than older people. During the same period, the unadjusted per-capita care use in the last seven years of life increased from 13.5 to 15.2 months, along with an increase in the number of deaths (+28%) and the total care use at the population level (+44%). Age and time to death are both important determinants of care use, but the increase in the number of people dying at older ages was the main driver for the increase in care use in Finland.

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## **Trends and Diversity in the Use of eContacts in Denmark: A Register-Based Study from 2005 to 2019**

*Patrik Harnisch*

Co-authors: *Yana Vierboom, Ridhi Kashyap, Soghra BohLOURihajjar, Kaare Christensen, Karen Andersen-Ranberg, Anna Oksuzyan*

Background: Rapid technological changes have resulted in the widespread use of the internet and health information technologies for health purposes (eHealth). Research suggests substantial heterogeneity in eHealth use, being more prevalent among youth, persons with higher socio-economic status, and non-partnered persons and persons with a history of long-term illness, depression, hypertension, and diabetes. While women at younger ages were more likely to use internet for health purposes, this pattern reversed around 50s. Whether these observed patterns are real or attributable to small and selective study samples needs to be investigated by large-scale population-based studies. Aim: The project utilizes register data to investigate trends and individual-level determinants of eContacts in Denmark from 2005 to 2019. Methods: Data on the main variables of interest—eContacts—is taken from the Health Insurance Register. eContacts include email communication between patients and doctors in municipal clinics, renewing prescribed medications, and exchanging short messages via email, encrypted websites, and the “My Doctor” mobile application. The analytical strategies include descriptive analysis of trends in eContacts across by gender, age, education, income, and migration history and the application of the mixed-methods to assess the relationship between eContacts controlling for individual-specific characteristics. Results: Our preliminary results show that although in-person consultations are the most frequently used mode of the patient-doctor communication, there is a clear increasing trend in eContacts during the observation period. However, the patterns vary by age and gender. Specifically, among people under 60 and over age 80, women use eContacts more frequently than men. Among 60 to 79 years old persons, men tend to use eContacts relative to women. Higher education and income levels are associated with higher use of eContacts.

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## **The Effect of Cognitive Ageing on Healthcare Utilisation in Denmark**

*Óskar Daði Jóhannsson*

Co-authors: *Julia Callaway, Seetha Menon*

The effect of cognitive ageing on healthcare utilisation in Denmark As Denmark continues to see a rise in life expectancy, it is becoming increasingly more necessary for the healthcare system to address challenges associated with ageing, one being the decline in cognitive function. Decline in cognitive function is common in older ages, but varies widely across individuals, and thus, the burden on the Danish healthcare system remains unclear. Despite the importance of this issue, there has been limited academic attention on the relationship between cognitive decline and healthcare utilisation, and a key limitation of existing studies is the reliance on self-reported healthcare usage. To overcome this, we link data from the Survey of Health, Ageing and Retirement in Europe to the Danish registries (SHARE-Reglink) to examine the association between decline in cognitive functioning at older ages and healthcare utilisation, over time. We use two measures of healthcare utilisations: 1) the number of visits to the general practitioner, and 2) all government health-related expenditure for individuals from public insurance data. We apply a two-part random effects regression model. The first model accounts for the zero parts, i.e., those who do not use the healthcare and those who do, and the second model accounts for the non-zero parts for: 1) counts following a poisson distribution, and 2) a log-normal model for the semicontinuous cost data. We find that, conditional on using healthcare, increased cognitive functionality significantly reduces visits to the doctor and costs accrued. This study allows us to understand the specific healthcare utilisation patterns and costs associated with cognitive decline in Denmark and contributes to the international body of research on health and ageing.



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## **Population Aging and Healthcare Expenditures: Coexistence of the Red Herring and Steepening Hypotheses**

*Alexander O.k. Marin*

Co-authors: *Malene Kallestrup-Lamb, Jes Sogaard*

The fiscal sustainability of healthcare systems faces mounting pressure from aging populations, with two competing explanations dominating the literature. The Red Herring hypothesis suggests that healthcare expenditure growth is driven more by proximity to death than by chronological age, while the Steepening hypothesis highlights the disproportionate increase in age-specific mean expenditures over time. However, these two frameworks have traditionally been studied independently rather than in conjunction. We develop a unified econometric model that simultaneously tests both hypotheses, allowing for rigorous assessment of their concurrent validity and interaction. Using comprehensive register-based monthly somatic hospital expenditure data for the entire Danish population from 2002 to 2017, we provide robust evidence that both hypotheses coexist and jointly shape healthcare expenditure dynamics. Our analysis reveals significant heterogeneity in the relative influence of each mechanism across age groups, time-to-death categories, and between sexes. Although Red Herring effects modestly mitigate the expenditure burden of population aging, they are substantially outweighed by pronounced Steepening effects, which account for nearly 60% of hospital expenditure growth over the study period. Through a novel decomposition method, we identify a previously unrecognized interaction between these phenomena—a time-to-death Steepening effect—which disproportionately accelerates expenditures in the final years of life. These findings suggest that healthcare systems face considerably greater fiscal challenges from population aging than previously recognized under the Red Herring paradigm alone.

### **5.3. Modeling and Explaining Demographic Shifts**

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## **Stationary-Through-Immigration Populations: A Model-Based Pivot Point of Demographic Change**

*Thomas Fent*

Co-authors: *Gustav Feichtinger Stefan Wrzaczek Andreas Novak*

In the process of demographic change, crossing the replacement fertility threshold is an important milestone. This is because this level marks the boundary between natural increase and natural decrease of a population, disregarding temporary effects of the age structure. Nevertheless, once a population entered the state of below replacement fertility, it makes a difference, whether fertility is just slightly or far below this threshold. We use stationary-through-immigration (SI) populations (Espenshade et al., 1982) to identify a new important threshold during demographic change. Such populations are achieved by replenishing stable but shrinking populations with a constant influx of migrants. We derive analytical conditions under which two local maxima of the support ratio exist with respect to the optimal entry age. Furthermore, we show that as demographic change progresses, a level is reached at which the global maximum jumps from the local maximum at higher ages to the local maximum at lower ages. We interpret this level as the pivot point separating two regimes of demographic change. This approach has two major advantages over concepts such as ultra-low and lowest-low fertility. The first advantage is that the threshold marks a significant change in population dynamics, and we can quantify at any time whether this threshold has already been surpassed. The second advantage is that this threshold takes the level and timing of age-specific fertility and survival rates into account. It therefore represents a more comprehensive and meaningful measure. We examine the transition beyond this pivot point in a sample of 39 countries. So far, the transition beyond the pivot point took place in 26 of these countries between 1992 (Spain) and 2022 (Denmark). Moreover, we conduct a sensitivity analysis to examine the influence of the quantum and timing of fertility and life expectancy on the pivot point.

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## **Spatial context and child health: assessing the link between low birth weight, wasting, and climate and conflict conditions**

*Kathryn Grace*

Co-authors: *NA*

Spatial factors such as climate change and political instability heighten the risk of food insecurity in regions such as sub-Saharan Africa where a substantial proportion of the population is dependent on sustenance farming for survival. This study seeks to investigate how exposure to spatial factors at different time points, such as during pregnancy and in early childhood, affects child nutrition outcomes. First, this study investigates the link between birth weight and child nutrition, and how it is influenced by spatial conditions such as climate and conflict. Second, given this information, this study projects where future levels of acute child malnutrition may emerge for potential humanitarian intervention.

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## **Explanatory Models of Changes in Life-Table Densities of Deaths for U.S. States 1980-2018.**

*Jim Oeppen*

Co-authors: *Jim Oeppen, Marie-Pier Bergeron Boucher*

Demographic analysis of the age-specific components of life tables has been almost entirely endogenous. If exogenous variables such as smoking or wealth are considered, it is usually in relation to a single demographic indicator such as period life expectancy at birth, infant mortality, or an index of lifespan inequality. A classic example is the model of life expectancy at birth as a function of time and GDP p.c. presented by Preston (1975). The innovation in this paper is that we estimate the age-specific associations between the distribution of life table deaths,  $dx$ , and possible explanatory variables. The regression equations allow the user to estimate and forecast “designer life tables” that match any given values for the covariates. The method is illustrated by an analysis of potential explanatory variables associated with the age-specific changes in State life tables from the United States Mortality Database, across the years before the opioid crisis (1980-89) and during it (2010-18).

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## **A Demographic Transition Underway for Remote Living Indigenous Australians?**

*Andrew Taylor*

Co-authors: *NA*

The demographic transition is a stylised but familiar account of the demographic changes which occur when a nation's population moves from high mortality and fertility to a low state for both. This is traditionally associated with improved education and health in the population because of industrialisation or modernisation. Aboriginal and Torres Strait Islander Australians living in remote areas have, in general, had persisting low life expectancy from very high mortality rates across all ages. Meanwhile fertility rates were concurrently high - until recently. Drivers have included effects from colonization and dispossession from traditional lands, lifestyle diseases and social determinants of health including low education levels. Recently, data for remote areas has shown a marked reduction in fertility rates. Education outcomes have improved, however mortality rates are not falling as fast, although the population is ageing from cumulative improvements. This raises the question on whether a different form of the demographic transition, where fertility lowers first, is occurring in remote Australia? If so, there are major policy and demographic implications now and into the future. We examine a range of data to outline past, present and likely future trends to address this question.

## **6.1. Housing, Benefits, and Socioeconomic Influences on Fertility**

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## **Socioeconomic Differentials in First Births: Evidence from Iceland (1998–2022)**

*Ari Klængur Jónsson*

Co-authors: *NA*

The almost universal fertility decline that began in the aftermath of the 2008 economic crisis is puzzling. This is especially true when it comes to the Nordic countries as they have been regarded as somewhat of an illustrative example for other countries of how to combine high female labour force participation and relatively high fertility in a dual-earner context. The objectives of this study are to provide, for the first time, insights into the first-birth childbearing trends in Iceland, dissected by educational level, income, and gender. The study thus provides new empirical evidence to the current theoretical debate surrounding the ongoing fertility development, with a specific focus on the progression of socioeconomic differentials in first-birth fertility over a period of 25 years – as declining first-birth intensities appear to be driving the fertility decline in the Nordic countries. To fulfil our aims, we combine event history techniques and population-based administrative register data and present the findings as age-standardised annual indices of first births during 1998–2022. The data, provided to us by Statistics Iceland, cover the total population born in Iceland during 1952–2007. The results indicate that the driving force behind the recent development in Iceland is related to increasing societal differentials in first-birth fertility, and which have escalated during the past decade. Albeit the aggregate decline in first-birth fertility appears to be mainly fuelled by declining birth intensities among men and women with relatively low educational attainment and those belonging to the lowest income group, we also find that the first-birth rates among those in the higher end of the socioeconomic ladder have on the other hand, if anything, increased.



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## **Housing Tenure, Housing Satisfaction, and Fertility Intentions: A Comparative Study in Nordic Countries**

*Yuting Li*

Co-authors: *Jessica Nisenn, Erik Carlsson*

The declining fertility rate in Nordic countries since the 2010s has challenged previous theories on demographic trends. Among the many factors influencing fertility, housing has become increasingly recognized as a crucial determinant of family formation and reproductive decisions. In Nordic countries, where housing systems vary despite shared welfare-state characteristics, the relationship between housing and fertility outcomes remains underexplored in the more recent decade with a comparative perspective. This study examines how homeownership and housing satisfaction are associated with fertility intentions across Nordic countries. Using microdata from the Generations and Gender Survey - Round 2 Wave 1 for Finland, Sweden, Norway, and Denmark ( $n = 14,573$ ), this research investigates whether housing tenure and individuals' perceived housing satisfaction are linked to fertility intentions by employing Logistic regression models. The study further examines whether these associations vary across different Nordic countries, between younger and older reproductive-age groups, and across different parity through the moderation effect analysis. Results suggest that homeownership is associated with positive fertility intention in Nordic countries, except in Denmark, where the relationship is reversed. This suggests that Denmark's tenure-neutral housing policies and extensive social rental housing provision may weaken the link between homeownership and childrearing. The positive association between homeownership and fertility intentions is particularly strong among younger individuals and those without children. Meanwhile, housing satisfaction is negatively associated with fertility intentions, with this pattern being more pronounced among younger individuals and in Denmark and Sweden compared to Finland and Norway. This suggests that higher housing satisfaction may reflect lifestyle preferences or reduced perceived urgency to transition into parenthood. This research contributes to the broader discussion on the current low levels of fertility in Nordic countries by examining the role of housing. Through comparative analysis, it offers a more nuanced understanding of how the relationship between housing and fertility varies. The findings also underscore the importance of integrating housing policies

with family support measures to foster an environment conducive to family formation.

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## **Changes in Homeownership and in the Entry into Parenthood in the Nordic Countries**

*Jessica Nisen*

Co-authors: *Lars Dommermuth Sofi Ohlsson-Wijk Peter Fallesen*

Since 2010, fertility levels have fallen unexpectedly in all Nordic countries, with some of the lowest fertility rates recorded in 2022 and 2023. Previous evidence points to differential declines across socioeconomic groups. The contributing causes of these fertility declines remain elusive, except that they are driven by fewer people entering parenthood in the first place. We investigate the role of housing among young adults in explaining these changes. Using harmonized Nordic individual-level register data, we assess whether the decline in first births is due to declining homeownership, changing fertility behavior within housing tenure groups, or both. Applying discrete-time event history models for the first birth rate and decomposition, we find that both homeownership and the first birth rate regardless of tenure status declined in the 2010s. However, the relative decline in first births was more pronounced among women who rented their homes than among women who lived in an owner-occupied dwelling.

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## **The Impact of Increased Family Benefits on Fertility in Estonia**

*Tanel Paas*

Co-authors: *Mark Gortfelder*

As of July 1, 2017, Estonia introduced a substantial child allowance for families with three or more children, providing 300 euros per month for families with at least three children in addition to regular child benefits. This universal, non-means-tested benefit aimed to alleviate financial burdens and encourage third and higher-order births. We examine the impact of this policy on the propensity and timing of third births, using longitudinal register data. The study contributes to the broader literature that has analysed the effects of family policy on fertility. We will use descriptive methods as well as event-history modelling to assess the effect of the policy, especially aiming to dissect quantum and tempo responses. While previous studies have shown mixed effects of family cash benefits on fertility, we hypothesize that the Estonian child benefit reform had a positive impact, given that the sum of regular and additional allowances amounted to 40% of the average salary at the time of implementation. Descriptive evidence suggests that the probability of third increased following the reform. However, its effect may have weakened over time due to rising wages (which decreased its relative value) and inflation (which decreased its real value), and uncertainties related to the COVID-19 pandemic and the Russo-Ukrainian war.

## 6.2. Healthy Longevity

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## **Can Physical Fitness Compensate for Social Disadvantage? An Examination of the Relationship Between Physical Fitness and Premature Mortality using Swedish Military Conscription Data**

*Kieron Barclay*

Co-authors: *Kieron Barclay*

This study examines the relationship between physical fitness and premature mortality risk, and whether good physical fitness is able to compensate for relative social disadvantage, expressed in terms of low educational attainment, and childlessness. I use Swedish population register data linked to military conscription data to follow full cohorts of men, born 1960-1979, up to the latest point currently available in the data, which is 2018. This means that we have a maximum follow-up time of approximately 38 years (e.g. from age 20 to age 58, for the cohort born in 1960). The military had a keen interest in understanding the fitness level of potential recruits, and therefore collected data on physical fitness capacity (operationalized as Watts/kg) at ages 17-20 for hundreds of thousands of men using a stationary bike test (N=597,903; Deaths=9,973). This is perhaps the largest ever study of the relationship between physical fitness and mortality, has one of the longest follow-up periods, and is among the first to examine whether the effects of physical fitness on mortality vary by social factors. We use survival analysis, and adjust for birth year, birth month, birth order, sibling group size, parental education, parental social class, and height at age 18, and in some models employ stratified Cox analyses to approximate a sibling comparison analysis. Results show that physical fitness in early adulthood is associated with premature mortality, with the relative risks of mortality twice as high for the least trained in comparison to those with highly trained fitness levels, and 50% higher even in sibling comparison analyses. Further analyses show that these patterns persist even when looking within levels of educational attainment, and amongst the childless—but that even high levels of fitness hardly compensate at all for the higher mortality associated with social disadvantage.

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## **Changes in the Onset of Dementia Over Time: Evidence from the Danish Population Registry,**

*Julia Callaway*

Co-authors: *Cosmo Strozza, Óskar Daði Jóhannsson*

Denmark, like other high-income countries, is experiencing unprecedented population aging. This demographic shift has led to increasing questions about the changing patterns and burden of age-related diseases, particularly dementia. The aim of this study is to quantify changes in the age of onset of dementia across birth cohorts, providing crucial insights into temporal trends in cognitive health. Using Danish registry data from 1990 to 2020, we analyze the time to dementia diagnosis for individuals aged 60 and older from the 1930-1970 birth cohorts. The Danish healthcare system's detailed population and health registries ensure robust and representative data for our analysis. We employ a Cox proportional hazards model to quantify both the risk of dementia and timing of onset. Dementia cases are identified through two primary indicators: prescription records for dementia-specific medications and/or first recorded clinical diagnosis. Our analysis accounts for potential confounding factors, including educational attainment, socioeconomic status, and the presence of other comorbidities. We also stratify our analyses by sex to account for known gender differences in dementia risk and life expectancy. Based on evidence from studies conducted in other high-income countries, we anticipate that younger cohorts will demonstrate both a reduced risk of dementia and later onset. These expected trends likely reflect several positive developments, namely, advances in healthcare delivery and medical innovation, rising educational attainment, improved living standards, and better management of risk factors over time. Findings from this study will make contributions to understanding cohort-specific dementia risks in Denmark and other Nordic countries. These insights are crucial for public health planning and policy development, particularly in designing targeted interventions aimed at delaying cognitive decline and improving quality of life for aging populations.

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## **Serum Proteome Signatures of Health and Mortality in Dutch Long-Lived Families.**

*Pasquale Putter*

Co-authors: *Peter Putter, Niels van den Berg, Marian Beekman, Joris Deelen, Eline Slagboom*

Currently around 60% of the older adults (65+) in the Netherlands is diagnosed with multimorbidity. Even though age is an important indicator of health, there are large individual differences in health at older age. Research showed that socioeconomic health differences are larger than ever before. Persons with a lower socioeconomic status (SES) pass away 8.5 years earlier than those with a high SES and live 24 year longer in poor health. The impact of these socioeconomic health differences is exacerbated by the growing number of older people which put an increasing strain on healthcare systems as well as on policy makers. Hence, there is a strong need for novel health markers that allow the identification of health issues, before the onset of disease, so that early intervention is possible. In this study we quantified 326 proteins using mass-spectrometry in the Leiden Longevity Study (LLS; N=2282). We investigate whether the proteins associate with time to first cardiometabolic disease in at baseline healthy individuals age 40-70, our results indicated that 15 proteins were significantly associated with the time to first cardiometabolic disease. Collectively, they accounted for a seven-month difference in the average age at first cardiometabolic disease (73.3 years compared to 73.9 years). Next we observed that 21 proteins were significantly associated with future mortality risk, we compared these proteins to an existing metabolomics-based predictor of mortality risk; the MetaboHealth score and observed that 15 proteins were significantly associated with mortality, independent of the MetaboHealth score. These findings emphasize the potential of serum proteome profiling to identify biomarkers for disease and mortality through accessible, cost-effective methods. Notably, five of these proteins are both associated with morbidity and mortality risk and may serve as high target potential intervention targets.



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## **The Absence of Genetic Risk for Chronic Diseases in Exceptional Survival (Longevity).**

*Pedro Sant'Anna Barbosa Ferreira*

Co-authors: *Niels van den Berg, Marian Beekman*

Aging is the major risk factor for chronic diseases. Unlike the general population, members of long-lived families maintain exceptional health as they age. Healthy survival to extreme ages (longevity) clusters within families. However, research has not yet elucidated the underlying mechanisms of longevity. There are two important reasons for this: 1) the group with the highest heritability is often not studied and 2) the hypothesis-generating nature of most genetic studies requires larger study cohorts. In our previous work, we showed that members of the longest-lived families have a 10-year delayed onset of their first chronic diseases. We therefore hypothesize that the absence of genetic predisposition to chronic diseases is one of the key-mechanisms involved in longevity delayed disease onset. We investigated this hypothesis in the Leiden Longevity Study, a cohort with data from more than 400 long-lived families in 3-generations. To analyze our data, we constructed a set of PRSs covering the top 10 causes of death in the Netherlands. We observed that descendants of long-lived families have lower genetic risk for cardiovascular disease (CVD). Using accelerated failure time modeling, we further showed that around 20% of the delayed cardiovascular disease incidence in long-lived families is explained by CVD common genetic variants. We conducted gene-annotation enrichment analysis of the SNPs in the CVD PRS using DAVID and observed seven significantly enriched clusters. Finally, we constructed a novel cholesterol PRS based on the cholesterol metabolism cluster which significantly predicted time to all-cause mortality in a 90+ study population, covering 19 years of follow-up. Our study indicates that common variants related to cardiovascular diseases and cholesterol metabolism contribute to healthy aging. Furthermore, we demonstrate that investigating SNPs, identified in well-powered Genome Wide Association studies, associated with longevity-related endophenotypes can provide insight into the genetic architecture of the longevity phenotype itself.

## **6.3. Innovations in Demographic Forecasting and Projection**

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## Population Projections with Hierarchical Bayesian Models

*Violeta Calian*

Co-authors: *NA*

The goal of population projections is to predict the future values and uncertainty measures of regional/total population by age, gender, time and other demographic characteristics and/or spatial attributes, based on past observed values. In this paper we describe our approach to population predictions based on Bayesian hierarchical models implemented in open-source R code (see the repository <https://github.com/violetacln/SIPP> where a recent working paper of Statistics Iceland is linked as well). The method can efficiently solve small area/population and rare events issues while accounting for complex (auto-) correlation structures and incorporating qualitative and quantitative prior information and/or expert assumptions. In addition, it allowed us to include and propagate the influence of errors in measurement, such as the (de-registration mainly) errors in register population. The multilevel models built for the fertility, mortality and migration processes involve smooth (additive or multi-dimensional) functions, such as splines and their tensor products or unknown functions defined by a prior stochastic process (e.g. Gaussian process, i.e. prior distribution over function-space) with appropriate types of correlation decay for observations close in time/age/space and updated by observed data values. A stochastic cohort component method is employed in order to generate the posterior distribution of the future population counts by age, gender and other characteristics of interest (e.g. education, place of birth, municipality), based on the standard population balance equation and (large number of) samples from the posterior distributions of the predicted demographic components. The model fitting and validation included standard posterior checks while the optimization of the model components was already included in the automatic fitting and model selection procedures. The in-sample forecast method was used for evaluating the model forecasting performance.

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## **Projecting Four Generations of Migrant Populations: Challenging the Great Replacement Narrative**

*Nico Keilman*

Co-authors: *Mark Sedgwick*

A multistate cohort-component population projection model is adapted to deal with the migrant population in a country and three generations of their descendants. In addition, the model includes the remaining population (“natives”). Inter-marriage between persons with a migration background and the native population is modelled implicitly. We apply the model to migrants living in Norway and born in Africa or Asia, and their descendants, for a projection period of 75 years. The model is calibrated against forecasts of deaths, births, and migration flows published by Statistics Norway in 2024. Scenarios for high immigrant fertility, low native fertility, high immigration, and two degrees of intermarriage shed new light on possible and unlikely trends in the size and age structure of migrant populations in Norway. Also, we discuss the cases of France, Germany, Italy, the Netherlands, and Sweden, using population growth rates. The available data suggest that a demographic turning point, in the sense that the native population becomes a minority before the end of the century, is very unlikely, possibly except for France.

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## Forecasting Refugee Migration with High-Dimensional Covariate Space

Haodong Qi

Co-authors: *Alina Sirbu, Rahman Momeni, Enes Hisam, Carlos Arcila-Calderón, Tuba Bircan, Stefano Iacus*

Forecasting refugee migration is challenging, exacerbated by the high dimensional and dynamic nature of its drivers, such as climatic, economic, and political stressors. This article introduces a novel forecasting framework based on the Dynamic Elastic Net (DynENet) algorithm, which incorporates a time-varying regularization and a new model selection criterion: the Penalized Deviance Ratio (PDR). Unlike conventional metrics such as the Deviance Ratio (DR), which emphasize in-sample fit, PDR explicitly penalizes model complexity, enhancing generalization in high-dimensional covariate setting. We apply this framework to forecast asylum seeker rates (ASR) from Somalia to EU member states, leveraging a comprehensive set of district-level predictors. Extensive validation demonstrates that PDR-tuned models consistently outperform DR-based benchmarks in out-of-sample accuracy, reducing average point prediction errors by over 40% and improving interval forecasts by more than 60%. Furthermore, we demonstrate how the DynENet framework supports explanatory insights at multiple levels—origin district, destination, and temporal—revealing both persistent and transient nature of migration drivers. The proposed methodology not only advances forecasting accuracy under high-dimensional covariate conditions but also enhances the interpretability of complex and evolving migration systems.

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## **A New Approach to Probabilistic Population Forecasting with an Application to Estonia**

*David Swanson*

Co-authors: *Jeff Tayman*

This paper shows how measures of uncertainty can be applied to existing population forecasts using Estonia as a case study. The measures of forecast uncertainty are relatively easy to calculate and meet several important criteria used by demographers who routinely generate population forecasts. This paper applies the uncertainty measures to a population forecast based on the Cohort-Component Method, which links the probabilistic world forecast uncertainty to demographic theory, an important consideration in developing accurate forecasts. We applied this approach to world population projections and compared the results to the probabilistic world forecast produced by the United Nations, which we found to be similar but with more uncertainty than found in the latter. We find, however that the results for both the world and Estonian probabilistic forecasts are consistent with knowledge about forecast uncertainty. We conclude that this new method appears well-suited for developing probabilistic world, national, and sub-national population forecasts.

## Poster Session 1

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### **Homeownership, Marriage and Childbirth Trajectories Across the Life Course of Descendants of Immigrants in Sweden: a Multilevel Multistate Event History Approach**

*Mary Abed Al Ahad*

Co-authors: *Gunnar Andersson, Hill Kulu*

We examine entry/exit to homeownership, marriage, and childbirth by immigrant origin and generations in Sweden focusing on immigrants arriving in Sweden before age 18 (1.5 generation (G)) and on descendants of immigrants with two (2G) or one (2.5G) non-Swedish-born parent(s). We use individual-level register data from Sweden (1997-2016) and apply a multilevel-multistate event history approach. Results showed the importance of owning a house for everyone which provides a sense of stability needed for marriage and childbearing. Results revealed higher risk of entry/exit to homeownership among 1.5G from Nordic countries and Western Europe, whereas higher risk of entry/exit to marriage and childbirth was observed among 1.5G and 2G groups with origins from conservative family cultures (e.g., Turkish, Ex-Yugoslavia, Middle East/North Africa, and South Asia). Results also supported a gradual assimilation across the generations with 2.5G showing the most similar patterns in the occurrences and timing of the three events to native-Swedes.

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### **Can We Improve the Timeliness of Population Statistics by Reducing the Lag without Significantly Affecting Quality?**

*Espen Andersen*

Co-authors: *Magnus Haug, Stian Nergård*

In a register-based statistical system, there is always a need to balance timeliness and accuracy. To account for notification delays related to various events, Statistics Norway has maintained a one-month lag in its population statistics production for the past 25 years. In recent years, primarily due to a modernized population register where registration has been streamlined,

most births and deaths now are registered close to the time of occurrence. Consequently, delayed notifications now primarily affect migration, both internal and international. This analysis explores the potential impact of reducing or eliminating the production lag on both the statistics on population stock and vital events in Norway. The effects of a two-weeks, one-week, and no lag approach are analysed. How would these changes affect the statistics on vital events for example in the quarterly statistics and the population stock as of January 1?

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## **The Relationship Between Fertility and Lifetime Accumulated Earnings in Norway**

*Michael Betz*

Co-authors: *NA*

The relationship between income and fertility has been extensively studied in the demographic literature, highlighting a complex interplay between earnings and childbearing decisions. In most high-income settings, higher earners tend to have fewer children, though recent evidence suggests this pattern may be shifting in some countries. Research on this topic has often focused on men's earnings and has been constrained by limited access to parental lifetime earnings histories. However, recent studies leveraging Nordic registry data (Kolk 2023; Nisen, Erlandsson, and Jalovaara 2024) have advanced understanding of this relationship by assessing how accumulated lifetime earnings relate to fertility, rather than relying solely on annual income measures. These studies find a positive association between lifetime earnings and fertility, while also demonstrating that childbearing contributes to gender differences in lifetime earnings in Sweden and Finland. Building on this work, our study uses Norwegian registry data to examine how lifetime accumulated earnings influence first and higher-order births and how this relationship differs between women and men. Additionally, we explore the impact of income shocks (defined as an annual income change of >10%) and their timing across the life course on fertility outcomes. Finally, we assess whether these relationships have evolved between the first and second decades of the twenty-first century. Our preliminary findings suggest that women's earnings have grown in importance relative to men's and that substantial income shocks early in adulthood can influence the timing of first births.



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## **Does Intensive Parenting Come at the Expense of Parents' Health?**

*Sunnee Billingsley*

Co-authors: *Anna-Karin Nylin, Stefanie Mollborn*

Given concerns that the intensification of parenting could have negative consequences for well-being, this paper explores whether intensive parenting is associated with parents' self-rated health in the case of Sweden, where extensive parental supports may provide protection. We apply binary logistic regression models to responses from 3,400 parents in the nationally representative Swedish Generations and Gender Survey from 2021. Results differ depending on whether we use a variable-centered or person-centered approach to measuring intensive parenting. The variable-centered analysis showed that only certain intensive parenting attitudes, mainly within the challenging dimension, predict negative self-rated health, and this only applies to mothers. Using latent class analysis to group respondents by their overall attitude profiles around intensive parenting, the person-centered approach revealed that associations between intensive parenting attitude profiles and self-rated health differed substantially by gender. Although very few differences were observed according to the strength of intensive parenting attitudes or by agreeing with only certain dimensions, the respondents' predicted probabilities of rating their own health as good or very good differed for those who reject intensive parenting versus adhering to it at least in part. Mothers who reject intensive parenting have significantly higher probabilities of good health, whereas fathers who reject intensive parenting have significantly lower probabilities of good health.

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## **Generations Through Life**

*Fredrik Bood*

Co-authors: *NA*

**Background** This study tracks individuals born in Sweden in 1975, 1985, 1995, and 2005 until 2023, using data from the Swedish Population Register, examining demographic events at birth and other ages, including parents' age, origins, marital status, and grandparents' survival. Each of these cohorts contain

approximately 100,000 individuals. Results • The age of mothers at childbirth has increased over time. The most common age for women giving birth in 1975 was 25 years, while in 2005 it was 30 years. • The proportion of married parents at childbirth decreased significantly when comparing the 1975 cohort with the 1985 cohort. • The proportion of children with at least one foreign-born parent increased from 15 per cent for the 1975 cohort to 25 per cent for the 2005 cohort. • For the 1975 cohort, most foreign-born parents were from Nordic countries, whereas for the 1995 and 2005 cohorts, Asia was the most common region. • Approximately 90 per cent of the children, in all cohorts, had their grandparents alive at birth. • For maternal grandfathers of children born in 1975, only 54 per cent were alive when the children were 18 years old, compared to 65 per cent for children born in 2005. Conclusions Younger cohorts have older parents due to delayed childbearing. Grandparents are also older for the younger cohorts, mainly due to an increased average length of life. The parents in older cohorts were more likely to be married at childbirth than parents of younger cohorts. This reflects a more relaxed attitude towards cohabiting among parents of the younger cohorts. In younger cohorts a quite substantial part has at least one foreign-born parent, and they come from further away than before. This reflects a changed immigration pattern, i.e., the makeup of immigrants as to where they come from has changed over time.

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## **Who Has Time for more (Children)? Outsourcing Household Chores and the Positive Ses Gradient in Swedish Fertility**

*Elien Dalman*

Co-authors: *Therese Nilsson, Lisa Eklund, Annika Elwert, Christofer Edling*

Background: A positive socioeconomic gradient in fertility has arisen or widened in various high-income contexts (Doepke et al. 2023). Despite its generous welfare and family policies, Sweden has a sizeable positive socioeconomic gradient in fertility. In terms of parity progression, a main contributor to this sizeable gap are socioeconomic differences in childlessness and union stability (Jalovaara, Andersson & Miettinen 2022). While the gradient itself is well-documented, its causes and consequences remain underexplored. A recent fertility decline increases the relevance of understanding these. Objective: This study exploits a uniquely generous and

accessible tax deduction policy introduced in 2007, which halves the costs of formally outsourcing household work. Regularly outsourcing domestic services, and resource gaps in being able to outsource, are in this study assumed to represent socioeconomic differences in the ability to solve time constraints more broadly. A couple's time constraints could either directly affect their (continued) childbearing, or indirectly through union stability. We address the relationship between regular outsourcing and the socioeconomic fertility gradient. Data: Our study population consists of all cohabiting couples formed in Sweden through 2007-2016 who are childless at the start of their cohabitation. We follow domestic outsourcing, fertility, and separation trajectories of these couples until 2022 using continuous population register. Method: We adopt a multi-state model to study how regular outsourcing impacts demographic transitions at different stages in the life course, stratified by socioeconomic groups. A couple's life course is modelled as movement through a set of discrete demographic states with defined transitions. Their first state is start of cohabitation, and from there they potentially undergo multiple transitions into cohabitation with an additional child, or into separation (absorbing state). We model how the (time-variant) use of regular outsourcing influences the transition hazards in each state using the *msm* package in R (Jackson, 2011).

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## **Political Bedrooms: Union Formation in Times of Growing Ideological Divides Between Genders**

*Florian Ege*

Co-authors: NA

Recent data of different surveys on Western countries document a widening ideological gap between (young) men and women. Some observers have warned that such gendered political polarization could suppress fertility rates, echoing the situation in places like South Korea, where the starkest ideological divides coincide with the world's lowest birth rates. The hypothesized mechanism is straightforward: an expanding ideological gulf between potential partners delays or prevents union formation, in turn reducing the likelihood of childbearing. In this paper, we examine whether ideological mismatch between would-be partners actually hinders union formation. We use data from the Dutch LISS household panel survey, which includes self-reported information from both members of a couple on political position

using a left-right scale of 0 to 10. From the European Social Survey (ESS) we observed that the Netherlands had transitioned from minor gendered ideological gaps ( $<0.5$ ) before 2010 to major gaps ( $>0.5$ ) from 2010 to 2022. We focus specifically on newly formed couples because, as highlighted in prior research, couples' political views tend to converge over time. Hereby we aim to identify if individuals form new unions across gendered ideological divides, or whether such divides indeed might hinder initial union formations. Our findings speak to the wider literature on homogamy. Specifically, concerns about ideological homogamy and whether growing gendered political polarization could feed into fertility trends through reduced partner matching. If ideological incongruence does indeed diminish the formation of new unions, countries facing the sharpest gender divides may struggle with consistently low fertility rates. This work promises a novel, perspective on how "political bedrooms" operate at the intersection of personal ideological compatibility and broader population outcomes.

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## **Connecting the Danish Population in a New Register**

*Lisbeth Harbo*

Co-authors: NA

This presentation will introduce a new register on relatives developed by Statistics Denmark as well as outline and discuss the limitations and implications of the Danish register data on family relations. On behalf of TrygFonden, Statistics Denmark was tasked to construct a new register on potential caregivers in Denmark – a task that originate in a Danish debate on the resources of relatives but also the strain on the care givers to people with a daily need for care. The aim was to construct a register that contain information on relations, found in Danish administrative data, at individual level. The register is primarily to be used for research/analytical purposes but will also provide the base line information for statistics on relatives in Statistics Denmark's online statbank. The construction of the new register is centered around the information on linkages between child and parent(s) as registered in the Danish CPR-register. The CPR-register is the Danish civil registration system, where each individual's linkages to their parents ideally is registered. Through these child-parent links, it is possible to identify siblings, grandparents, grand children etc. in addition to the currently available information on children and

parents. However, due to the history of the establishment and development of the CPR-register, this task holds a number of challenges, just as the various actual family formations contain their own challenges when combining the data into family trees that should ideally be somewhat easily communicated to the coming users. This presentation will seek to shed light on a number of these data challenges and subsequent decisions that went into the construction of the new register on relatives.

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## **Hard-to-Reach in Administrative Data**

*Annika Klintefelt*

Co-authors: *NA*

The term “hard-to-reach” is often used with reference to specific variables that are lacking in administrative sources, but also to population groups that are totally lacking from the administrative sources. The two issues are interlinked and both deserve to be investigated. These challenges in producing statistics on hard-to-reach groups are not necessarily unique to administrative sources, and some of them are outweighed by other challenges seen when using traditional sources. Some examples of hard-to-reach groups include: ensuring inclusion of the primary and secondary homeless and undocumented migrants in statistics derived from administrative registers; representing marginalized ethnic, religious and gender minorities and people with disabilities in statistics if administrative sources are not able to or do not routinely capture these characteristics; and producing sex-disaggregated statistics to permit gender analysis of crucial topics such as poverty, when the administrative sources used to provide the information are gathered at the level of the household rather than the individual. On the other hand, administrative data might allow to overcome the challenges of traditional field collection or to get more complete information for some groups considered difficult to reach with traditional survey methods, or improve the coverage for some hard-to-reach populations such as older people or young people that might be missed by field enumeration. The presentation will outline the work done by a UNECE Task Force on measuring hard-to-reach groups in administrative sources chaired by Denmark with members from Canada, France, Ireland, Italy, the Netherlands, New Zealand, Poland, Russia, United Kingdom, United States, Eurostat, UNICED and UNSD.

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## **The Widowhood Effect Beyond Heteronormativity: Examining Mortality Risk after Partner Loss in Same-Sex and Mixed-Sex Partnerships**

*Estelle Knoblach*

Co-authors: *Stefanie Möllborn, Kaare Christensen, Anna Oksuzyan*

Losing a partner to death is a major stressful life event with adverse health effects, including an excess mortality risk post-widowhood. Previous research has focused on examining the widowhood effect within partnerships conforming to heteronormative expectations. Despite the increasing number of non-heteronormative partnerships, the gender composition within a partnership has not been considered when investigating the widowhood effect. Utilizing Danish Register Data from 1989 to 2022, this study investigates the disparities in mortality risk following the loss of a partner between individuals who were in an institutionalized same-sex and a mixed-sex relationship. Preliminary results reveal that compared to individuals in mixed-sex relationships, individuals in same-sex relationships have a higher mortality risk in times of marriage as well as widowhood. Within the first three years upon widowhood, the mortality risk increases to a greater extent for individuals who lost a same-sex partner than for those who lost a partner of a different gender. The results suggest that, in the short term, the health implications of widowhood may be more profound for individuals who were in a same-sex institutionalized partnership. It can be assumed that mechanisms underlying the elevated risk of dying among individuals in mixed-sex partnerships may differ among individuals experiencing same-sex partner loss. In comparison with individuals in mixed-sex relationships, the specific gendered dynamics inherent in same-sex partnerships, exposure to additional stress related to their minority status in society, and their lack of social support following partner loss, may contribute to an increased vulnerability and, consequently, an elevated mortality risk.

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## **Households and Kinship in Sweden**

*Martin Kolk*

Co-authors: *Emma Petterson*

Households and kinship over the life cycle. Martin Kolk and Emma Pettersson. In this study we document how household size, and the different family relationships a person has with those household members, vary over the life course in contemporary Sweden, using full population data, with all observable genealogical kinship types, including step-kin. We study both how the number of household members change of individuals of different ages, as well as how the composition of different types of household members evolves. We study households over the life course from a multifaceted view, engaging with gender differences, size of the household, various less common extended family kin types, and age of the other household members. We put a particular focus on households involving “complex” families, originating from union dissolution and repartnering (Thomson, 2014). We map how in Sweden, individuals are born in relatively large households full of mostly parents and siblings, but throughout their childhood see more complexity as the number of step-parents and half/step-siblings increase, though these are a quite small share of all household members. In their 20s they have largely left the parental home, and live in smaller households with more non-relatives. As they advance throughout their 20s they form first new partnerships and eventually new nuclear families, and thus family size grows again, until they eventually live alone with their partner, and as they reach their 70s and 80s increasingly live alone. Broadly, our results are consistent with Sweden as an individualistic nuclear family-oriented society, characterized by neolocal household formation and a relatively early exit from the parental home. Most household members belong to either the nuclear family of procreation (where a child grows up), or nuclear family of destination (the new family in adulthood). Nevertheless, we document non-trivial shares of extended family relationships, and their distribution over the life course. We also show the extent of non-family household members over the life course.

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## **Economic Uncertainty and Fertility Intentions in Norway: a Longitudinal Study**

*Axel Peter Kristensen*

Co-authors: *NA*

The aim of this study is to investigate the relationship between economic uncertainty and the formation and realization of fertility intentions in Norway.

Norway is a country where there has been a dramatic decrease in fertility levels for the last fourteen years, where the TFR has dropped from being among the highest (1.98 in 2009) to being below average in Europe (1.40 in 2023). Economic uncertainty has been suggested as one reason behind the fertility decline, but empirical evidence remains scarce. This calls for more research on the underlying mechanisms behind the relationship between economic uncertainty and fertility. In this study we focus on young people's intentions to enter parenthood and to which degree they realize their intentions, depending on different aspects of economic uncertainty. We aim to disentangle which aspects of economic uncertainty matters more for young people's fertility intentions and their subsequent entry into parenthood. We use longitudinal data from the Norwegian Generations and Gender survey (GGG-II), conducted in 2020 and 2024. Regarding economic uncertainty, we distinguish between objective and subjective measures, i.e., observable objective measures of people's current employment and income situation and people's expectations towards their individual and societal future economic situation.



## Poster Session 2

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### **Keeping Kin Close: Intergenerational Geographic Proximity in the United Kingdom**

*Sen Li*

Co-authors: *Hill Kulu, Urska Demsar*

Drawing on data from the Understanding Society survey, this study examines patterns of geographic proximity between adult children and parents, as well as multigenerational coresidence, in the United Kingdom. Binary and multinomial logistic regressions are used to analyse factors associated with coresidence and geographic proximity at individual, household, and community levels. The modelling results reveal substantial differences across sociodemographic groups. Overall, ethnicity plays a significant role in shaping coresidence and geographic proximity, with minorities – particularly Indian, Pakistani, and Bangladeshi – more likely to live with or in closer proximity to other generations. Females are less likely than males to coreside with their parents but, if not coresiding, tend to live closer to them. Aging and being foreign-born are linked to a lower likelihood of living with or near parents, or in a three-generation household. Individuals with lower levels of education show a stronger tendency to reside with or near their parents or adult children rather than living far away. Partnership and family structure, which is measured by the number of children and siblings, also significantly impact coresidence and geographic proximity patterns. In addition, spatial variations are notable between rural and urban areas, as well as across government office regions. Our findings contribute to the literature by providing a comprehensive understanding of intergenerational living arrangements in the context of demographic shifts, while also shedding light on informal care provision within families and, by extension, the organisation of formal care.

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### **The Impact of Economic and Employment Instability on Fertility: Sub-Population Heterogeneities in Sweden**

*Mimmi Lounela*

Co-authors: *Mimmi Lounela is the only author of this paper.*

Over the past two decades, Sweden has seen a rapid increase in immigration. This demographic shift coincides with transformations in the Swedish labour market towards greater flexibility, resulting in increased uncertainty and instability for workers. These changes in labour regulations have particularly impacted migrant populations, who are often overrepresented in precarious and instable-non-standard employment arrangements. Nevertheless, a notable research gap remains regarding how employment instability specifically affects migrant fertility. For future employment and family policies to better support and cater for the growing migrant population, it is important to understand how employment instability influences their childbearing decisions. Therefore, the aim of this study is to investigate whether employment instability has a differential effect on the fertility of Swedish-born individuals, migrants, and their descendants. Using event-history analysis on Swedish total population register data, the effect of different employment trajectories among native Swedes, different migrant origin groups, and their descendants on first birth will be analysed. Additionally, the study will look at the differences in gender patterns between these groups. Following the Narrative framework, the instability of employment and income is expected to limit future planning and the creation of a stable life narrative. The short-term effect of employment and income instability on fertility is generally expected to be negative, consistent with much of the existing literature. Nevertheless, existing empirical evidence suggests that migrant fertility does not respond as negatively to labour market and income uncertainties as the fertility of native-born individuals. Instead, the negative effect of employment and income uncertainty has been found to be weaker or, in some cases, reversed for migrants, despite migrants experiencing heightened vulnerabilities on the labour market. Therefore, I expect to find varying effects of employment instability for migrants and natives, and that this will depend on migrant origin, reason for migration and gender.

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## **The Reasoning Behind Young Women's Choice not to Have Children**

*Karoline Juul Lunde*

Co-authors: *NA*

The aim of this study is to explore the underlying factors behind the desire not to have children among young women. In Norway, there is a prevailing view that wanting and having children is a universal desire. Investigating how women without such desire see their stance in relation to social norms is therefore of high relevance. Through ten semi-structured in-depth interviews with women aged 26-33 who have actively decided not to have children, the study gained insight into their reality and life choices through their subjective experiences and perspectives. Their narratives reveal not only personal preferences but also insightful reflections on societal expectations. Utilizing individualization theory and a normative perspective, the main findings is that the informants' desire not to have children is linked to an active and deliberate choice. The ability to choose a lifestyle characterized by freedom and flexibility, which aligns with their self-identity, is essential. Thus, identity and the ability to follow one's own voice are significant aspects of the decision not to have children. The women also express motivations rooted in a need for control and concerns, alongside broader societal factors like global uncertainty and heteronormativity. However, these seem to be underlying reasons and justifications for an already established choice. Overall, the young women perceived the desire not wanting children as going against the norm, but the value of being able to choose for themselves outweighs any potential downsides associated with breaking the norm. They prefer to avoid the risks associated with a lack of control over various life factors, believing it's better to, in this context, regret something not done than something done.

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## **The Unaccompanied Minors of 2015 and their Current Status in Sweden**

*Karin Lundström*

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In 2015, over 35 000 unaccompanied minors sought asylum in Sweden. These children, under the age of 18, arrived without a parent or guardian. A study conducted in 2023 found that by the end of 2022, around 20 000 of them had been granted residence permits and were registered in Sweden. Approximately 13 000 of them received residence permits as unaccompanied minors, while around 7 000 were granted permits under a temporary law, the Upper Secondary School Act (gymnasielagen). This law allowed young people whose asylum applications had been rejected or who had turned 18 to

stay in Sweden to study at the upper secondary level. The Upper Secondary School Act has gradually been phased out and after January 20, 2025, it is no longer possible to apply for permanent residency under this law. Both groups predominantly consist of boys with Afghan citizenship. Among those granted residency as unaccompanied minors, 87% are boys, and 98% of those who received permits under the Upper Secondary School Act are boys. A majority are born in 1999, leaving a clear mark on Sweden's population pyramid. Many who received residency as unaccompanied minors were granted permanent residence permits when they were granted asylum. By the end of 2022, about 40% had become Swedish citizens. Those under the Upper Secondary School Act could obtain permanent residency if they found employment after completing upper secondary school. By the end of 2022, a majority had completed upper secondary education and around 80% were employed. At that time, around half of them had permanent residency in Sweden and many of those with temporary permits were likely in the process of applying for permanent residency. A second follow-up study will be made when data for 2024 are available to find out how many who have been granted permanent residency and how many have left Sweden.

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## **Moving Between Municipalities in Sweden**

*Li Ma*

Co-authors: *NA*

This study explores the trends and patterns of cross-municipality migration in Sweden during the period 2014–2023. Data used for analysis come from the Swedish register data. In this study we analyze: 1) cross-municipality net migration for each municipality group by age, household type and occupation; and 2) migration flow between municipalities. Changes of trends and patterns before, during, and after the pandemic years receive special attention. Four of the nine municipality groups, such as large cities, have had negative net migration throughout the entire observation period. The net migration for large cities was unusually negative during the pandemic years 2020–2021. Three municipality groups, such as medium-sized towns, have had positive net migration during the observation period. In the remaining two municipality groups, the net migration shifted from negative to positive during the pandemic years 2020–2021. It is worth noting that the

net migration in 2020–2021 was notably positive in commuting municipalities near medium-sized towns as well as small towns. The notably negative net migration in large cities during the pandemic period was mainly driven by individuals aged 31–69 years, living in households with children and working as managers or in occupations that requires higher education. These individuals had more opportunities to work remotely during the pandemic compared to those in other occupations. Interestingly, the notably positive net migration during the pandemic in less-populated municipalities such as small towns, was contributed by individuals with similar characteristics. If the submission is accepted, the cross-municipality net migration in different municipality groups, the migration flow between municipalities, the changes in migration patterns around the pandemic period in university municipalities, and the proportion of returning migrants will be also presented at NDS 2025.

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## **Subjective Well-Being Across Partnership Types in Eastern Versus Northern Europe**

*Leen Rahnu*

Co-authors: *Linda Kridahl, Allan Puur, Jani Turunen*

Relying on data from two rounds of GGS and applying a multivariate linear regression model with country fixed effects, we explore the association between subjective well-being and various partnership types in Eastern versus Northern Europe in the 2000s and the 2020s. Our main explanatory variable, partnership type, distinguishes between married, cohabiting, LAT and single individuals. Subjective well-being is measured via life satisfaction and happiness on one hand, and self-rated health, and loneliness on the other hand. The primary assumption is that having a partner is positively associated with subjective well-being as suggested in previous research. Less is known to what extent the association is modified by different types of partnership (married, cohabiting, LAT) and societal context. It is plausible that disparities in well-being across partnership types have increased between the 2000s and 2020s as a result of various crises and rising overall uncertainty hitting harder those living alone and in less committed relationships. Based on this reasoning we expect to observe more pronounced gaps in well-being between partnership types in countries with less advanced social protection and in countries where non-traditional partnership forms such as cohabitation and LAT are a relatively new phenomenon. In contexts where single living

is increasingly common, however, this choice of life may not necessarily stand for higher vulnerability anymore.

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## **Distance Work and Migration: Evidence from Young Families in Sweden**

*Linda Randall*

Co-authors: *NA*

Previous research has noted declining rates of interregional migration among young families in Sweden since the 1970s. This has been linked to the rise of dual-income households; the rationale being that migration possibilities are more constrained when a family is tied to place by two jobs, as opposed to just one. This effect is particularly relevant to those with higher levels of education, as the relative importance attached to career aspirations is expected to be reflective of the time invested. In this context, this paper uses Swedish register data to explore the extent to which increased opportunities for distance work in many professions since 2020 have resulted in a subsequent increase in longer-distance internal migration (>50 km) among young families. Migration propensity is calculated for all dual-income, cohabiting couples in Sweden with at least one child (<13 years) during two time periods – 2016-2019 and 2020-2023. The potential for distance work is calculated based on a framework which uses information about the work tasks of employees in different sectors to determine whether or not a job can (theoretically) be performed from a distance. Following this, regression analysis is used to discern whether families with at least one partner employed in a sector with distance work potential were more likely demonstrate increased migration propensity in 2020-2023 than those families without distance work potential. In order to understand the extent to which any effects observed are specific to young families, or are more general implications of increased distance work, comparisons are also made between families with distance work potential and those with distance work potential in other demographic groups (e.g., couples without children, single people). Finally, the spatial structure of moves is analysed in order to understand the implications of the results across different geographical contexts (e.g., urban, rural, etc).

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## **Impact of the COVID-19 pandemic on cohort life expectancy**

*Silvia Rizzi*

Co-authors: *NA*

Background: During the COVID-19 pandemic, period life expectancy at birth declined from 2019 to 2020 in most of the Western countries. Males experienced the largest losses, e.g., 2.2 years for males in the USA. Reductions were mostly attributable to an excess mortality above age 60 years and to COVID-19 deaths. Objective: To estimate the changes cohort life expectancy associated with the COVID-19 pandemic. Setting: High income countries with high quality and complete mortality data. Data: All-cause death counts retrieved from the Human Mortality Database. Method: A novel forecasting method to forecast cohort mortality and the cohort life expectancy of non-extinct cohorts based on a penalized composite link model is applied to data pre- and post- the COVID-19 pandemic. Prediction intervals are computed via a bootstrapping procedure. Outcome: Changes in cohort life expectancy due to the COVID-19 pandemic are estimated as the difference between expected cohort life expectancy using data up to and including 2019 and expected cohort life expectancy using data from 2022 onwards.

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## **Couple Formation by Mother Tongue of Immigrants in Finland 1987-2023**

*Jan Saarela*

Co-authors: *Caroline Ugglä*

To understand with whom immigrants form a union is of great interest in many societies as it sheds light on intermarriage, fertility patterns, integration prospects and the future of the resident population. In Europe, homogamy of partners increased on traits like age and education during the 20th century, while in contrast, the likelihood that partners differ with respect to origin country, increased. In Finland, immigration happened comparatively late, with significant immigration only in the past three decades. Hereto, we have no comprehensive knowledge of the partner choice from the perspective of immigrants in Finland. To fill this gap, we use Finnish register data on all individuals who immigrated 1987-2023, and combine them with information on the registered unique mother tongue of both the ego and the residing partner.

The setup adds a different dimension to the partner choice literature, which often explore inter-ethnic partnerships solely based on country of birth. In the analyses, we are able to examine partner choice among three distinct categories of immigrants: i) those who arrived with their partner, ii) those who arrived as singles, and iii) those who arrived as children (the so called 1.5 generation) and formed their first union in Finland as adults. Preliminary analyses among all the foreign-born immigrants (N=640,016), show that, as observed recently after arrival, there is a significant decrease over the study period in the likelihood that migrants live together with a partner (from about 70% to 30%). We are particularly interested in how male and female immigrants of different language groups form unions with native Finnish and Swedish speakers, and with other immigrants by their mother tongue. We discuss and relate any patterns that emerge with previous demographic evidence from other countries, along with sociological theories on union formation.

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### **Socioeconomic Disparities in Couples and Transitions to First Birth During the Fertility Decline of the 2010s**

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Over the past decades, women's education has started to outpace men's in almost all post-industrial countries (Van Bavel, 2012). Due to the lack of information on cohabiting couples, research on the impact of educational dissimilarity between partners has often focused on married spouses and parents (Kalmijn, 1998; Dribe & Stanfors, 2010; Nitsche et al., 2020). In Sweden, register information on childless cohabitants only became available in 2011. There is yet no research on how socioeconomic (SES) dissimilarity between cohabiting partners impacts their transition to first birth, which has been the parity transition driving the fertility decline in the 2010s in Sweden and many other Western countries. The reversal of the educational gender gap in society also affects the educational pairings within couples. In 2005, 29% of highly educated married women in Sweden were married to a man with lower education, making Sweden a forerunner in the development towards reversed couple heterogamy (Domański & Przybysz, 2007). Despite the increasing gender gap in education in the recent cohorts that have produced the sharp



drop in fertility since 2010, there are no studies on how educational and income dissimilarities within cohabiting couples have impacted family formation during this period. To assess the extent to which increased heterogamy among cohabiting couples has contributed to recent fertility developments, we first focus on whether the share of heterogamous cohabiting couples has changed during the 2010s. Secondly, we assess how different types of socioeconomic heterogamy have been related to first birth hazards in Sweden between 2011 and 2023. To address this issue, we use register data from Statistics Sweden for all individuals of childbearing age in Sweden during the period in question. This data allows us to determine changes in cohabitation, income, education and a number of potentially confounding factors for the couple on a yearly basis and make it possible to apply hazard models to determine how the risk of first births covaries with the degree of heterogamy within the union.

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## **Understanding end-of-life multimorbidity: An analysis of Multiple Causes of Death in Denmark**

*Cosmo Strozza*

Co-authors: *Elizaveta Ukolova, Marie-Pier Bergeron-Boucher*

The process leading to death is often complex, involving numerous health risks and diseases over a lifespan. Ultimately, death is attributed to a single underlying cause, defined as the condition that triggered the sequence of events resulting in death. While valuable for identifying key health threats, focusing solely on the underlying cause offers a limited view of the broader morbidity process leading to death. Multiple causes of death (MCoD) data, which capture all contributing conditions, provide a more complete understanding of mortality risks. In this study, we investigate the reliability of MCoD data and whether they accurately reflect health conditions near death. Combining the Population and Death Danish registers with the Chronic Diseases and Severe Mental Disorders and Cancer registers, we trace diagnoses from specific diseases, such as cancer, chronic obstructive pulmonary diseases, and dementia, and examine (1) time between diagnoses and death, (2) how often these causes are recorded among MCoD by number of year since diagnosis, and (3) what role they played: underlying, immediate, intermediate, or contributory cause. The analysis is conducted by age, sex, and over as many years as the registers allow. We expect cancer to be more frequently recorded as the

underlying cause when diagnosed near death, while COPD and dementia, as chronic conditions, may appear more often as contributory causes. The findings will enhance our understanding of end-of-life multimorbidity patterns, reveal potential inconsistencies in cause-of-death registration, and assess the quality of Danish MCoD data. It provides essential insights for public health policies aimed at improving longevity and quality of life.

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### **Bridging Morbidity and Mortality: Analysis of Mortality by Disability and Interrelated Causes of Death using Czech Administrative Data**

*Elizabet Ukolova*

Co-authors: *NA*

Morbidity over a lifetime increases frailty, meaning that individuals with chronic diseases have different mortality risks than the general population. This study examines mortality disparities by morbidity and causes of death in subgroups by chronic conditions. We use data from the Czech Health Registry for the period 2014-2024. Results show that individuals with diabetes or COPD, without additional comorbidities, have a remarkably long lifespan of nearly 90 years. As the number of comorbidities increases, life expectancy declines sharply—on average by 8 years per additional condition. These effects vary depending on which diseases cooccur. In general, the life expectancy among individuals with less than 4 diseases has stagnated or even declined during 2014-2023, except for neoplasms. Only a small proportion of people die directly from the chronic conditions they have at the end of their lives. In conclusion, the probability of death varies significantly across populations with (multi)morbidities, and in Czechia, people often do not die from the diseases for which they are being treated at the end of their lives. The accumulation of diseases leads to rapid decline in life expectancy in Czechia.

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### **School Performance and Inequalities in Family Formation: a Population-Wide Register-Based Study from Norway**

*Jonathan Wörn*

Co-authors: *Martin Flatø, Øystein Kravdal*

Educational inequalities in family formation, particularly in entering partnerships, maintaining stable relationships, and becoming parents, are widely documented. Most research, however, focuses on completed educational attainment as a predictor. This study examines (1) to what extent early educational performance, specifically lower secondary grade point average (GPA), predicts family formation patterns, and (2) to what extent GPA explains family formation differences by educational attainment. Using Norwegian individual-level population-register data from birth cohorts (1985-2000), we analyzed approximately 750,000 individuals aged 18-33 years in 2018. Data collected included GPA at age 15, highest educational attainment, dates of union formation and dissolution, and childbirth dates. Survival models assessed risks of first union formation, union stability, and first childbirth while family-fixed effects models accounted for shared family factors. Preliminary findings reveal a gendered pattern: women with lower GPAs are more likely to enter unions in their early twenties, whereas for men, GPA-based differences in union formation emerge only after the mid-twenties. Union stability is lower for those with the poorest school performance. Initially, lower GPA correlates with higher parenthood risk; however, differences considerably diminish by the thirties. At the conference, updated analyses extending to age 39 will be presented, allowing better coverage of the life-phases relevant to family formation. We will also present results on the extent to which GPA accounts for family formation differences by educational attainment. Using unique data on school performance to examine early life origins of educational inequalities will add nuance to scientific and public debates on inequalities in family behavior.

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### **Religion and Gender-Typical Educational Choice: Evidence from Finnish Population Register Data**

*Wei qian Xia*

Co-authors: *Catherine Bowen, Vegard Skirbekk, Jan Saarela*

Despite numerous initiatives to decrease gender segregation in education, men and women continue to pursue different fields of study. Based on the associations between religiosity on the one hand and attitudes about gender and traditional values on the other, we examine whether being affiliated with a

religion and/or living in a more or less secularized community at age 17 is associated with the pursuit of gender atypical fields of study (i.e., studying STEM subjects for women; studying education, health/welfare for men). Based on multilevel regression analyses of Finnish administrative data of native-born men and women born between 1954 and 1975, we find that being unaffiliated at age 17 as well as the proportion of unaffiliated persons in one's community of residence at age 17 are both weakly related to the pursuit of gender atypical fields of study at both the upper secondary and tertiary levels. We conclude that a secular upbringing is related to a greater willingness to cross traditional gender boundaries in education.

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## **Family and Socioeconomic Differences in Height in Sweden 1967-2007**

*Ingrid van Dijk*

Co-authors: *Dribe van Dijk*

More recent Swedish cohorts are taller but do differences by their socioeconomic background persist? In this paper, we study social inequalities in birth cohorts of young men in their stature, from the conscript register. We also address inequality in a select group of women's stature using medical birth registers. Results show that there is a strong social gradient in stature that persists in the studied period, with boys whose fathers have a non-manual occupation taller than boys from skilled and unskilled manual worker backgrounds. The socioeconomic background of the family affects stature of boys up until 2007 (birth cohort 1989) when the conscription army was abandoned. We find no evidence for stronger similarity between brothers among the highest socioeconomic classes, however. We address the role of childhood adversity – poverty, sickness and bereavement in the family – in shaping these differences, and address the interaction with social mobility.

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